EXPERIMENTAL SLOT FILM COOLING EFFECTIVENESS MEASUREMENTS FOR VARYING INJECTION ANGLES IN ACCELERATING AND NON-ACCELERATING FLOWS

by

BRUNO PHILIPPE MEHLMAN

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Submitted to the Department of Mechanical Engineering
on February 1, 1990 in partial fulfillment of the
requirements for the combined Degree of Bachelor and
Master of Science in Mechanical Engineering

ABSTRACT

A parametric study is performed to investigate the effects of slot injection to mainstream flow angle on adiabatic film cooling effectiveness for an accelerating and non-accelerating mainstream flow. Five different injection angles are investigated (α = 0.0°, 5.0°, 8.5°, 11.5° and 15.0°). The accelerating mainstream flow test is performed with the 8.5° injection angle configuration. Acceleration factors at the slot breakout location are equal to Ka = 5.7-7.5 10^{-6}. Correlations are realized for the film effectiveness (η) in terms of the non-dimensionalized downstream distance (x/Ms). An optimum injection angle equal to 8.5° is observed for (x/Ms) values less than 60. Lower film effectiveness values are observed when acceleration is introduced into the mixing region. A numerical study using FLUENT is performed for a two-dimensional slot configuration with tangentially injected coolant into a mainstream flow. Computational results indicate a much higher increase in effectiveness values as a function of mass-velocity ratio compared to the experimental results.

Thesis Supervisor: Prof. Bora Mikic
Title: Professor of Mechanical Engineering

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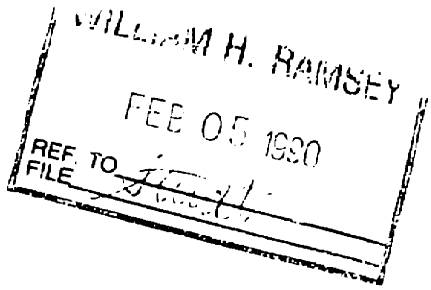

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NOMENCLATURE

h	=	local heat transfer coefficient
H	=	mainstream plenum height
k	=	thermal conductivity
Ka	=	acceleration parameter $(\upsilon/U^2)(\partial U/\partial x)$
m	=	air mass flow rate
M	=	mass-velocity ratio $(\rho U)_c/(\rho U)_g$
q	=	heat flux
Re_x	=	Reynolds number (U x /ν)
s	=	injection slot height
t	=	injection slot lip thickness
T	=	temperature
x	=	distance downstream from slot
U	=	velocity
W	=	mainstream plenum width
w	=	injection slot width
α	=	injection angle
η	=	film effectiveness $(T_g - T_{aw})/(T_g - T_s)$
υ	=	kinematic viscosity
ρ	=	density

Subscripts

aw	=	adiabatic wall value
f	=	film
s	=	property value at injection slot conditions
g	=	property value at mainstream air conditions

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I. Introduction

I.1 The Need for Advanced Cooling Techniques in Gas Turbines

In today's advanced gas turbine engines, the limits of operating temperatures are continually pushed higher in order to meet present and future performance requirements for jet engines. In fact, typical gas turbine operating temperatures are much greater than the allowable metal temperatures of turbine airfoils. As a result of the increase in turbine inlet operating temperatures, the need for a better understanding of current cooling methods in the hope of developing more effective state-of-the-art cooling techniques applied to turbine airfoil design has become a necessity. Some of the common methods of providing thermal protection to the airfoil are based on complex applications of internal convective cooling, impingement cooling and external film cooling using slot or hole injection configurations. A typical airfoil incorporating the above mentioned cooling techniques is shown in *Figure 1-1*.

In the blade or vane cooling process, compressor bleed air is introduced into the hollow core of the blade and is channeled through complex serpentine passages. The surface of the internal passages are roughened with turbulence promoting devices located at discrete positions to increase the internal heat transfer coefficients between the blade's surface and the internal cooling air. The channeled air is then ejected out the blade via rows of holes strategically located at the leading edge and at multiple locations along the blade's convex and concave surfaces. The exiting coolant is used to convectively cool the surfaces, especially in regions of high heat fluxes, by reducing the source the source gas temperature next to the external surface. This external convective process is called film cooling.

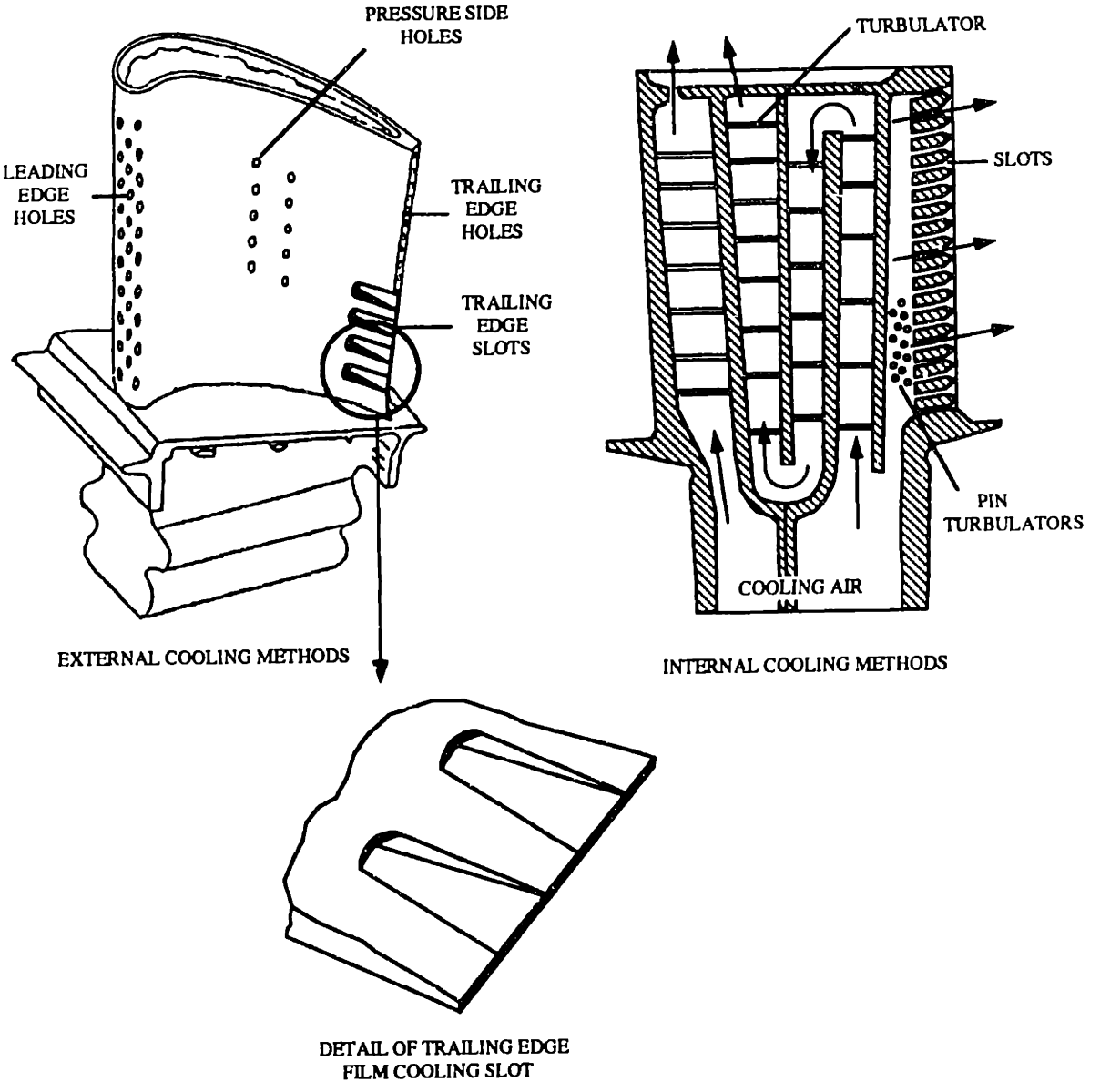

Figure 1-1: Typical turbine blade internal and external cooling features

I.2 Film Cooling Applied to Gas Turbine Airfoil Designs

Film cooling has become a widely used cooling technique as a means of protecting solid surfaces exposed to hot gaseous environments. Typically, relatively cool air is injected into the boundary layer on the surface to be protected, thereby creating an insulating layer (film) between the surface and the hot gaseous stream flowing over it. To be effective, film cooling must provide acceptable metal surface temperatures as well as a reasonably uniform temperature distribution over the blade's surface to limit thermal stresses as a result of large temperature gradients. Uniform and effective film cooling is accomplished by injecting coolant air at various locations along the blade's surface. Multiple film cooling holes are used in a showerhead configuration to cool the blade's leading edge surface. Single or multiple rows of injection holes are also located on the blade's concave and convex surfaces. The blade's trailing edge is film cooled by ejecting air through holes or rows of slots on the concave surface near the trailing edge. This life limiting area, subject to the highest thermal loads on the blade's surface, is of primary importance. Improvements in the predictive capability of the cooling requirements have significant payoffs in terms of enhanced turbine life, development cost, and turbine engine performance.

I.3 Previous Work

Much research has been devoted to the topic of film cooling and there exists a considerable amount of experimental data for air-to air film cooling for different slot geometries and various primary and secondary flow fields. A comprehensible survey of film cooling was performed by Goldstein [1] and the information presented in the following paragraphs draws heavily from this reference with an emphasis placed on experimental results obtained for

adiabatic film effectiveness for two-dimensional slots configurations which could be applied to predict airfoil pressure side trailing edge film cooling.

Convective heat transfer associated with film cooling is determined by using a film heat transfer coefficient h_f and an adiabatic wall or film temperature T_{aw} as described by Goldstein [1]:

$$q_f = h_f (T_w - T_{aw}) \tag{1}$$

where T_w is the local wall temperature. Since the adiabatic wall temperature is not only a function of the slot injection geometry and the primary and secondary flow fields but also the temperatures of the two gas streams, it is convenient to define a dimensionless adiabatic wall temperature η, called film cooling effectiveness, in term of T_{aw}. For low speed constant property flow the film cooling effectiveness is given by:

$$\eta = \frac{T_g - T_{aw}}{T_g - T_s} \tag{2}$$

where T_g is the mainstream gas temperature and T_s is the secondary or cooling injection gas temperature. Thus, the film cooling effectiveness η varies from unity at the point of injection where $T_{aw} = T_s$ to zero far downstream from the slot where the adiabatic wall temperature approaches the mainstream gas temperature due to the mixing between the injected fluid and the mainstream. Both h_f and η must be known and both depend at least on the slot injection geometry, the coolant-to-mainstream mass-velocity ratio (M), and the distance (x) measured downstream from the injection slot. Then, for any given mainstream and coolant temperatures and a prescribed wall heat flux, the wall temperature distribution can be obtained using Eq. 1.

Most film cooling studies have primarily focused on the experimental determination of the adiabatic wall temperature distribution. Wieghardt [2] was the first to experimentally investigate film cooling for applications in de-icing of airplane wings. In Wieghardt's investigation, heated air was injected into a cold mainstream through a slot angled at approximately 30° relative to the mainstream wall. *Figure 1-2* presents Wieghardt's slot

configuration along with other investigated slot geometries. The resulting film effectiveness data was correlated according to the following relationship:

$$\text{for } x/Ms > 100 \qquad \eta = 21.8\ (\ x/Ms)^{-0.8} \qquad (3)$$

where (M) is the mass-velocity ratio defined below by Eq. 4 and (x/s) is the downstream distance non-dimensionalized with respect to the slot height (s).

$$M = \frac{(\rho U)_s}{(\rho U)_g} \qquad (4)$$

Hartnett, et al. [3], used the same slot geometry as Wieghardt's but performed film-cooling instead of film-heating measurements and reported a similar correlation but with a lower numerical constant:

$$\text{for } x/Ms > 60 \qquad \eta = 16.9\ (\ x/Ms)^{-0.8} \qquad (5)$$

Seban, et al. [4], conducted an experimental study on film cooling by injecting the secondary air flow both normally and tangentially to the main flow with a slightly different slot configuration than Wieghardt. For tangential injection with a small slot lip thickness (t), the following results were obtained:

$$\text{for } x/Ms < 40 \qquad \eta = 0.16\ Re_s^{1/3}\ (x/Ms)^{-0.25} \qquad (6)$$

$$\text{for } x/Ms > 40 \qquad \eta = 0.83\ Re_s^{1/3}\ (x/Ms)^{-0.7} \qquad (7)$$

where Re_s is the Reynolds number based on the slot height (s).

Seban [5] also studied film cooling effectiveness downstream of a stepdown slot with tangential injection and correlated his data at low blowing rates with the following relation:

$$\text{for } M < 1 \qquad \eta = 25\ M^{0.4}\ (x/Ms)^{-0.8} \qquad (8)$$

Chin, et al. [6], using a slot configuration similar to [4] have obtained values of the dimensionless adiabatic wall temperature for various injection rates. The correlation achieved for these data gives higher results than the data of Seban and Wieghardt:

$$\text{for } U_s/U_g < 1 \qquad \eta = 1 \qquad A < 15$$

$$\eta = 1.5\ A^{-0.15} \qquad 15 \le A \le 72$$
$$\eta = 12.7\ A^{-0.65} \qquad A > 72$$

$$\text{with} \quad A = (\rho_s/\rho_g)^{-0.5}\ Re_s^{-0.3}\ Re_L^{0.19}\ (x/Ms) \qquad (9)$$

for $1 < U_s/U_g < 2$

$$\eta = 1 \qquad B < 10$$
$$\eta = 1.41\ B^{-0.15} \qquad 10 \le B \le 60$$
$$\eta = 3.93\ B^{-0.40} \qquad B > 60$$

$$\text{with} \quad B = (\rho_s/\rho_g)^{-1.5}\ Re_s^{-0.3}\ Re_L^{0.19}\ (x/s) \qquad (10)$$

where Re_L is the Reynolds number based on the hydrodynamic starting length (L).

Papell and Trout [7] reported film cooling effectiveness for tangential injection at large temperature differences between the free stream and the injected air. The slot configuration was similar to that of Seban. Several different correlations were proposed for the effectiveness for various ranges of mass injection:

for $\eta \le 0.73$, $M \le 2.0$ and $x/s > 14$ $\quad \eta = 12.6\ M\ (x/s)^{-0.72}\ (T_s/T_g)^{0.5}$

$x/s < 14$ $\quad \eta = 1.86\ M^{0.44}\ (x/s)^{-0.36}$

for $\eta > 0.73$, $M \le 4.0$ and $x/s > 18.6$ $\quad \eta = 1.15\ M^{0.18}\ (x/s)^{-0.11}$

$x/s < 18.6$ $\quad \eta = 0.83\ M^{0.18}$

Samuel and Joubert [8] measured effectiveness downstream of a tangential injection slot similar to Seban et al. [4]. The data was correlated as follows:

for $M<1$

$$M^{-1.75}\ x/s < 18 \qquad \eta = 1$$
$$18 < M^{-1.75}\ x/s < 600 \qquad \eta = 4.2\ (M^{-1.75}\ x/s)^{-0.5} \qquad (11)$$

for $M>1$

$$M^{0.375}\ x/s < 25 \qquad \eta = 1$$
$$25 < M^{0.375}\ x/s < 400 \qquad \eta = 3.0\ (M^{0.375}\ x/s)^{-0.35} \qquad (12)$$

Papell [9] also investigated the effects of injection angle on film cooling effectiveness and made measurements with angles of 45, 80 and 90° relative to the direction of the free-stream. The measurements were carried out with large temperature differences and with Mach numbers

mainly greater than 0.5. Sivasegaram and Whitelaw [10] measured film cooling effectiveness for a similar slot configuration as in [9] with injection angles 30, 60 and 90° relative to the direction of the free-stream. Both these investigations indicated a significant decrease in film effectiveness as the injection angle increases.

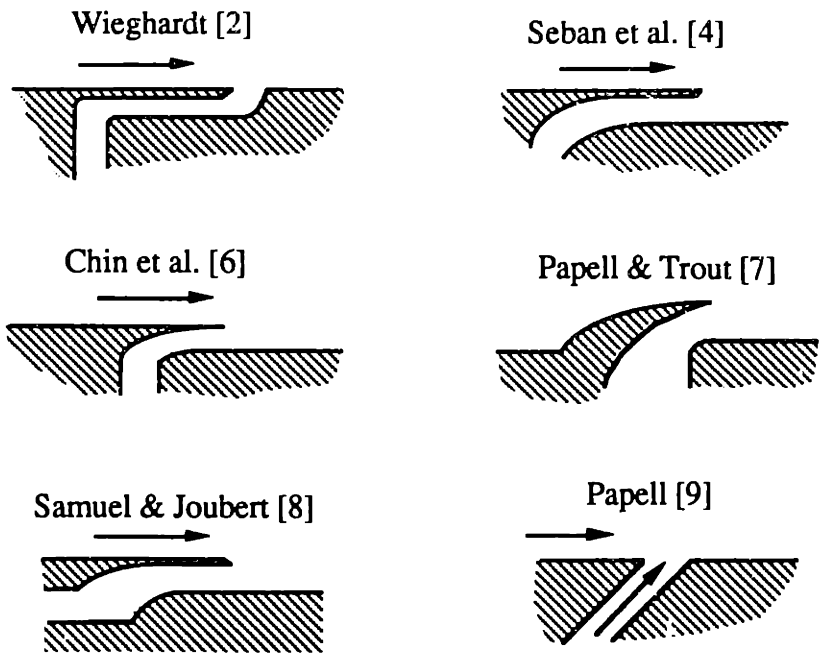

Figure 1-2: Slot configurations for air-to-air film cooling

I.4 Objectives of the Investigation

As discussed in the previous paragraph, most of the experimental studies on film cooling were investigations with tangential secondary air injection and with a single injection slot geometry. Typical turbine airfoils have a small trailing edge thickness for aerodynamic reasons and do not allow for tangential injection but instead the secondary film cooling air is injected at a discrete angle relative to the mainstream flow. Furthermore, for reasons of mechanical integrity, turbine airfoils have multi-slot configurations at the trailing edge with a

slot lip thickness representing in some cases an appreciable proportion of the slot height. Therefore, the film cooling correlations obtained from the previously mentioned investigations cannot be directly applied to airfoil designs. Most correlations can be applied at large distances downstream from the slot breakout location where the flow has reached a fully developed turbulent boundary layer velocity profile. However, for applications to turbine airfoils, the region of interest is just downstream of the slot breakout where a fully developed profile cannot be assumed because of the complex hydrodynamic flow structure. Therefore, there exists a need to quantitatively understand the geometric parameters pertinent to turbine airfoils which influence the effectiveness of film cooling.

The emphasis in this investigation is to study the effects of injection angles on film cooling effectiveness. Results are reported for five injection angles ($\alpha = 0^{\circ}$, 5.0°, 8.5°, 11.5° and 15.0°) spanning the typical jet engine operating range. The effect of accelerating mainstream flow on film cooling effectiveness is also investigated. These results will provide a further understanding and better utilization of airfoil trailing edge slot injection film cooling and will also generate a new data base for design engineers.

To check the predictability of film effectiveness a numerical study is performed using a commercially available finite difference program, FLUENT, developed by Creare Inc. (1985) [14]. A two-dimensional model of the experimental test rig for the case with tangentially injected secondary coolant into a non-accelerating mainstream flow is generated and the flow field as well as the temperature profiles are solved and effectiveness values are calculated and compared with the experimental results.

II. Experimental Program

II.1 Introduction

A 10X wooden scale model of a typical pressure side trailing edge slot configuration is designed and manufactured to study the effects of slot injection angles on film cooling effectiveness for accelerating and non-accelerating mainstream flows. Sizing of the model and determination of experimental operating conditions are based on values obtained for typical turbine airfoils. A comparison between experimental testing values and typical jet engine blade conditions is shown in *Table 1-1*. Since the objective of the investigation is to single out the effects of slot injection angle on film effectiveness, the experimental test rig does not account for rounded slots with tapered lands which is a more realistic model of a typical trailing edge film cooled geometry.

Details of the test apparatus will be discussed in this section as well as the test procedures and methods of data reduction. An error analysis is also included in this section.

II.2 Test Apparatus

Figure 2-1 shows a schematic diagram of the experimental apparatus. The apparatus consists of a main air supply, a secondary air supply, a test rig with a multi-slot test section and associated measuring instruments. A compressor station supplies the main and secondary air to the test rig. The compressed mainstream air is filtered, dried and directed through a air heater where its temperature is accurately set to desired levels. The air is then directed through a thin-plate metering orifice and into the test rig's mainstream plenum chamber.

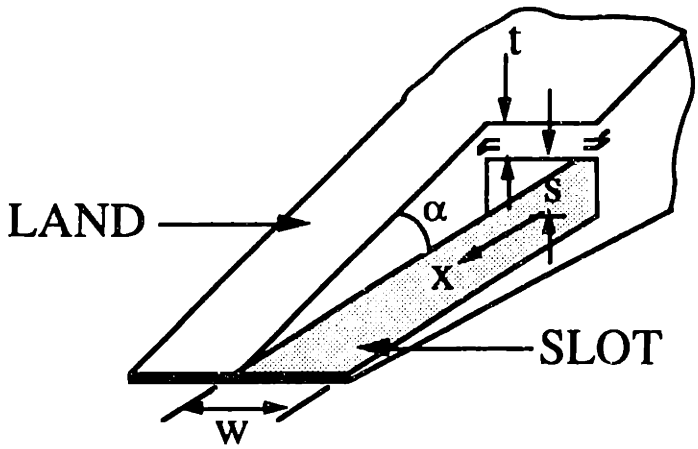

Table 2-1: Geometrical parameters and operating conditions

Typical turbine blade/vane (at slot breakout location)

α deg.	t/s	w/s	x_{max}/s	M	T_g/T_s	$Ka_{x=0}$ x 10^{-6}
5.0 - 15.0	0.5 - 1.25	5.00	10 - 20.0	0.5 - 1.3	1.2 - 2.2	0.6 - 10.0

Experimental test rig (at slot breakout location)

α deg.	t/s	w/s	x_{max}/s	M	T_g/T_s	$Ka_{x=0}$ x 10^{-6}
5.0 - 15.0	1.0	3.1 - 7.1	6.8 - 20.1	0.2 - 1.4	1.2 - 1.4	5.7 - 7.5

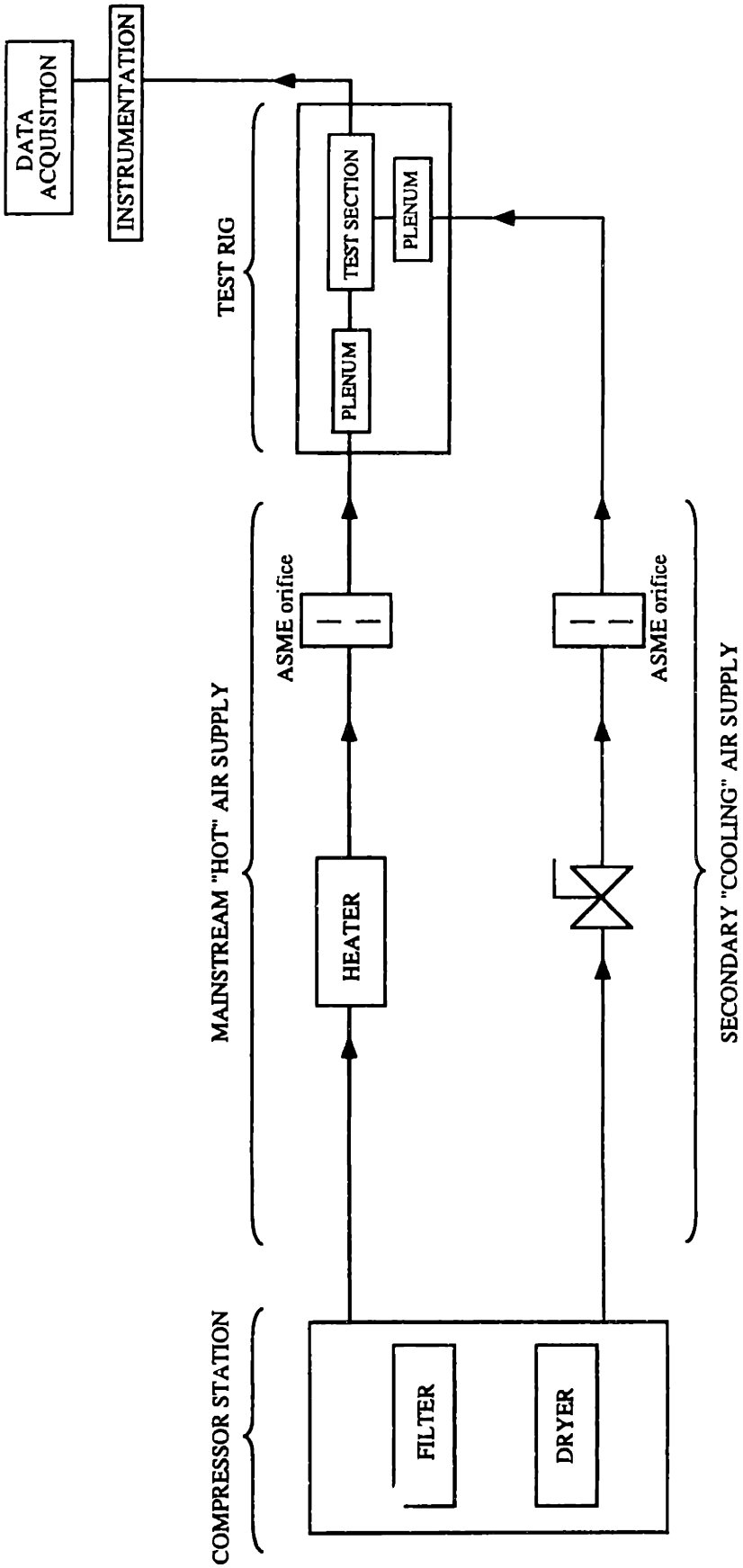

Figure 2-1: Schematic diagram of experimental apparatus

Similarly, the secondary or film-cooling air after being filtered and dried is routed through pressure and flow control valves, a thin-plate metering orifice and into the test rig's secondary plenum chamber.

The test rig used throughout the experimental investigation was manufactured out of maple wood and is shown in *Figure 2-2* . The filtered heated mainstream air is fed into the test rig's mainstream plenum via a 4 in. nominal diameter stainless steel pipe. The mainstream plenum consists of a diffuser section 3 ft. long with inlet dimensions 3 x 3 in. which diffuses to a straightening section 3 ft. long with inlet dimensions 11.65 x 3 in. The change in area of the diffuser section is a smooth transition in order to avoid flow separation and to obtain a uniform and parallel flow distribution prior to entering the test section. The secondary air passes through a plenum which also consists of a diffuser section inlet 1.5 ft. long followed by a straightening section 1 ft. long. The secondary or film cooling air is then channeled through nine parallel slots where further downstream of the slots it is injected into the mainstream flow.

Six different test section configurations were used for the experimental investigation. Originally, one test section was manufactured which corresponded to tangential injection of the secondary film cooling air into the mainstream. This configuration had been used previously to study the effects of the ratio of slot lip thickness-to-slot height on the adiabatic film effectiveness. The same test section is used in this study as a baseline case for tangentially injected secondary air.

The test section is designed as a separate module which in effect links the mainstream plenum to the secondary air supply plenum so that the coolant is injected into the mainstream via a multi-slot injection geometry. A cross sectional view along the length of the test section corresponding to this configuration is shown in *Figure 2-3a.* The entire test section was manufactured from maple, except for the slot lip plate which was made from fiberglass sheet. Wood was used as the material for the test section as well as for almost the entire test rig because of its low thermal conductivity and extremely good machineability. The slot lip plate, which separates the film-cooling air from the mainstream air prior to the slot breakout location,

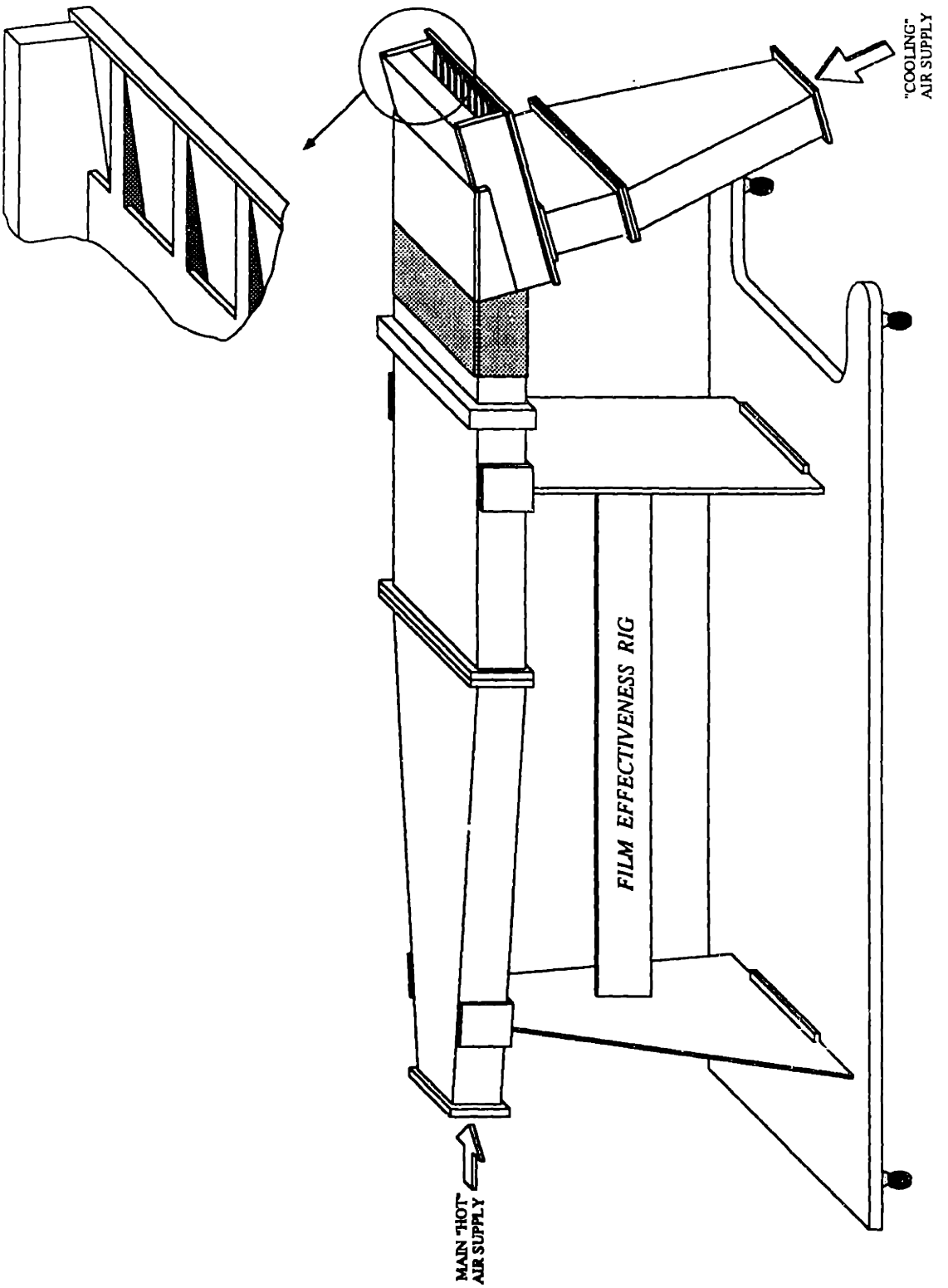

Figure 2-2: Detailed drawing of test rig (not to scale)

rests on eight wooden lands. Eight grooves were made into the 1 in. thick test plate to allow easy installation and removal of the lands and, thereby, testing of a range of geometric combinations. For the tangential injection configuration the slot height (s) is 0.25 in. and the slot lip thickness (t) is 0.25 in. Styrofoam insulation 2 in. thick is placed on the top and side walls of the test section and a 2 in. thick layer of uroethane foam was sprayed under the test plate to minimize heat losses to the surroundings.

To perform angled film cooling injection tests, four new lip plates, four sets of lands, and four adapter sections were manufactured corresponding to the four angles of injection (α= 5.0°, 8.5°, 11.5°, 15.0°). These new parts were made out of birch. A cross sectional view of a typical test section corresponding to this configuration is shown in *Figure 2-3b*. In order to maintain the lip thickness-to-slot height ratio (t/s) constant and equal to 1 for each tested configuration, the slot height varied as a function of the injection angle (α). *Table 2-2* summarizes the different values for test section geometrical parameters and operating conditions corresponding to each configuration.

For the test performed with an accelerating mainstream flow, the 8.5° slot injection angle configuration was used and a converging nozzle made from birch was placed at the exit of the test section (*Figure 2-3c*) in order to obtain a variation of the free stream velocity. The exact profile and dimensions of the converging nozzle are shown in *Figure 2-4*.

Table 2-2: Test section geometrical parameters and operating conditions

α deg	t in.	H in.	t/s	w/s	x_{max}/s	M	T_g/T_s	$Ka_{x=0}$ x 10^{-6}
0.0	0.250	2.93	1.0	5.00	16.00	0.2 - 1.4	1.24 - 1.31	0.0
5.0	0.175	2.98	1.0	7.14	22.86	0.2 - 1.4	1.22 - 1.26	0.0
8.5	0.299	2.90	1.0	4.18	13.38	0.2 - 1.4	1.25 - 1.30	0.0
11.5	0.407	2.90	1.0	3.07	9.83	0.2 - 1.4	1.24 - 1.29	0.0
15.0	0.536	2.93	1.0	2.33	7.46	0.2 - 1.4	1.28 - 1.33	0.0
8.5	0.299	2.29	1.0	4.18	13.38	0.2 - 1.4	1.32 - 1.37	5.7 - 7.5

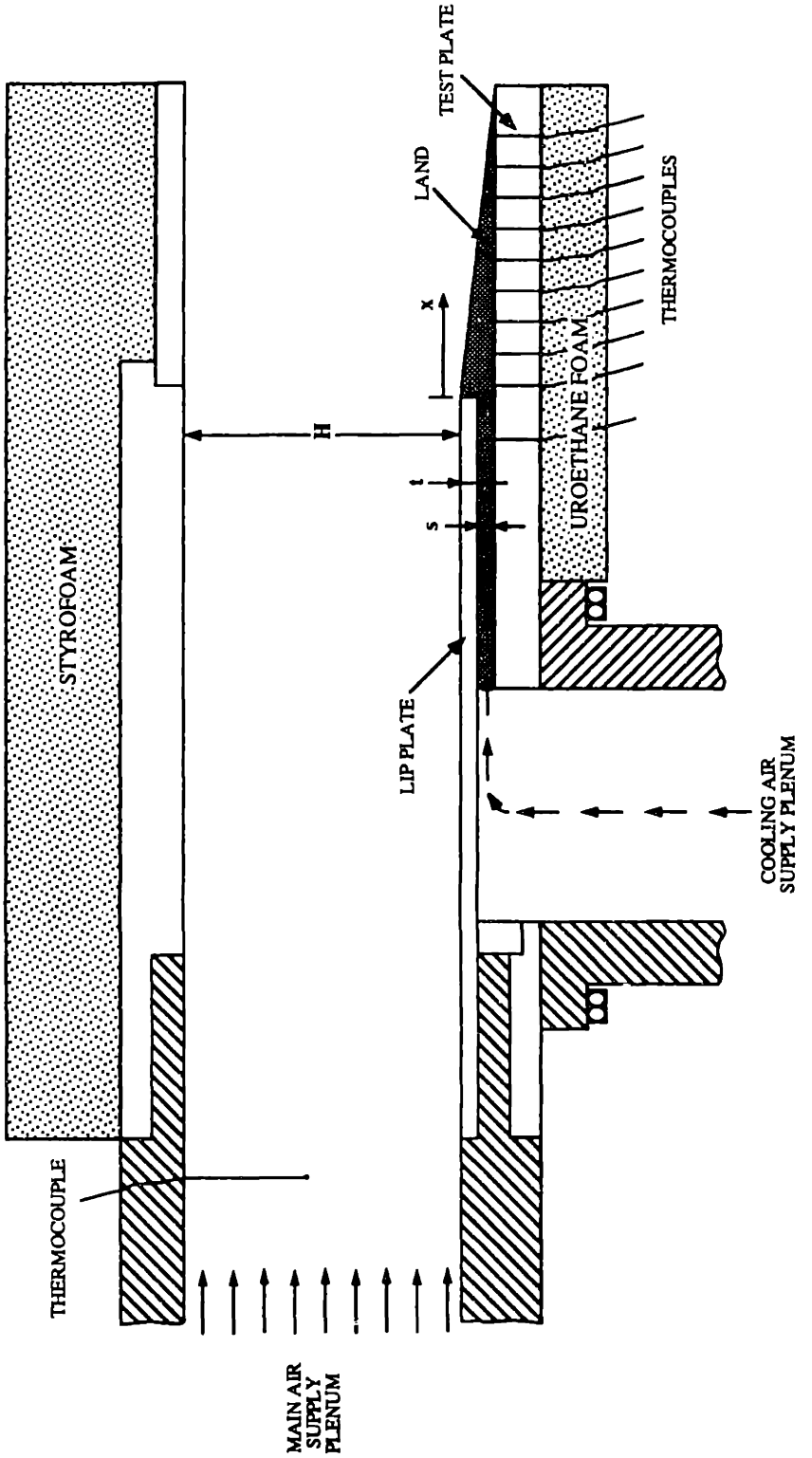

Figure 2-3a: Cross-sectional view of test section for tangential film cooling injection and non-accelerating mainstream flow

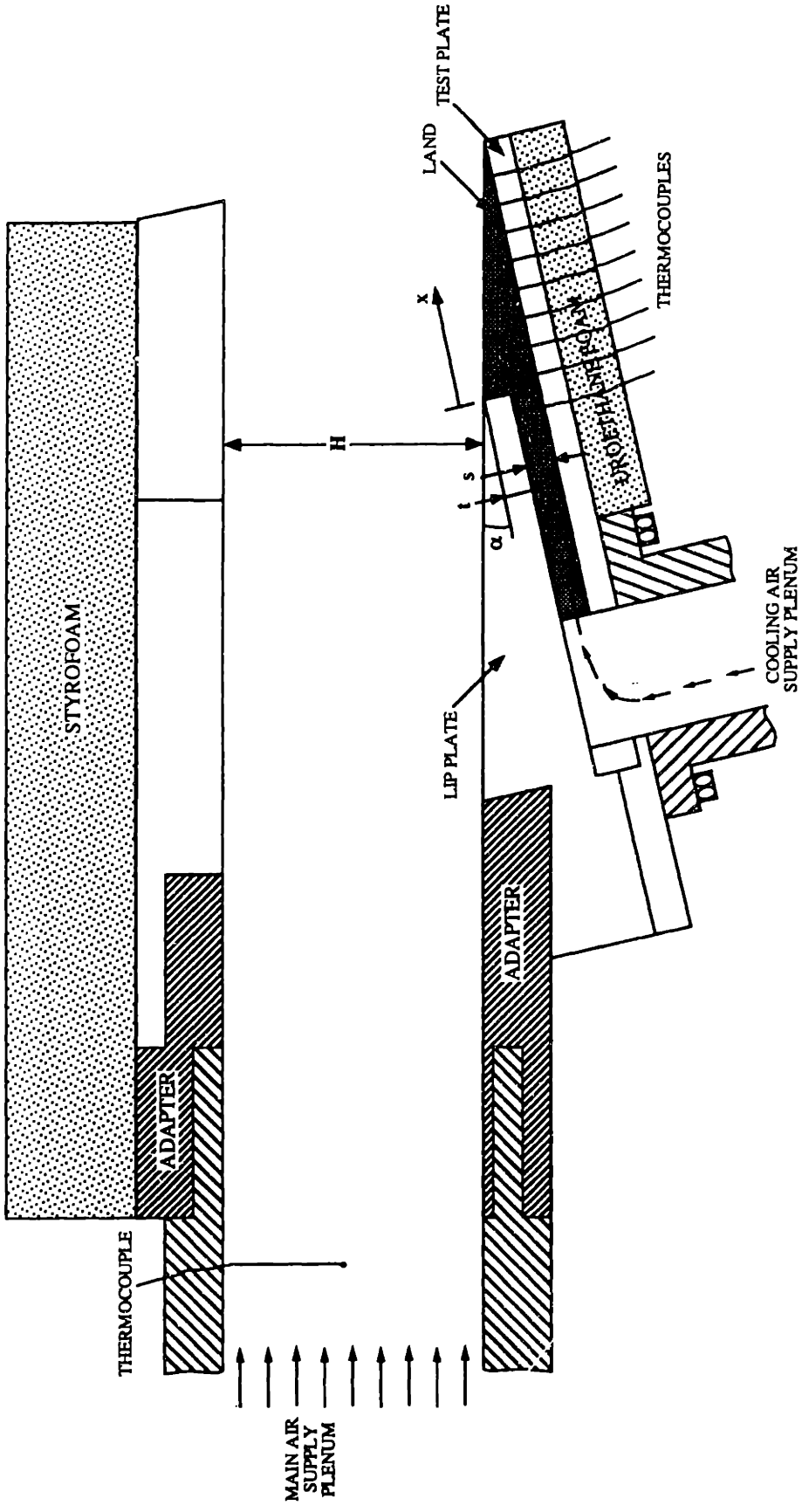

Figure 2-3b: Cross sectional view of test section for angled film-cooling injection (α= 5.0 , 8.5 , 11.5 , 15.0) with non-accelerating mainstream flow

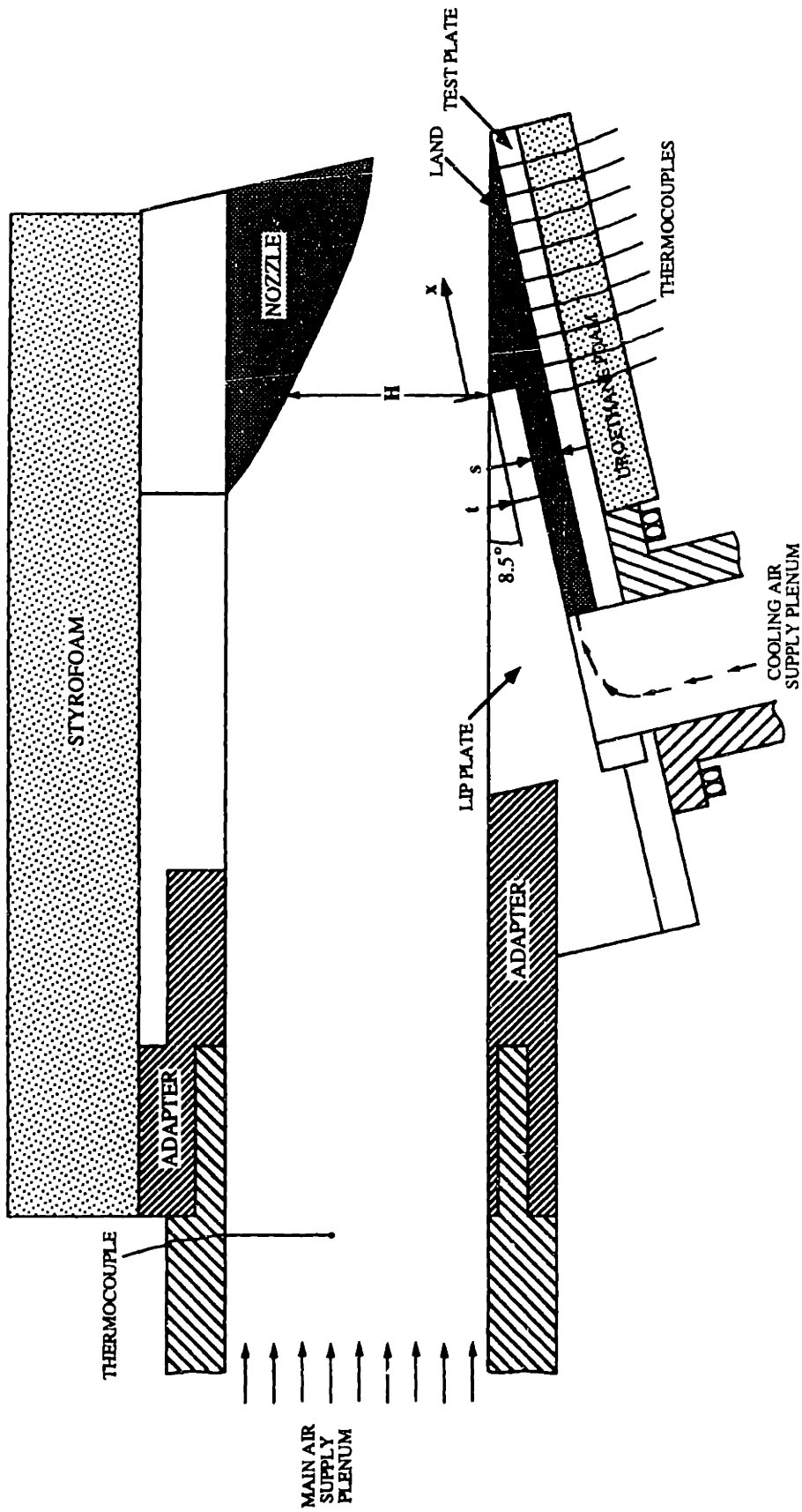

Figure 2-3c: Cross-sectional view of test section for angled film-cooling injection (α = 8.5) with accelerating mainstream flow

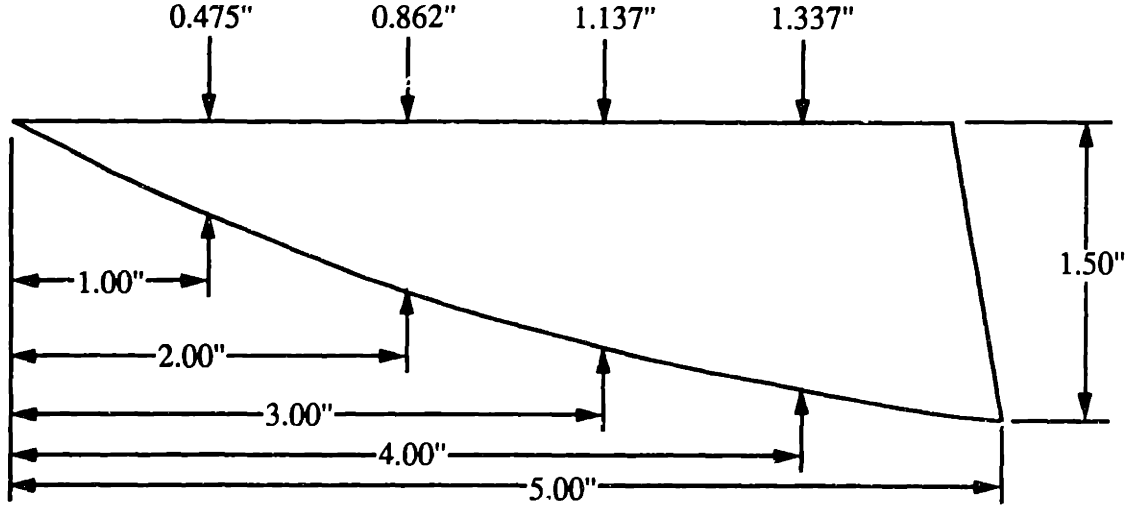

Figure 2-4: Nozzle profile for 8.5 degree injection angle and accelerating mainstream flow

Instrumentation of the test plate is identical for all tested configurations and is shown in *Figure 2-5*. Six columns of eight thermocouples placed 0.5 in. between each other with the first thermocouple placed 0.15 in. from the slot breakout. The thermocouples used are K-type Chromel-Alumel. The thermocouples were inserted into small holes drilled through the test plate such that the thermocouple bimetallic bead is flush with the surface of the test plate. The symmetry of the effectiveness distribution is investigated across the slots. The secondary film cooling temperature is measured at two different locations: at the midspan of slot #5 and slot #7 0.5 in. upstream of the slot breakout location. The mainstream air temperature is measured with three thermocouples evenly spaced across the width of the inlet section immersed into the air stream. In addition to measuring the temperature across the width of the slot, temperatures on the surface of the land located between slot #6 and slot #7 are measured for the case with the accelerating mainstream flow. Static pressure taps are also placed on the surface of the land located between slot #3 and slot #4. A total pressure probe is inserted in the mainstream to measure the total pressure upstream of the nozzle. Using Bernoulli's equation, assuming inviscid flow, average mainstream velocities are calculated based on the total and static pressure measurements. In turn the calculated velocities are used to evaluate the acceleration factor (Ka) defined as:

$$Ka = \nu_g \frac{dU}{U^2 dx} \qquad (13)$$

where ν_g is defined as the kinematic viscosity of the air evaluated at the temperature of the mainstream gas (T_g).

II.3 Test Procedure

The experimental tests are performed using General Electric's Component Test Laboratory in Building 70 in Lynn. Mainstream air was heated using a natural gas-fired burner and heat exchanger. For each run a standard procedure is employed in which all variables are

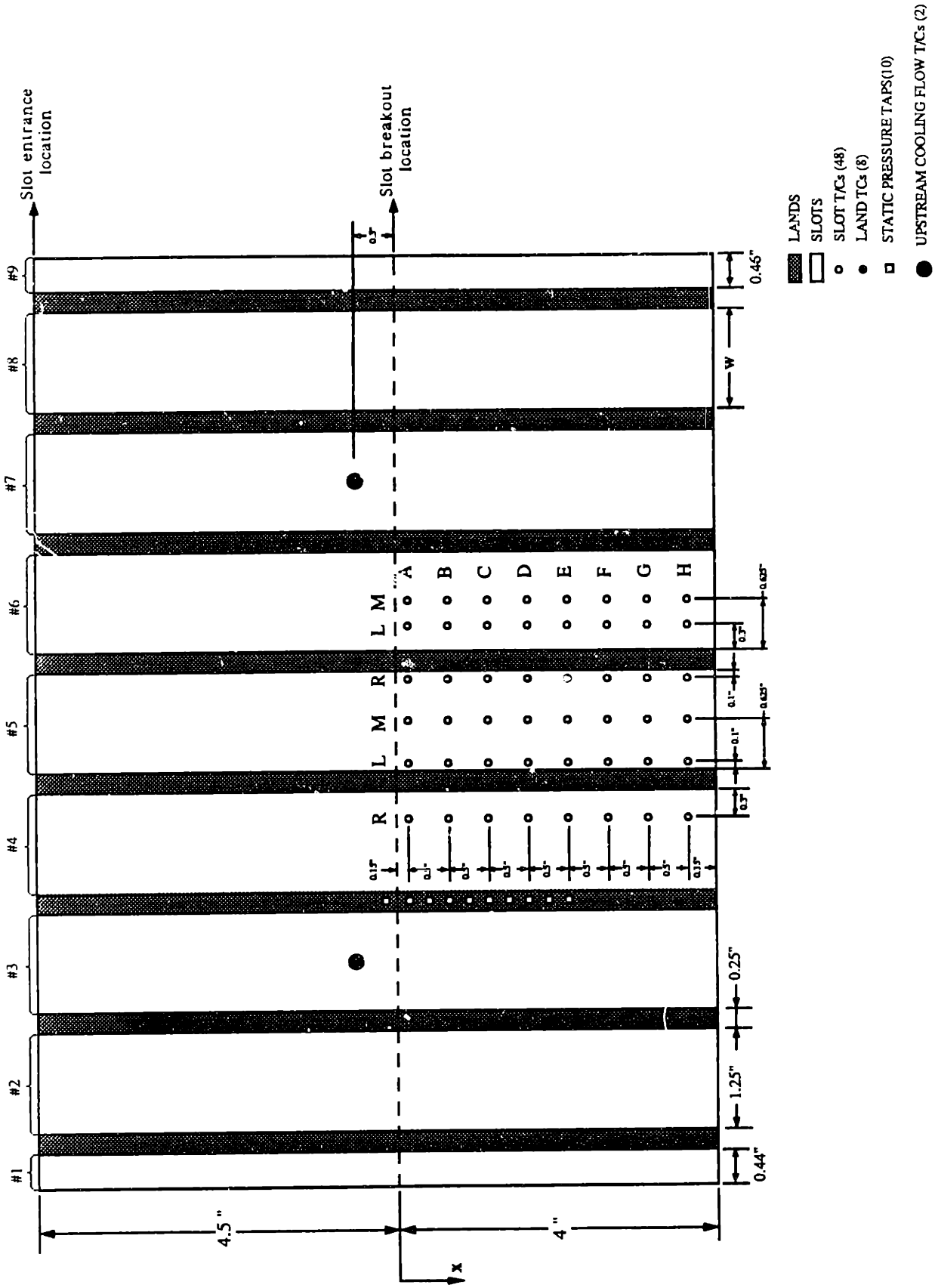

Figure 2-5: Test plate instrumentation

kept constant except for the mass-velocity ratio (M). The mainstream air temperature is set to 250 deg. F while the secondary film cooling air temperature varied depending on the outside ambient temperature and the test cell room temperature. The flow rates of the mainstream and secondary air are measured using thin-plate orifice meters in conjunction with flange taps, constructed according to the ASME Code Standards.

A typical test is performed as follows: the mainstream temperature is set to 250 deg. F and the mass flow rate at 1 lbm/sec. For the test with the converging nozzle the mainstream flow rate is set to 1.5 lbm/sec. The secondary flow rate is set such that the mass-velocity ratio is equal to approximately 0.2. At each mass-velocity ratio setting, sufficient time is allowed in order to obtain equilibrium conditions before the necessary pressures and temperatures are recorded. Equilibrium conditions are established by monitoring the transient output from a thermocouple located half way downstream of the slot breakout distance and in the middle of the slot. Once steady state is reached, thermocouple and total and static measurements are read and recorded. After sampling the data, the secondary cooling flow is increased until a satisfied mass-velocity ratio is obtained. The mass-velocity ratio varied from approximately 0.2 to 1.4. Having reached a value of 1.4 the same mass-velocity ratio settings are achieved by decreasing the secondary flow rate. This procedure is performed to investigate any hysteresis effect related to the test rig.

II.4 Data Reduction

Thermocouple and total and static pressure measurements output are read and recorded using a Motorolla 6800 high speed digital data acquisition system directly connected to a Honeywell H6000. In this manner data is acquired and reduced immediately.

When the system is operated and equilibrium conditions are established, the wall temperature measured by the surface thermocouples is taken as equal to the adiabatic wall temperature T_{aw}. Then the film effectiveness is evaluated directly from the experimental results

according to Eq. 2 described in the previous section. Because some heat is lost through the test plate due to radiation from the surface and transverse as well as axial conduction, an error is incurred in performing film effectiveness calculations based on the measured wall temperature instead of the idealized adiabatic wall temperature. The largest contributions to the heat lost to the environment come from the transverse conduction. From the definition of η, it can be seen that small errors arising from conduction through the test section plate and insulating uroethane foam can cause significant relative errors in η for small values of η. The conduction error is proportional to the difference between the surface temperature and the ambient temperature. These conduction errors are small for the results presented in this study in comparison with the uncertainty of temperature-recording instruments and the slight timewise variation of T_g and T_s. Accordingly, for these results, the test plate surface temperatures were taken as the adiabatic wall temperatures, with a maximum estimated error of 2 percent. A detailed calculation of the conduction error is given in Appendix A.

The reported effectiveness values are based on a weighted average of the film effectiveness calculated according to Eq. 2 based on measured surface temperatures. The effectiveness was reduced in three steps as follows:

(1) average effectiveness for increasing and decreasing values of blowing ratio:

$$\eta = \frac{\eta_{up} + \eta_{down}}{2}$$

(2) average effectiveness for symmetric columns of thermocouples (i.e. columns 4R and 6L):

$$\eta = \frac{\eta_{4R} + \eta_{6L}}{2}$$

(3) average effectiveness across width of slot at a given downstream distance from breakout:

$$\bar{\eta} = [\, 0.1\, \eta_{5L,5R} + 0.2 \frac{\eta_{5L\text{-}5R} + \eta_{4R\text{-}6L}}{2} + 0.325 \frac{\eta_{4R\text{-}6L} + \eta_{5M\text{-}6M}}{2} \,] / 0.625$$

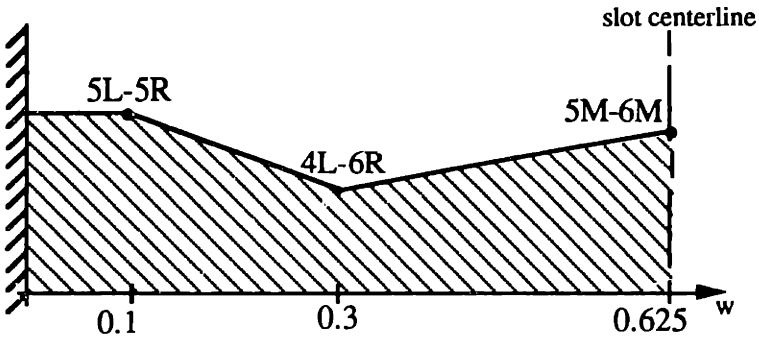

Figure 2-6: Weighted average of film effectiveness across slot width

A sample data reduction for the adiabatic wall temperature measurements for 8.5 degree injection angle is given in Appendix D.

II.5 Error Analysis

There is always a certain degree of experimental uncertainty resulting from the inaccuracy of the measuring devices. A brief discussion of the uncertainty of measurements and their effects on the experimental results is described in this section. Detailed calculations of these uncertainties are given in Appendix B.

II.5.1 Temperature Measurements

Temperature measurements using K-type (Alumel-Chromel) thermocouples are accurate to within $\pm$ 1.0° F [11]. Since the film effectiveness (η) defined by Eq. 2 is inversely proportional to (T_g-T_s) and proportional to (T_g-T_{aw}), it is important to maintain the temperature difference between the gas and the adiabatic wall temperature sufficiently large such that the thermocouple accuracy does not strongly affect the calculated film effectiveness. From reference 1, the maximum uncertainty for the film effectiveness is $\pm$ 4%.

II.5.2 Mass Flow Rate Measurements

The air mass flow rates measured using ASME sharp edged orifices in conjunction with flange taps can be calculated as follows [12]:

$$m = 0.86275 \frac{C\,Y\,d^2\,F_a}{\sqrt{1-\beta^4}} \sqrt{\frac{P_1\,(\Delta P)}{T_1}} \qquad (14)$$

where

	m = mass flow rate	(lbm / sec)
	Y = expansion factor	(dimensionless)
	C = discharge coefficient	(dimensionless)
	d = orifice diameter	(in.)
	D = pipe diameter	(in.)
	β = diameter ratio (d/D)	(dimensionless)
	F_a = area thermal expansion factor	(dimensionless)
	P_1 = pressure upstream of orifice	(psia)
	P_2 = pressure downstream of orifice	(psia)
	$\Delta P = P_1 - P_2$ = pressure drop across orifice	(psia)
	T_1 = temperature upstream of orifice	($^\circ$R)

From Eq. 14, the maximum uncertainty interval according to reference 13 was found to be equal to $\pm$2.4%.

II.5.3 Accuracy of Test Section Geometries

From the definition of the mass velocity ratio (M) blowing ratio, the accuracy of M depends on the accuracy of the total slot area A_s and the mainstream area A_g. From reference 1, the maximum uncertainty interval of the slot area A_s and for the mainstream area A_g is $\pm$ 5.6% and $\pm$ 0.4% respectively.

II.5.4 Accuracy of Mass Velocity Ratio

To specify the secondary film cooling air injected into the mainstream flow, the mass-velocity ratio or blowing ratio (M) defined in Eq. 4 can also be expressed in terms of the secondary and mainstream flow rates as follows:

$$M = \frac{(\rho U)_s}{(\rho U)_g} = \frac{(m/A)_s}{(m/A)_g} \qquad (5)$$

From the accuracy of the flow rates and the test section geometries described in the previous paragraph, the uncertainty interval for the mass-velocity ratio is equal to $\pm$ 6.5%.

III. Experimental Results

III.1 Introduction

Results for the adiabatic wall temperature are presented in terms of the average film effectiveness (η) and are plotted against mass-velocity ratio (M) for various dimensionless distances (x/s) from the slot breakout location. An attempt is made to correlate the experimental data on a purely empirical basis where the average film effectiveness is presented in terms of the non-dimensional parameter (x/Ms). A comparison of film effectiveness data with previous investigator's results for tangentially injected secondary flow is also discussed.

Adiabatic wall temperature data as well as film effectiveness data for each run and for each test configuration are presented in tabular form in Appendix C.

III.2 Effect of Injection Angle on Film Effectiveness

III.2.1 Non-Accelerating Mainstream Flow

Figures 3-1 through *3-5* show the effect of varying the secondary cooling air injection angle (α) on the film effectiveness for the case when the mainstream flow is uniform and non-accelerating. In each figure, the average film effectiveness (η) is plotted against the mass-velocity ratio (M) for various slot heights downstream of the injection slot breakout location. A salient feature of the representation of the data for all figures is the dependence of η on both the value of M and the value of (x/s). For distances close to the slot breakout, η exhibits a strong dependence on M and (x/s). As the distance from the slot increases, film effectiveness decreases since more mixing occurs between the injected coolant and the hot mainstream. For increasing blowing ratios, the film effectiveness increases and tends towards unity but becomes

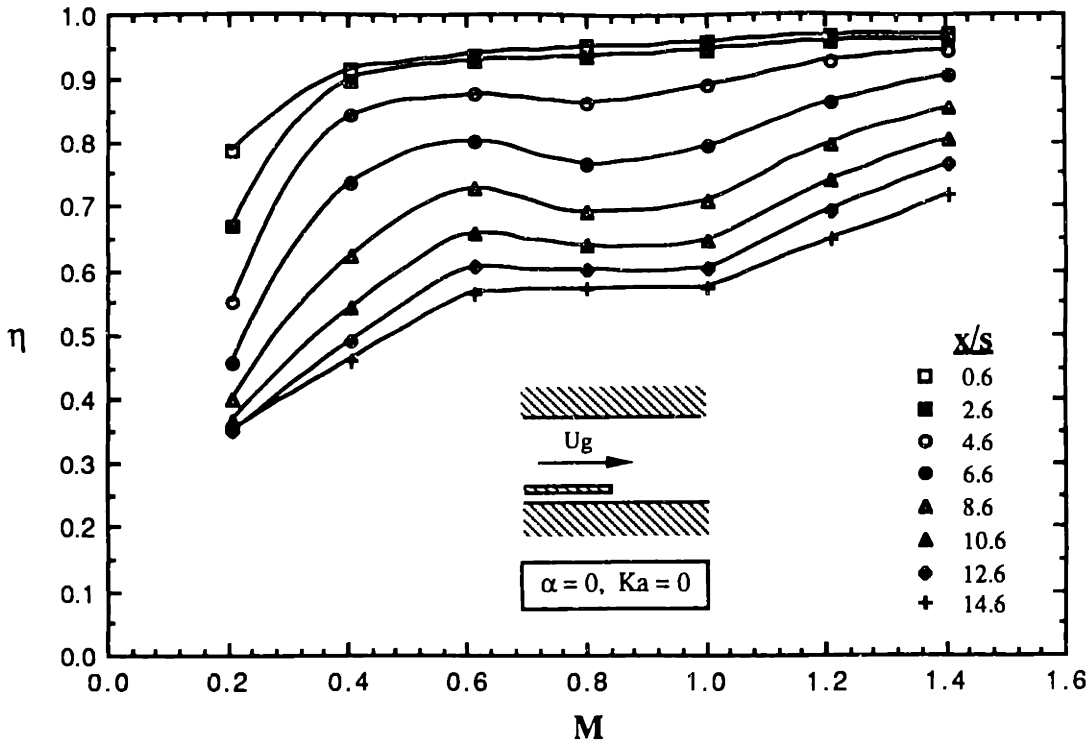

Figure 3-1: Film effectiveness (η) vs. blowing ratio (M) for 0 deg. injection angle

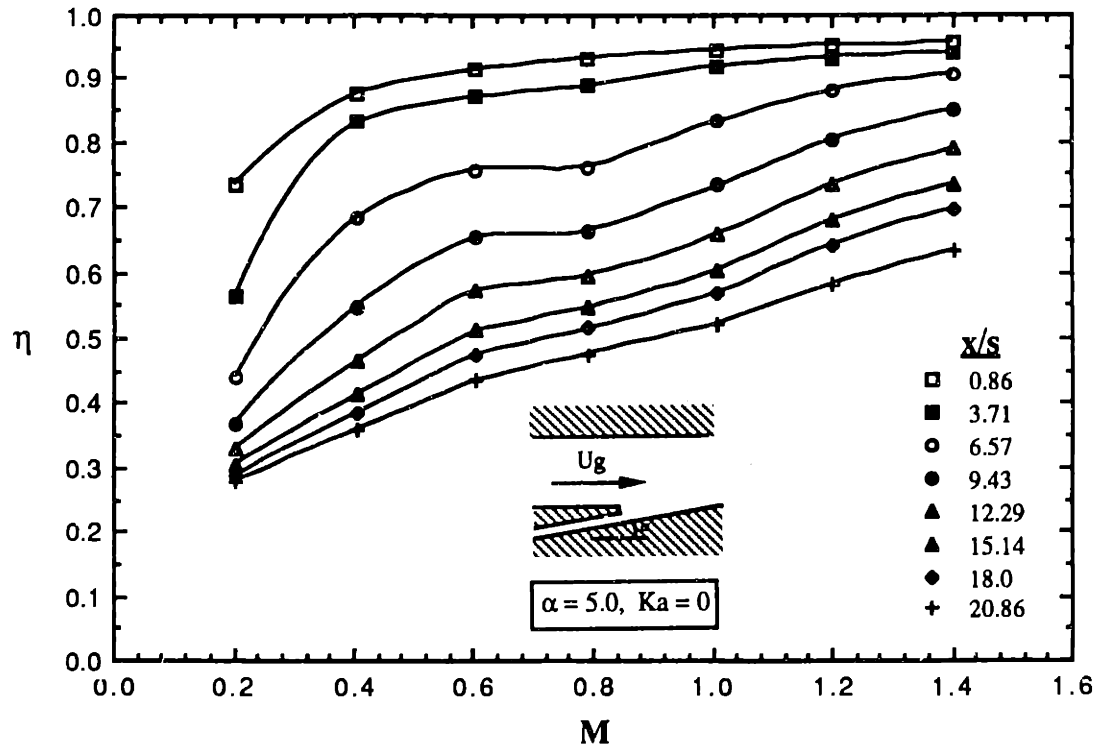

Figure 3-2: Film effectiveness (η) vs. blowing ratio (M) for 5.0 deg. injection angle

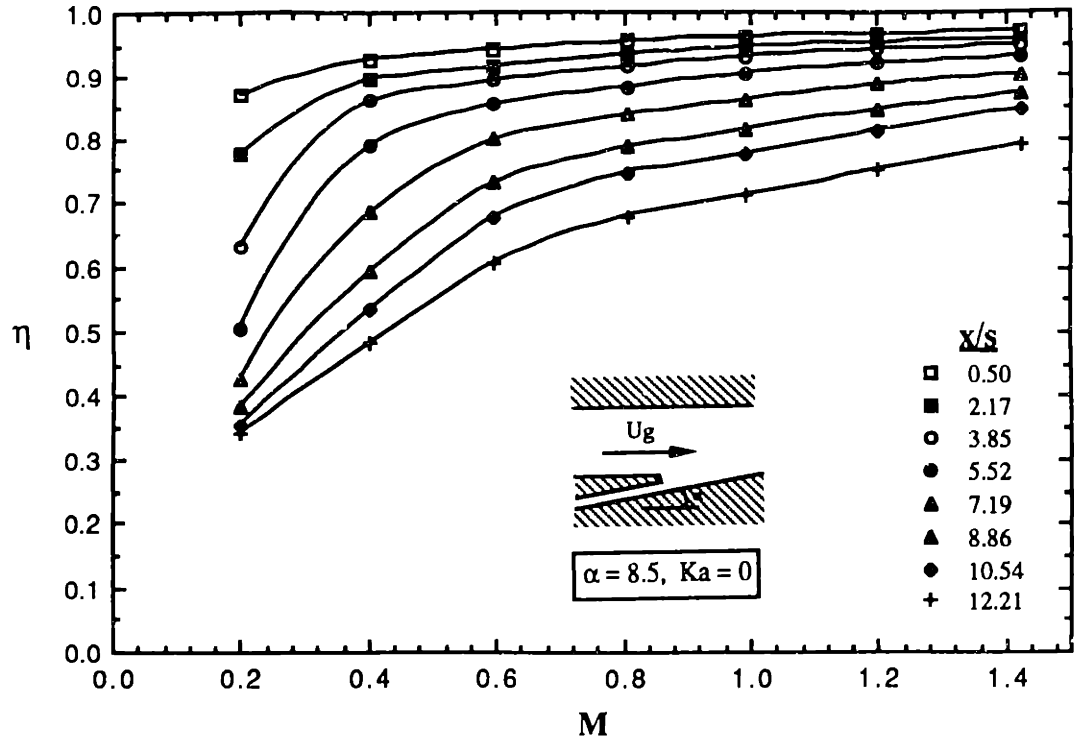

Figure 3-3: Film effectiveness (η) vs. blowing ratio (M) for 8.5 deg. injection angle

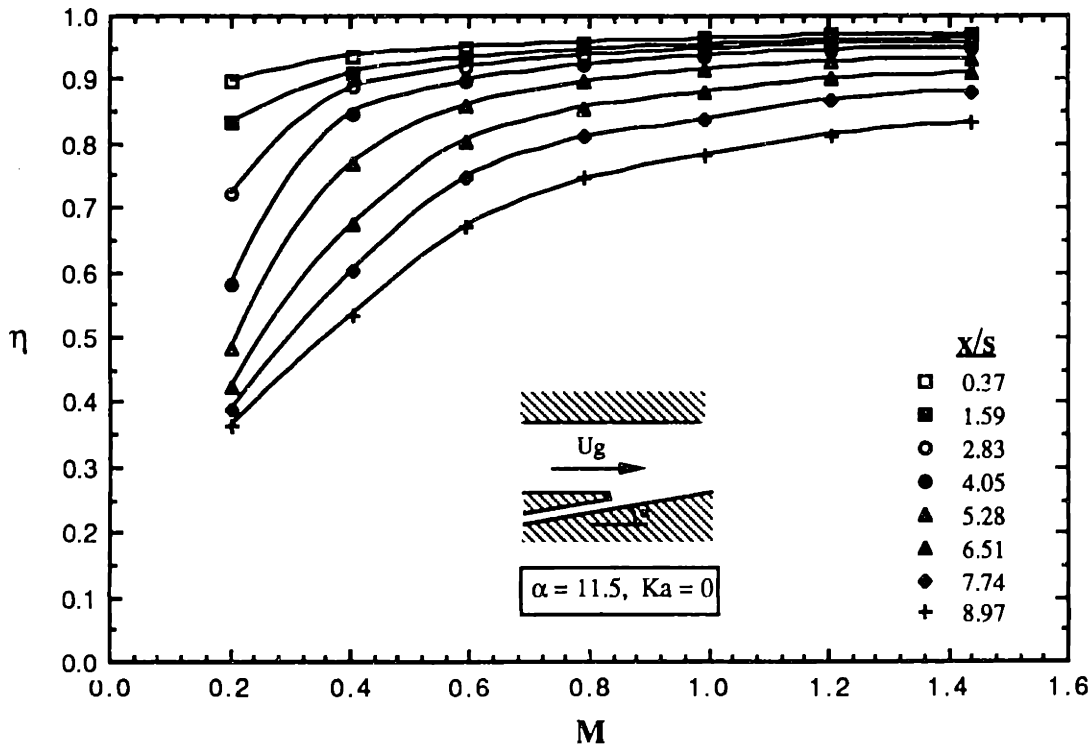

Figure 3-4: Film effectiveness (η) vs. blowing ratio (M) for 11.5 deg. injection angle

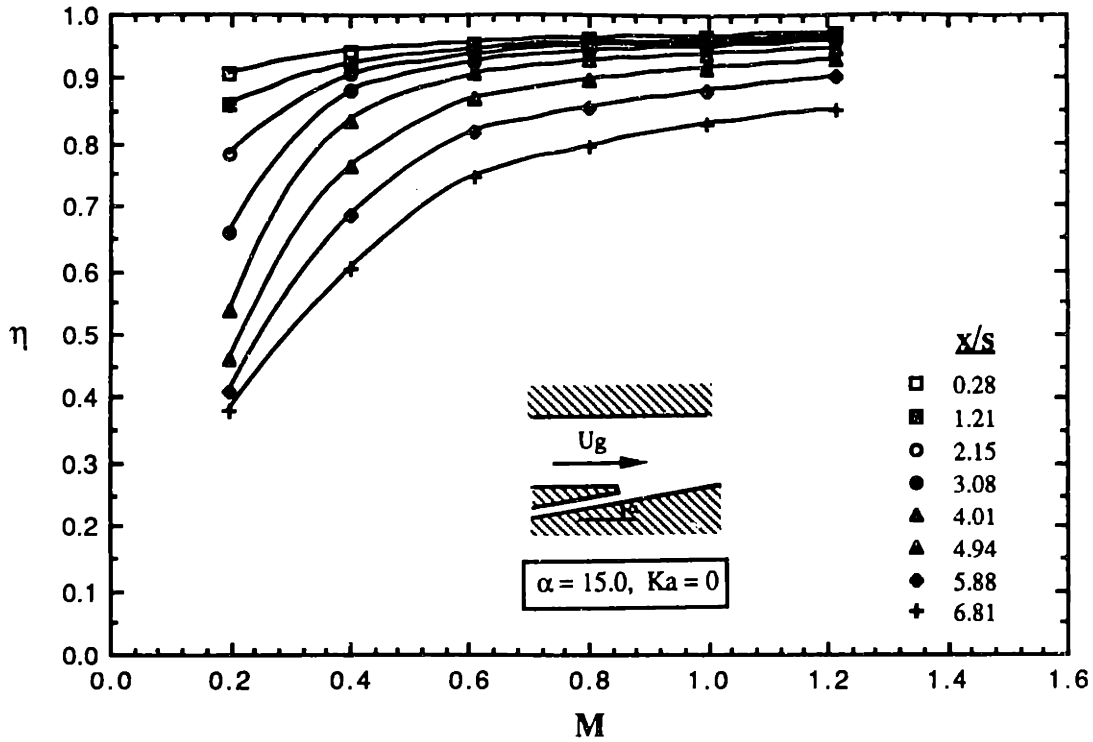

Figure 3-5: Film effectiveness (η) vs. blowing ratio (M) for 15.0 deg. injection angle

less a function of (x/s) especially for higher injection angles as can be seen from the collapsing of the effectiveness values.

For the case when the secondary flow is tangentially injected into the mainstream flow (*Figure 3-1*), the curve η versus M is divided into three regions. In the first region the average film effectiveness increases as the blowing ratio M increases from a value of 0.2 to 0.6. The second region is characterized by a leveling off of film effectiveness for M ratios between approximately 0.6 and 1.0 and for (x/s) ratios between 4.6 and 10.6, η drops to a local minimum. The third region is similar to the first one where an increase in M results in an increase in effectiveness value. A similar trend is observed for the case when the injection angle is equal to 5 degrees with the existence of a local maximum effectiveness also occuring at a blowing ratio equal to M=0.6 although, for downstream locations greater than approximately 16 slot heights, the transition plateau is not present. For injection angles greater than 5 degrees film effectiveness curves vary monotonically as a function of M and thus, a leveling off or dip

in film effectiveness is not observed. It must be noted that because of the increase in slot height (s) with increasing injection angles greater than 5 degrees the range of (x/s) values corresponding to thermocouple wall locations decreases with increasing angles and the dip in film effectiveness might occur for greater values of (x/s) which were not investigated. Nevertheless, there clearly exists a dip in film effectiveness for which its magnitude and location depends at least on the blowing ratio and the slot geometry. Qualitatively speaking, the dip in film effectiveness may result from an instability in mixing between the injected coolant and mainstream flow. For low blowing ratios, mixing occurs uniformly over the slot length. For M ratios between 0.6 and 1.0 a flow instability develops and causes more mixing between the coolant and the mainstream thereby decreasing film effectiveness values. As the blowing ratio is increased the instability still exists but the film effectiveness must increase in value since a larger mass of coolant is injected into the mainstream. A pictorial sketch of this mixing mechanism for varying M ratios is shown in *Figure 3-6.*

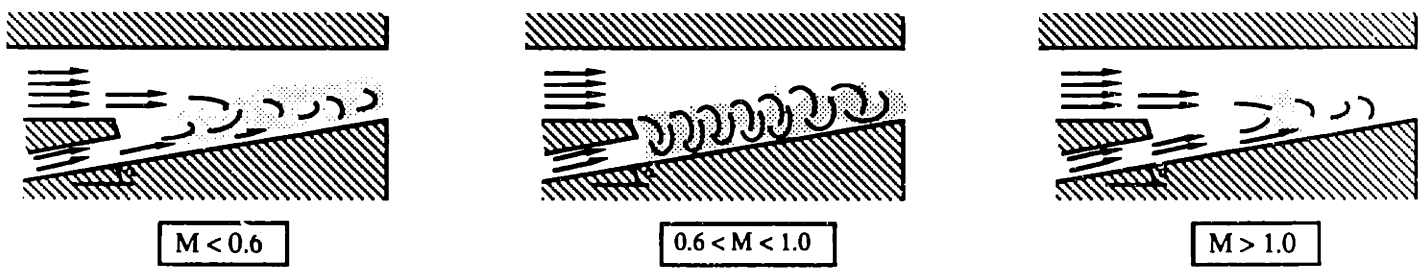

Figure 3-6: Mixing due to flow instability

III.2.2 Accelerating Mainstream Flow

Film effectiveness values obtained for the case when the converging nozzle is present in the mainstream are presented in *Figure 3-7.* A similar trend as for the tangentially injected flow

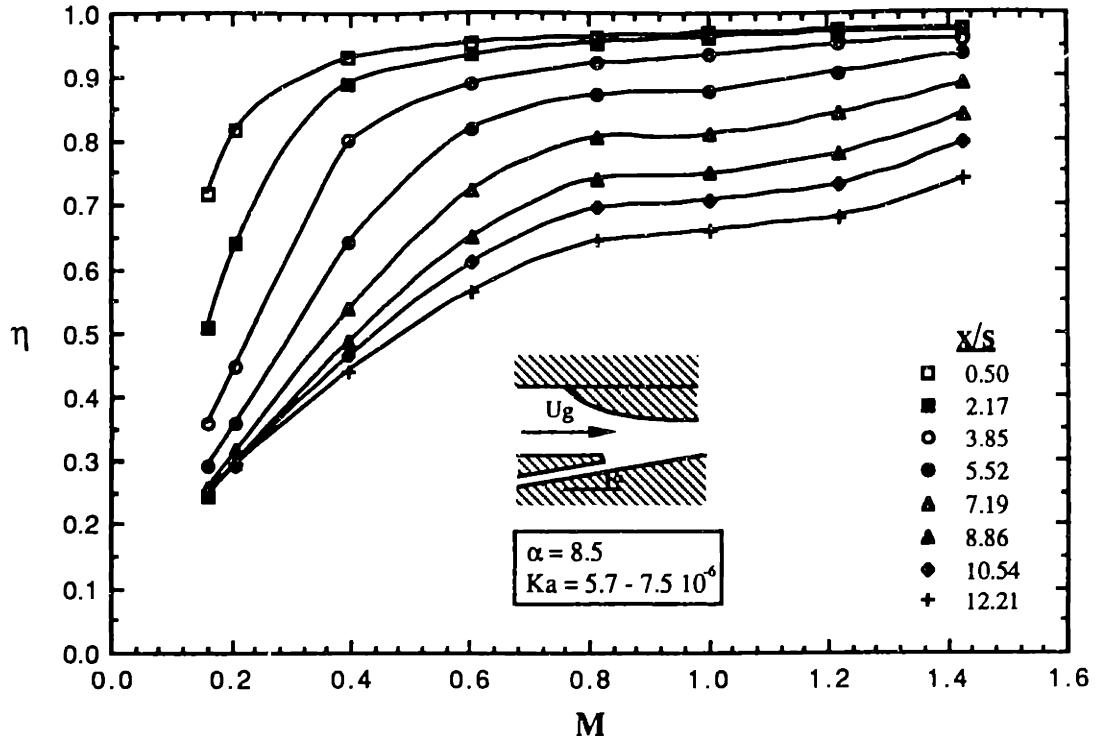

Figure 3-7: Film effectiveness (η) vs. blowing ratio (M) for 8.5 degree injection angle with accelerating mainstream flow

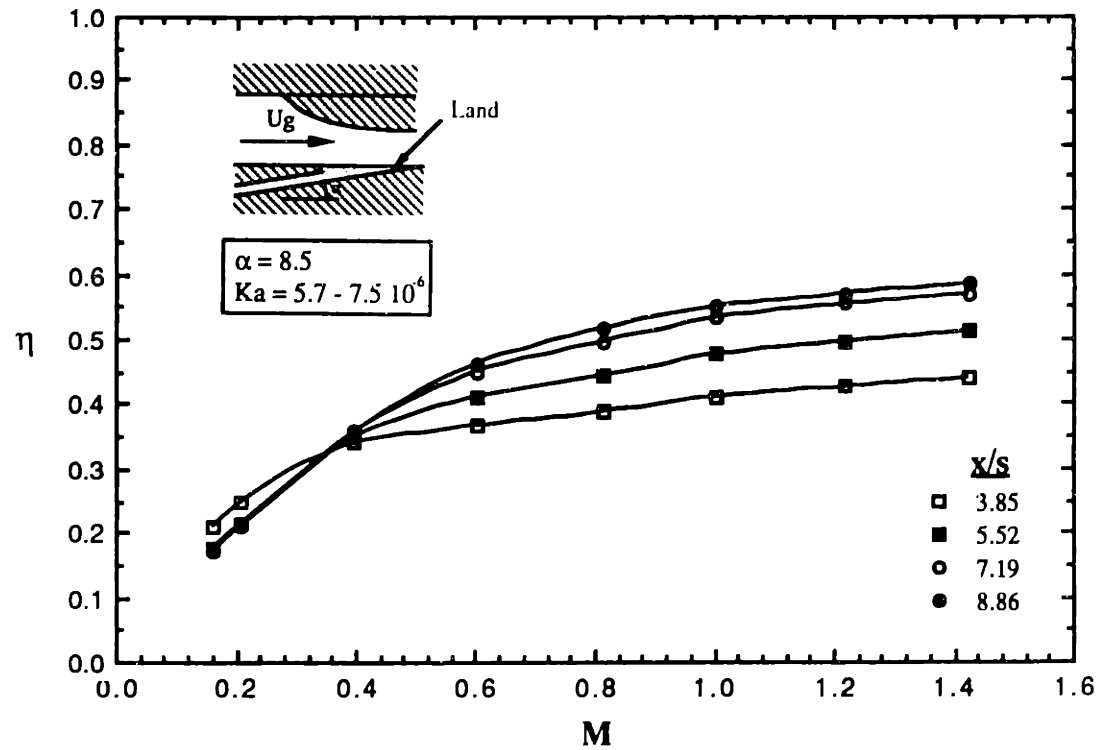

Figure 3-8: Land film effectiveness (η) vs. blowing ratio (M) for 8.5 degree injection angle with accelerating mainstream flow

is observed where film effectiveness values level off for blowing ratios between 0.8 and 1.0 for downstream slot heights greater than 5.

Average film effectiveness values for temperature measurements made on the land surfaces are presented in *Figure 3-8*. For low blowing ratios the land effectiveness value is close to zero and as the downstream distance from the slot increases mixing becomes more important thus, creating a complex three dimensional hydrodynamic structure which causes some amount of the injected coolant to diffuse over the surface of the land. Hence, the increase in land effectiveness for increasing (x/s).

III.3 Correlation of Film Effectiveness Data

To compare film effectiveness results for various downstream slot heights (x/s), each for different injection angles, the film cooling effectiveness is correlated in terms of the parameter (x/Ms) which is also another form of a dimensionless distance from the slot breakout. This type of correlation is very convenient for a heat transfer engineer who has a particular mass flow of secondary air available and a specific injection slot height and who wishes to choose an effectiveness value as a function of the distance downstream from the slot breakout. The resulting graphs are shown in *Figures 3-9* through *3-14* where average film effectiveness is represented logarithmically as a function of (x/Ms). Typical of all the figures is an initial constant value of the effectiveness close to unity followed by a transition to an approximate power-law dependence on the non-dimensional distance (x/Ms). Beyond the point of transition which is independent of the downstream distance (x/s), the results are roughly linear and so indicate a power-law relation. The constant and the exponent of the power law relation were evaluated by performing a least-squares fit to the data for a range of (x/Ms) values. Reasonable correlations are obtained for the different injection angles except for

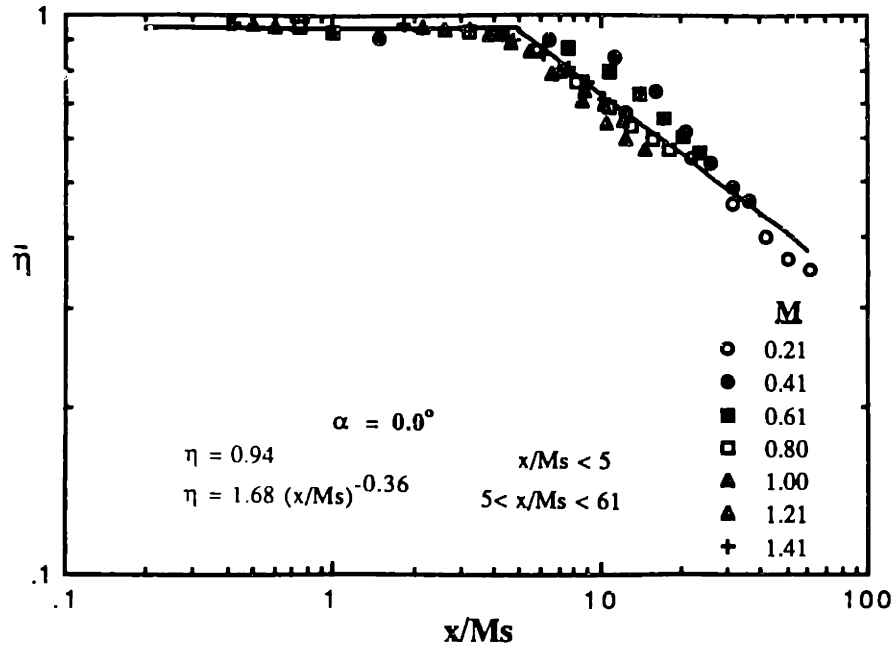

Figure 3-9: Film effectiveness (η) vs. (x/Ms) for 0 deg. injection angle

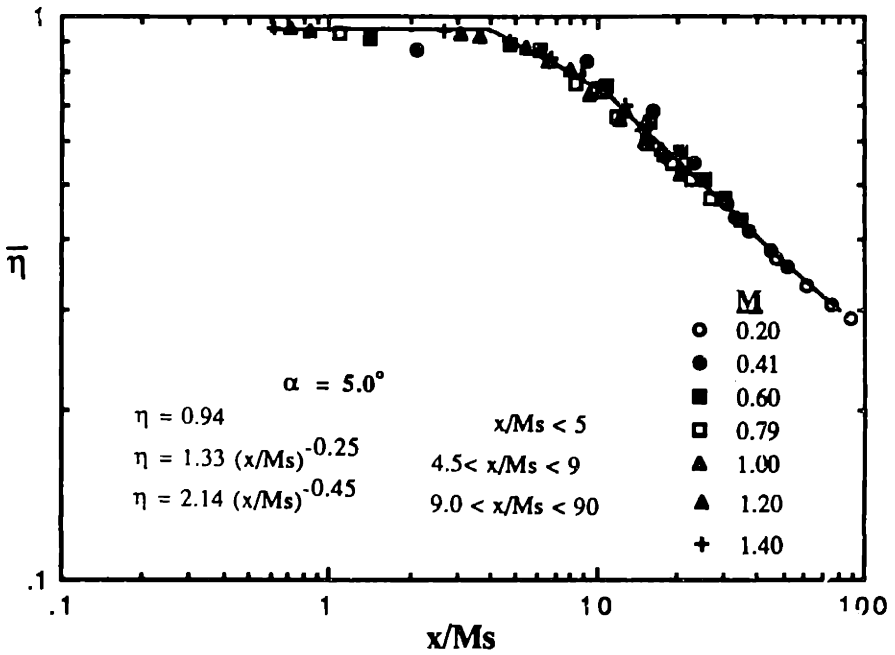

Figure 3-10: Film effectiveness (η) vs. (x/Ms) for 5.0 deg. injection angle

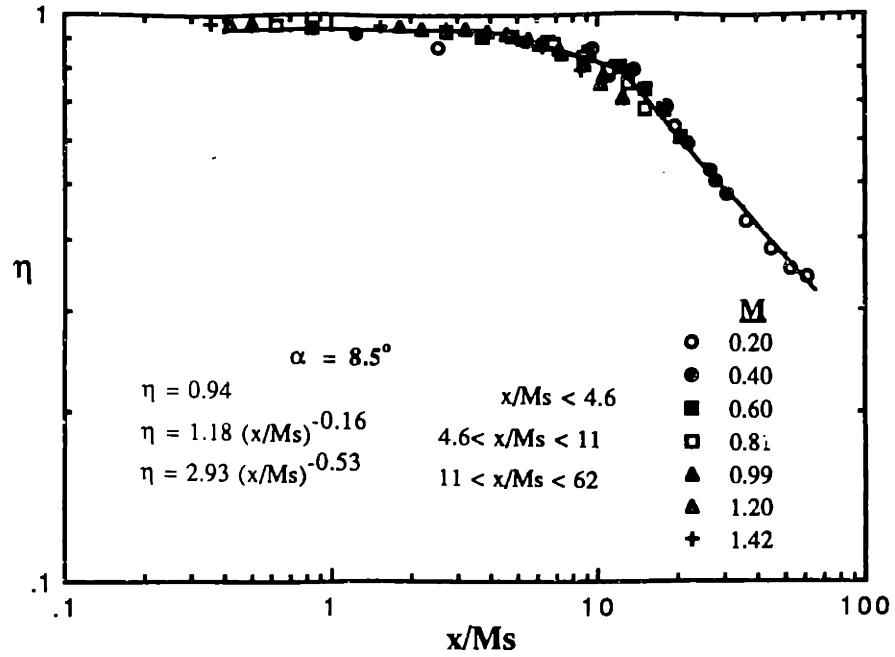

Figure 3-11: Film effectiveness (η) vs. (x/Ms) for 8.5 deg. injection angle

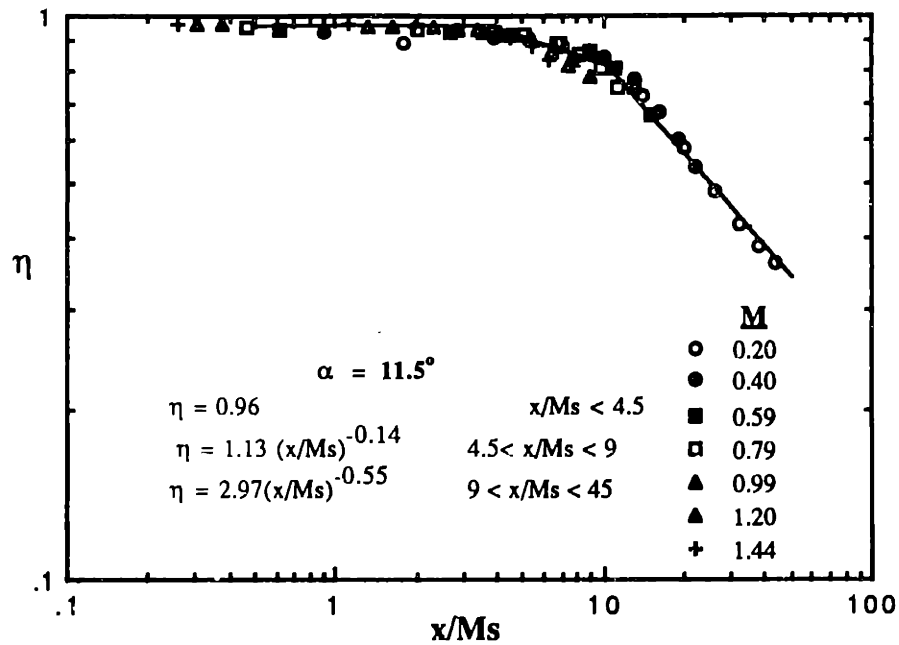

Figure 3-12: Film effectiveness (η) vs. (x/Ms) for 11.5 deg. injection angle

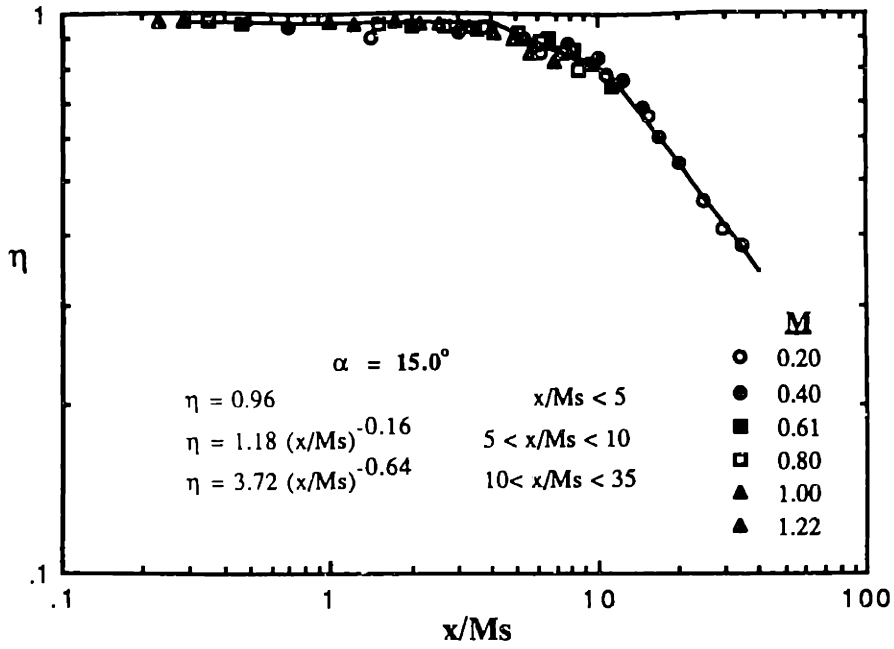

Figure 3-13: Film effectiveness (η) vs. (x/Ms) for 15.0 deg. injection angle

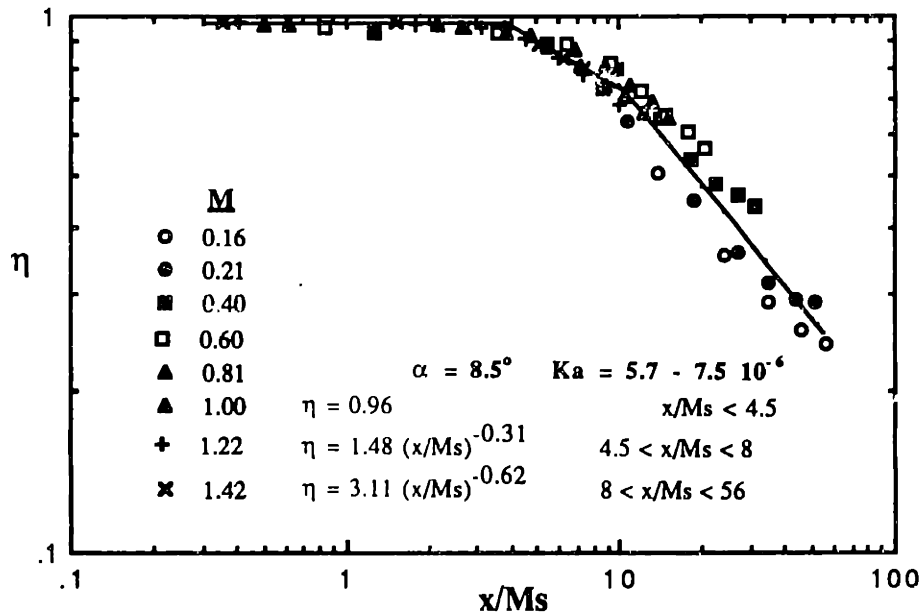

Figure 3-14: Film effectiveness (η) vs. (x/Ms) for 8.5 deg. injection angle with accelerating mainstream flow

the tangential injection case and the case for which the mainstream is accelerated. The correlation parameter (x/Ms) does not collapse the data for the tangential injection configuration because of the non-monotonic behavior of the film effectiveness η as a function of the blowing ratio (M) as was discussed in the previous paragraphs.

A comparison is made between film effectiveness values obtained for 8.5 degree injection into an accelerating and non-accelerating mainstream for which the results are shown in *Figure 3-15*. The presence of the converging nozzle alters the free-stream velocity and the large acceleration in the mixing region produced by the variable free-stream velocity clearly lowers effectiveness values. For an x/Ms value equal to 20 the film effectiveness decreases by approximately 20% when the nozzle is added in the mainstream.

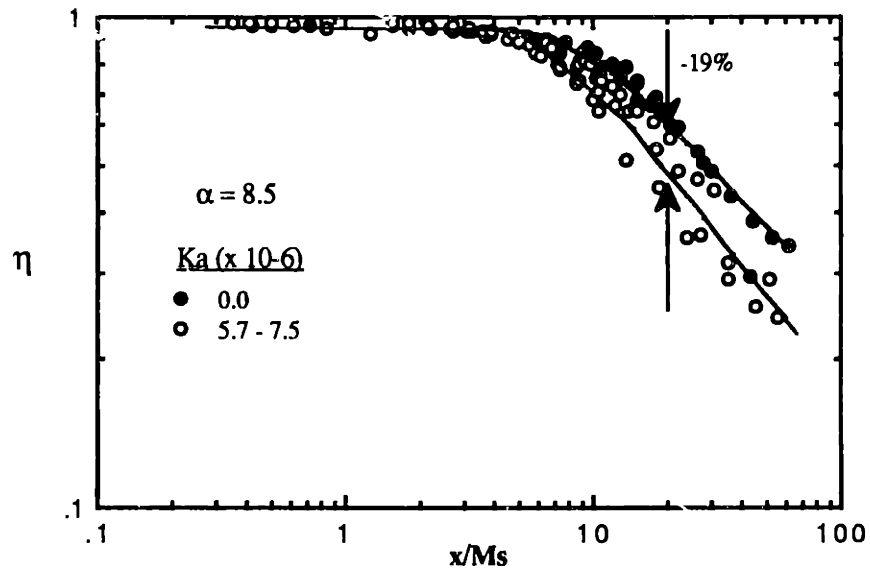

Figure 3-15: Film effectiveness (η) vs. (x/Ms) for 8.5 deg. injection angle. Accelerating vs. non-accelerating mainstream flow

III.4 Summary of Correlations

Table 3-1 summarizes the results obtained from the previous discussed correlations. The value of R corresponds to the correlation coefficient for the linear least-squares fit on a log-

log scale. Based on these correlations, a plot of the average film effectiveness as a function of (x/Ms) is presented for different injection angles. The resulting graph is shown in *Figure 3-16* and an optimal injection angle equal to 8.5 degrees is observed. Since tangential injection is never achieved in practice for turbine airfoil designs, results for this configuration are omitted in this graph.

Table 3-1: Summary of correlations

α	$Ka_{x=0}$	x/Ms	$\eta = a\,(x/Ms)^b$ a	b	R^2
0.0	0	5-61	1.68438	-0.36340	0.90
		0.4 - 5	0.94	0	
5.0	0	9 - 90	2.13998	-0.45040	0.98
		4.5 - 9	1.3285	-0.24534	0.90
		0.6-4.5	0.94	0	
8.5	0	11 - 62	2.9273	-0.5252	0.98
		4.6 - 11	1.17846	-0.15771	0.71
		0.4 - 4.6	0.94	0	
11.5	0	9 - 45	2.9711	-0.55183	0.97
		4.5 - 9	1.1339	-0.13880	0.52
		0.2 - 4.5	0.96	0	
15.0	0	10 - 35	3.71575	-0.6449	0.99
		5 - 10	1.183469	-0.16377	0.60
		0.2 - 5	0.96	0	
8.5	5.7 - 7.5	8 - 56	3.10914	-0.6226	0.92
		4.5 - 8	1.482043	-0.30808	0.81
		0.35 - 4.5	0.96	0	

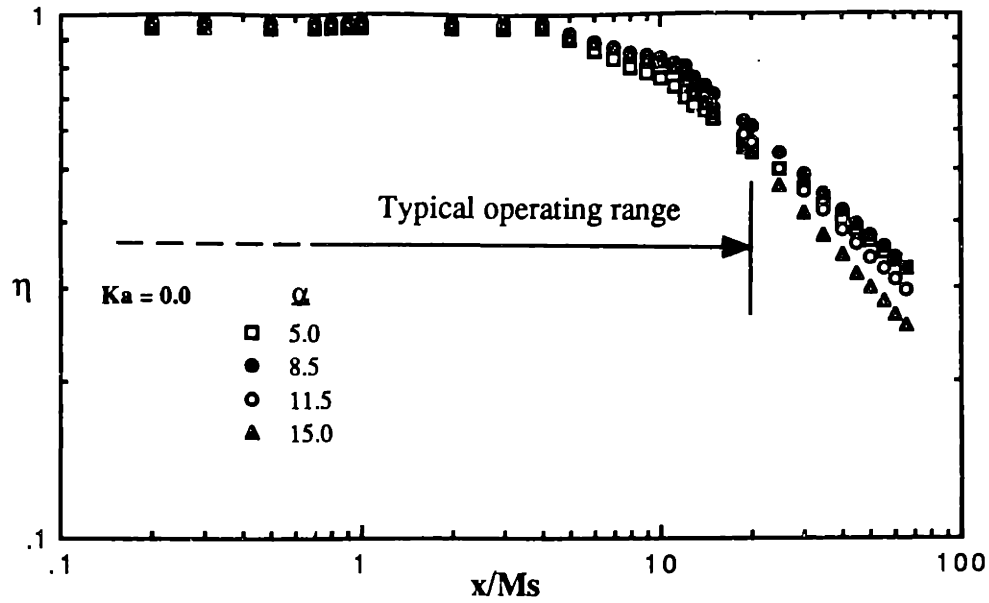

Figure 3-16: Film effectiveness (η) vs. (x/Ms) for varying injection angles. (α = 5.0°, 8.5°, 11.5°, 15.0°)

III.5 Comparisons with Previous Work

Experimental results obtained for the tangentially injected flow configuration are compared to results obtained by Seban et al. [4]. Since the method of correlation was similar to the one used in this study, the experimental results are plotted in *Figure 3-17* according to the correlating parameter (x/Ms) and compared to the correlating equation of Seban described previously (Eq. 6 and 7). The experimental results obtained in this study are lower than those obtained by [4] although the power law dependence of η on x/Ms is comparable. The discrepancy in film effectiveness magnitude can be explained by the difference in slot geometry. Seban et al. used an infinitely small slot lip thickness which gives higher effectiveness values particularly for downstream locations close to the slot breakout.

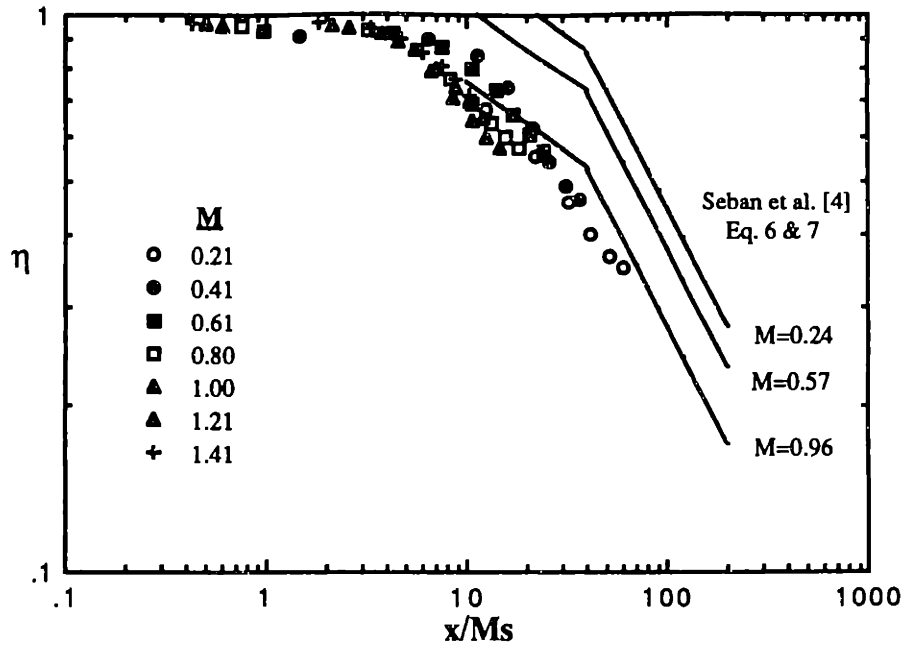

Figure 3-17: Comparison of experimental results with previous correlations of Seban et al. [4].

As a further comparison, results are compared with those of Joubert and Samuel [8]. Reasonably good agreement is found with the authors' correlating curve for low M ratios, bearing in mind that Joubert's curve pertains to greater downstream distances than the present results.

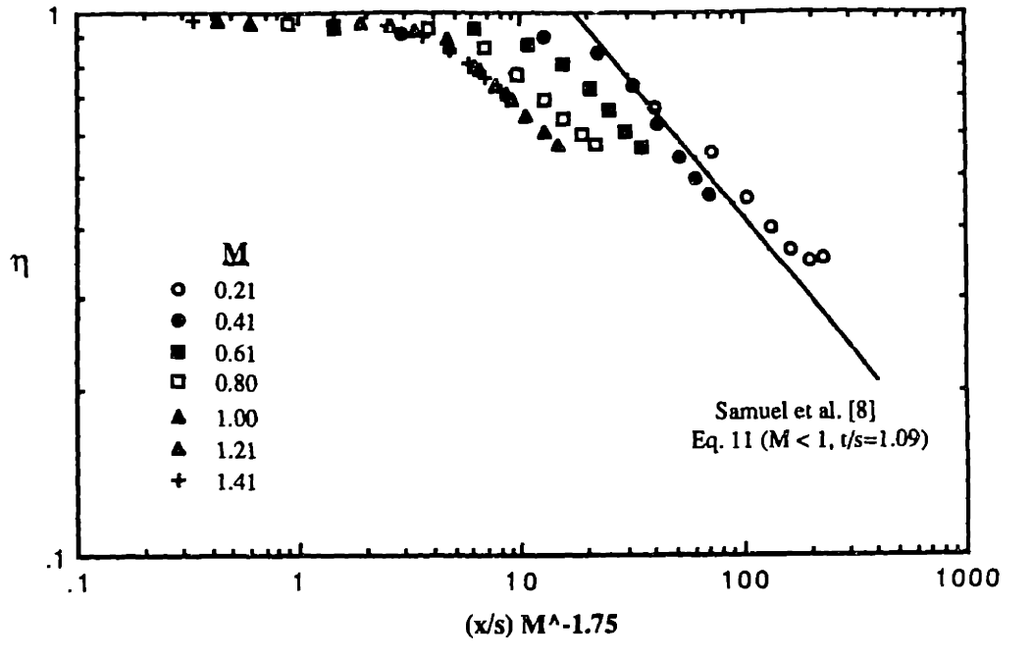

Figure 3-18: Comparison of experimental results with previous correlations of Samuel and Joubert [8].

IV. Numerical Investigation

IV.1 Introduction

An experimental investigation gives the most reliable source of information about a physical process and often small scale models are constructed to predict the physics behind the phenomena under investigation. However, small scale models do not always simulate all the features of the full-scale equipment. On the other hand, building full-scale tests are extremely expensive and often impossible. With the advent of large digital computers, a theoretical prediction of the physical process based on a mathematical model has become a more attractive alternative. In particular, a very attractive advantage is the low cost associated with using a theoretical prediction based on a computational numerical method. A computational prediction can also be performed with remarkable speed and the solution can provide extremely detailed and complete information about various variables pertinent to the physical process (such as velocity, pressure, temperature, turbulence intensity, etc.).

With the availability of commercial Computational Fluid Dynamics (CFD) codes, a numerical model is used to predict the film cooling effectiveness for a two-dimensional slot geometry identical to the one used in the experimental investigation. Numerical results are compared with experimental results. The CFD code used for this study is FLUENT developed by Creare Inc. (1985).

IV.2 Numerical Model

The experimental geometry of the test rig used for the case with tangential film cooling injection in a non-accelerating mainstream flow is modelled as a two-dimensional flow field. *Figure 4-1* shows the numerical model used in this study. The dimensions and boundary

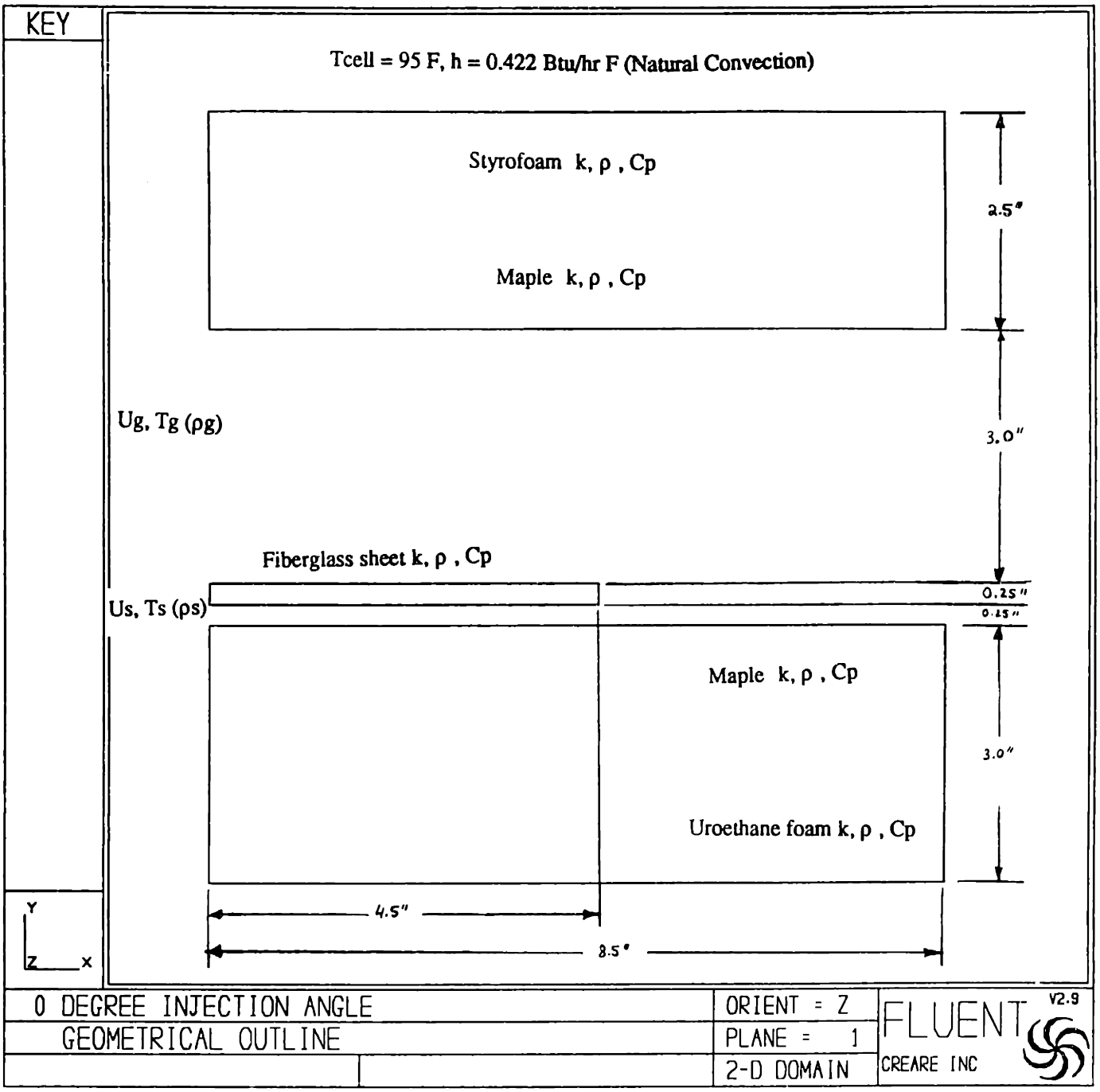

Figure 4-1: Numerical Model of experimental test rig for tangential film cooling injection

conditions of the computational domain are based on actual test rig dimensions and operating conditions such that an accurate model of the experiment is obtained. The main air flow inlet velocity is set at 74.44 ft/s and the temperature at 250 deg. F. The inlet velocities of the secondary cooling air flow are given in *Table 4-1* as well as the corresponding blowing ratios (M). The secondary air flow inlet temperature is set at 100 deg. F. Since air is used for both the main and secondary flows, the ideal gas law is applied to determine the density at any point in the fluid domain. The turbulence intensity for both flows is set to 8%. A two-dimensional finite difference grid for the fluid and solid domain, shown in *Figure 4-2*, is generated and is unchanged for all the simulations. A finer mesh for the grid is used for regions just downstream of the injection slot in order to obtain more accurate results in this hydrodynamically complex region.

Table 4-1: Boundary conditions for numerical model

t/s	Ug	Us	M	T_g	T_s
1	74.44	11.74	0.2	250	100
1	74.44	23.48	0.4	250	100
1	74.44	35.22	0.6	250	100
1	74.44	46.97	0.8	250	100
1	74.44	58.71	1.0	250	100

IV.3 Numerical Procedure

The numerical procedure is based on the solution of a finite-difference representation of the time-averaged, three dimensional form of the Navier-Stokes equations. The turbulence model for the predictions is based on Prandtl's mixing length model. Most of the pre-processing work involved generating the finite difference grid and defining the thermal and fluid boundary conditions. Then, for each simulation, only the inlet slot velocity specified as a

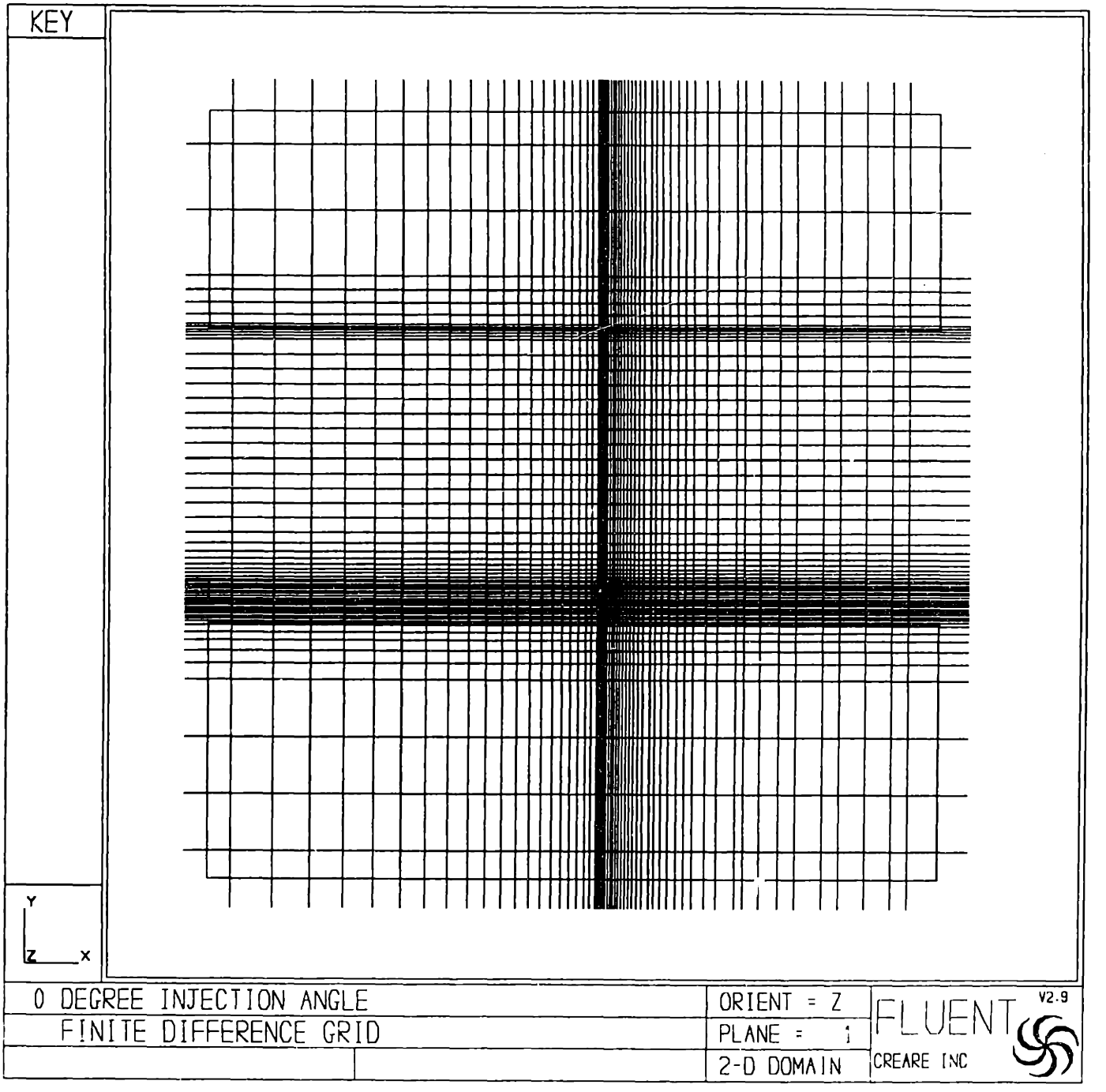

Figure 4-2: Finite difference grid

fluid boundary condition is set which in effect is the same as setting the blowing ratio (M). Numerical simulations were performed on a VAX 8820.

IV.3 Results for Tangential Film Cooling Injection

Velocity vector plots for various blowing ratios (M) are shown in *Figures 4-3* through *4-8*, and indicate the magnitude of the resultant velocity at each point in the flow field. The vectors are scaled in length according to the magnitude of the velocity. For low blowing ratios a recirculation zone is established just downstream of the slot breakout location and a stagnation point is observed approximately 2 slot heights downstream where the velocity is practically zero. As the blowing ratio increases the stagnation point disappears and the flow region downstream of the slot is similar to that of a wake flow behind a bluff body. Temperature profiles are shown in *Figures 4-8* through *4-12* Note that the dashed line refers to the datum location. The distance between the dashed datum line and the solid profile line indicates the magnitude of the temperature. Because the temperatures are reported in degrees Rankine, it is difficult to distinguish differences in the shape of the profiles for increasing blowing ratios. For each node, defined by the intersection of two grid lines, a temperature is calculated and the data is readily available in an output data file. By selecting nodes on the surface of the slot, adiabatic film effectiveness values (η) are determined from Eq. 2 based on the temperature corresponding to the respective node.

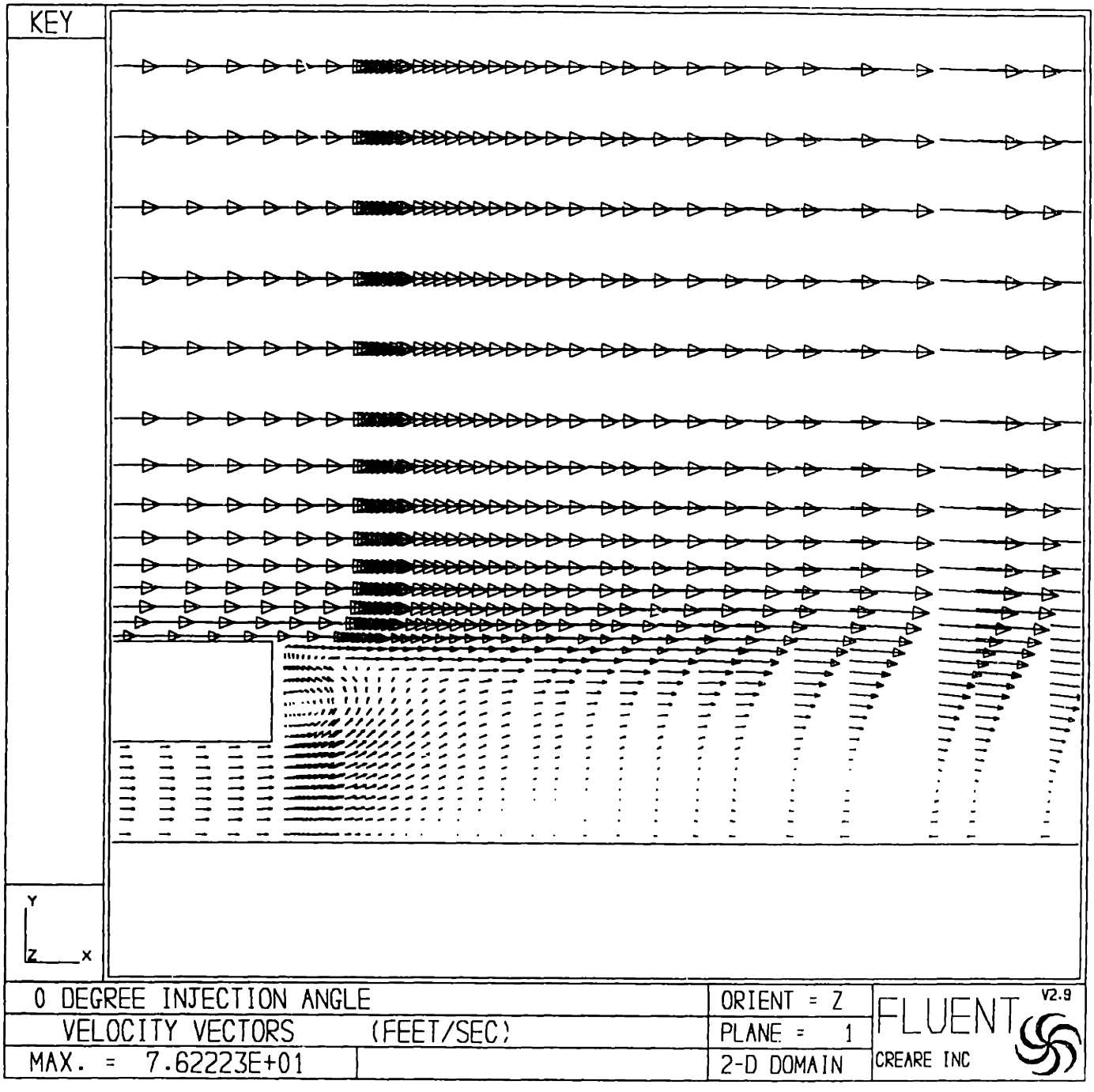

Figure 4-3: Velocity vector plot (M=0.2)

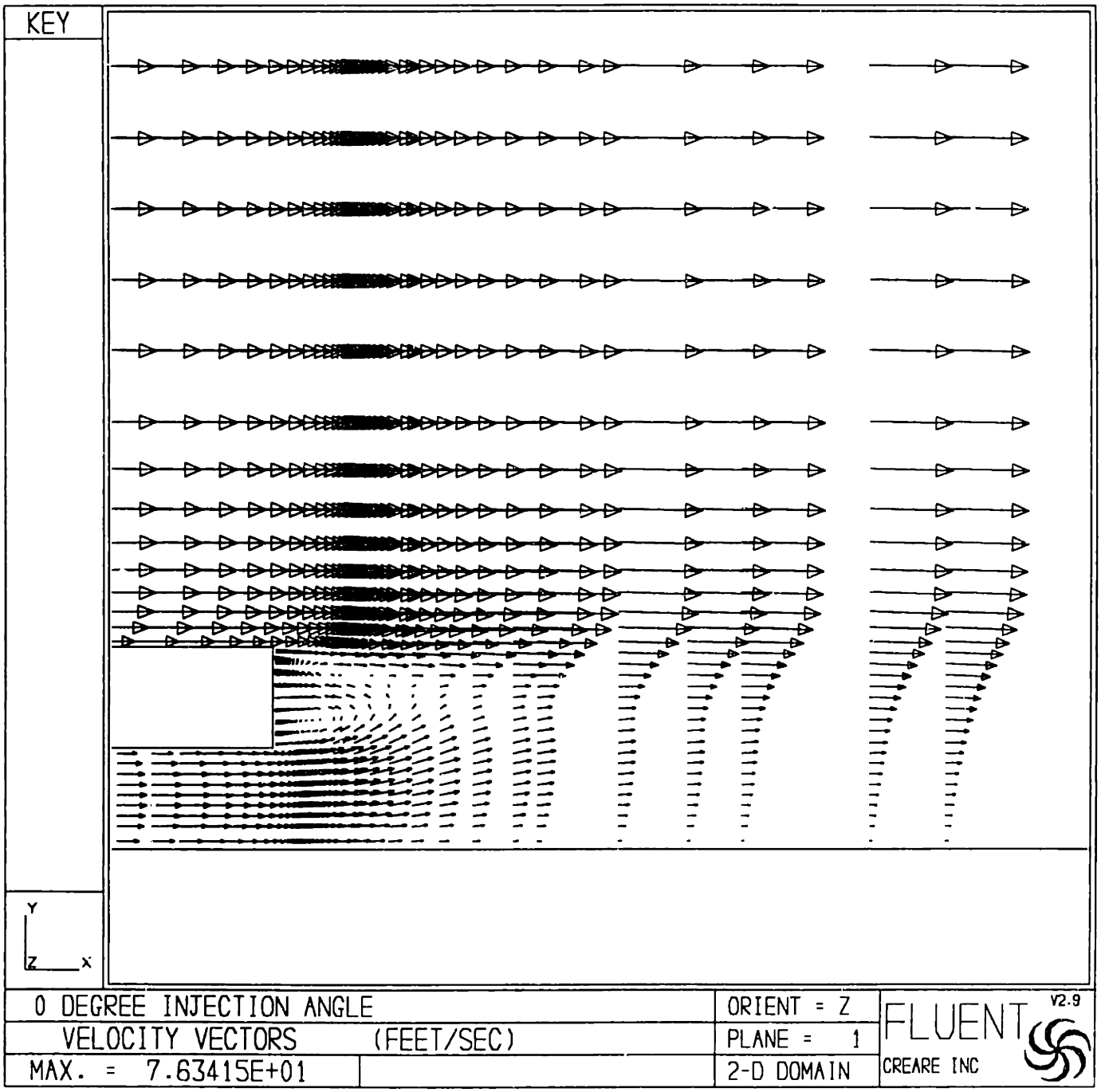

Figure 4-4: Velocity vector plot (M=0.4)

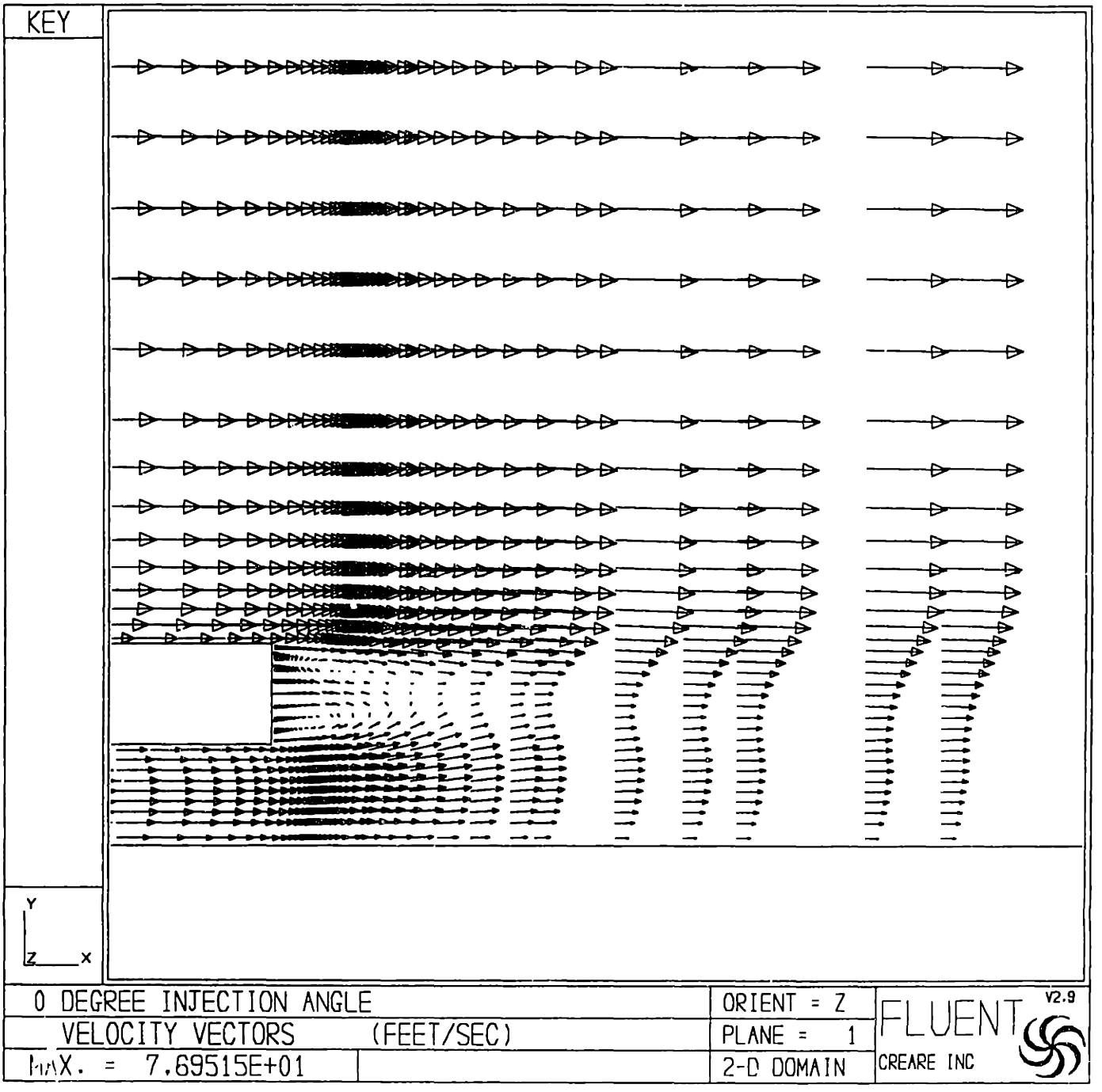

Figure 4-5: Velocity vector plot (M=0.6)

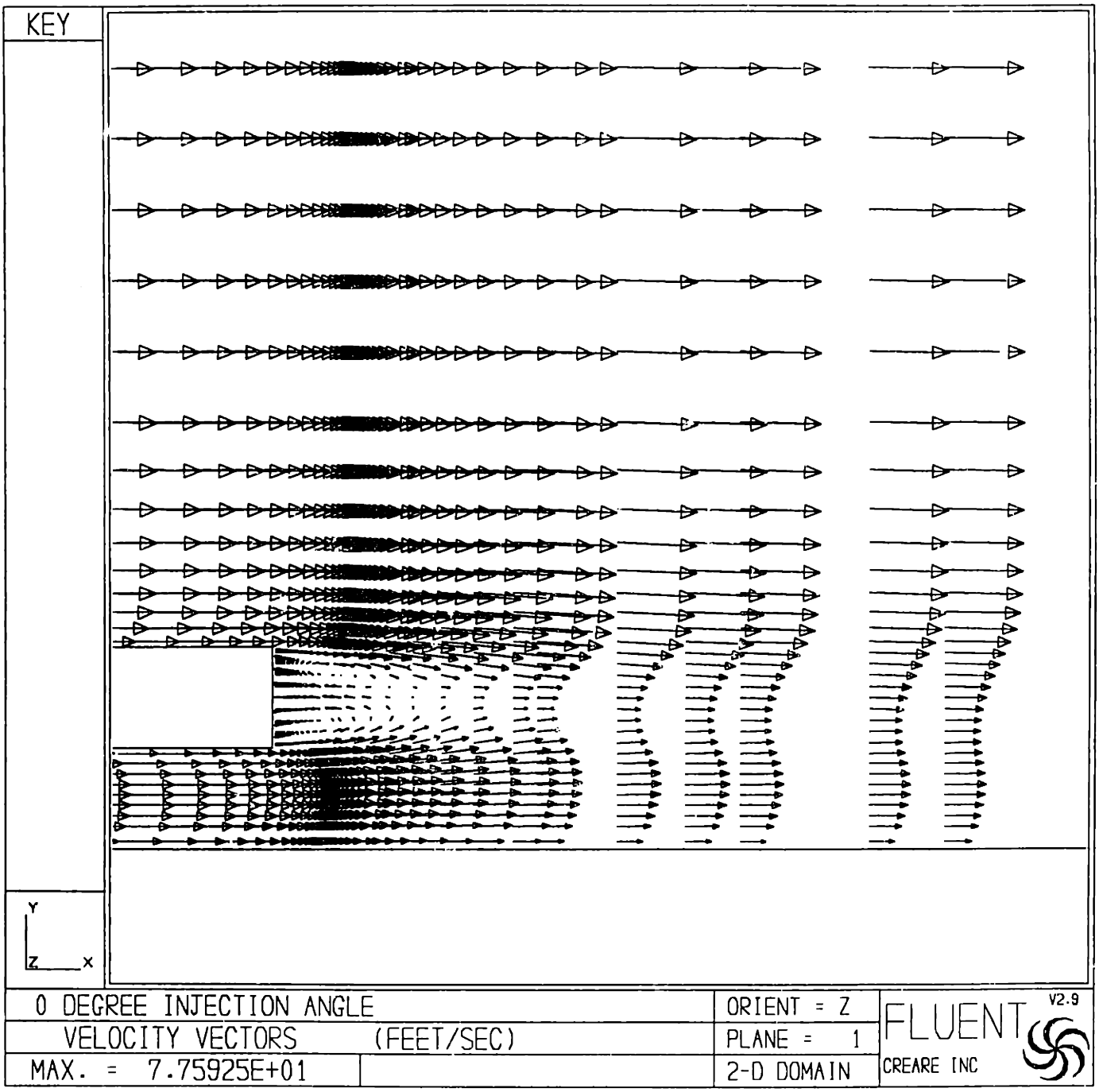

Figure 4-6: Velocity vector plot (M=0.8)

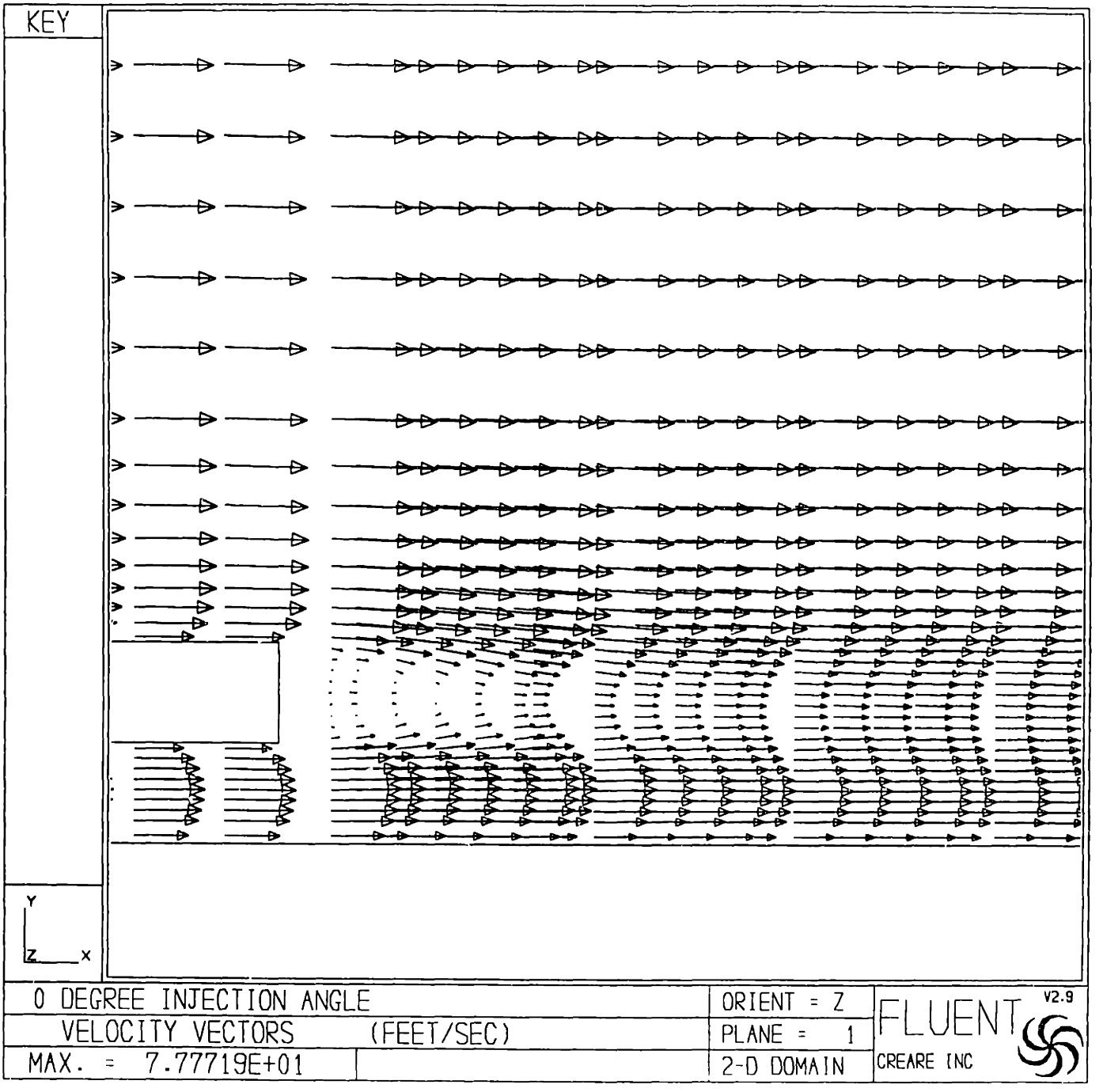

Figure 4-7: Velocity vector plot (M=1.0)

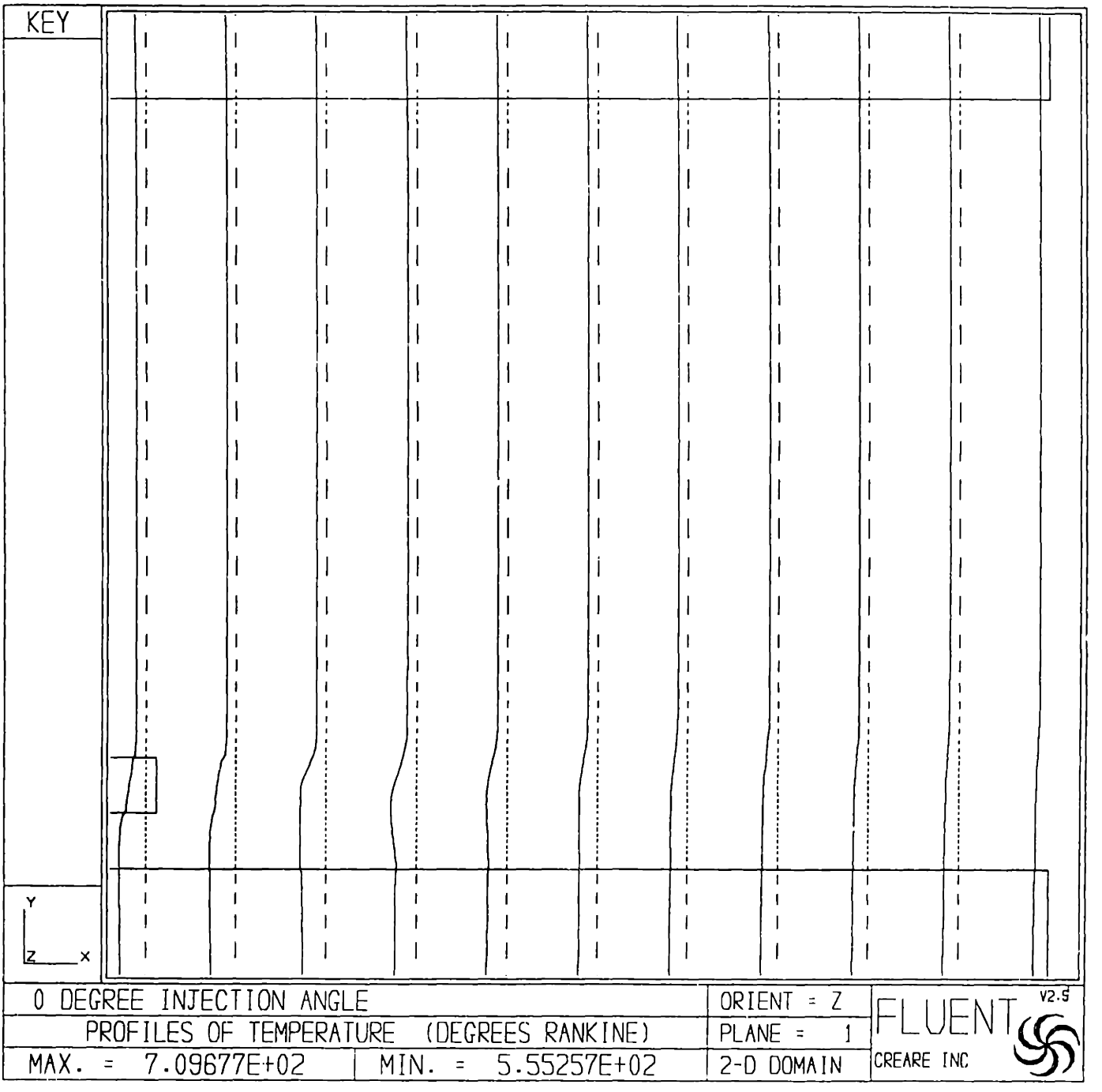

Figure 4-8: Temperature profile (M=0.2)

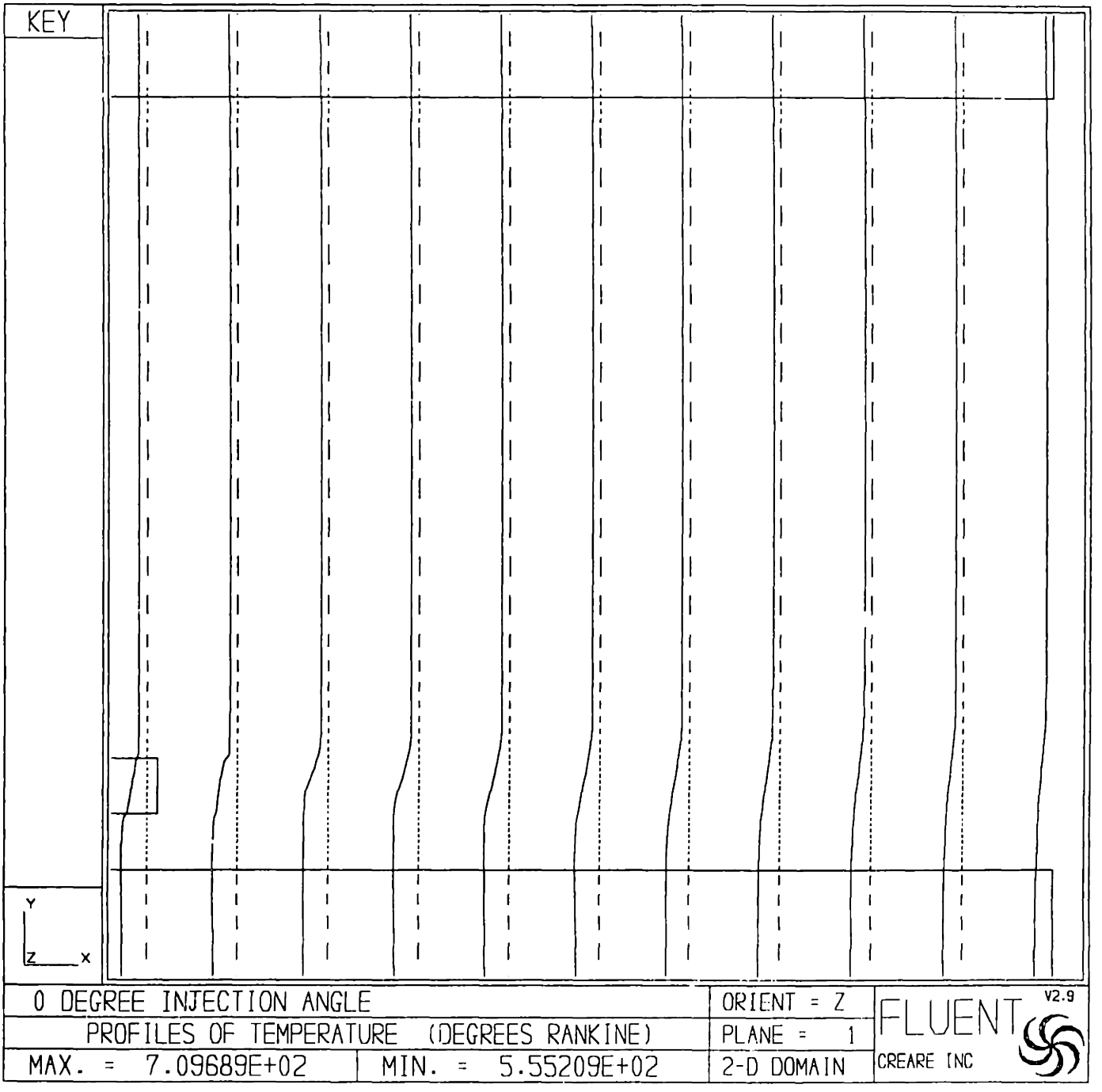

Figure 4-9: Temperature profile (M=0.4)

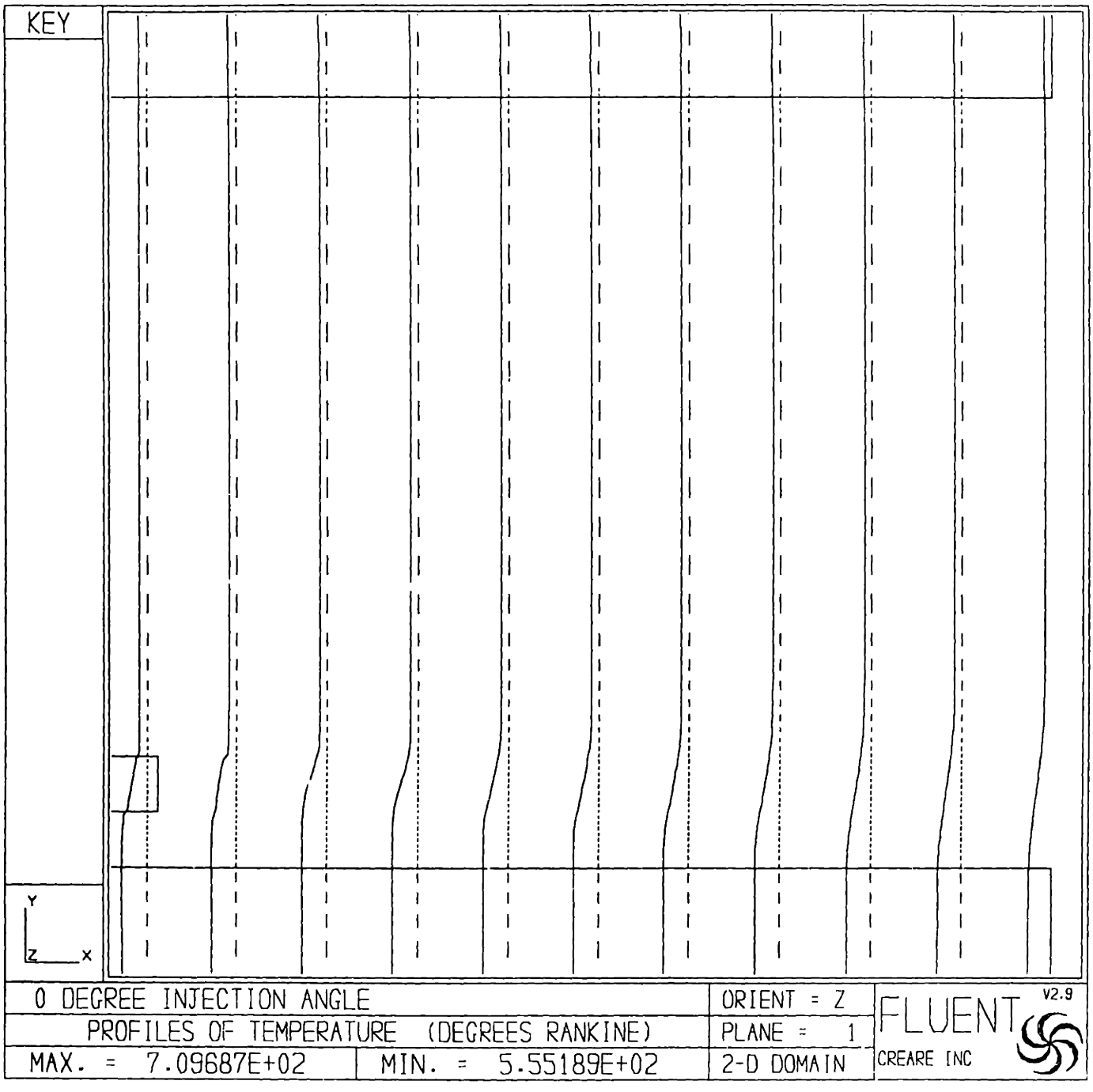

Figure 4-10: Temperature profile (M=0.6)

Figure 4-11: Temperature profile (M=0.8)

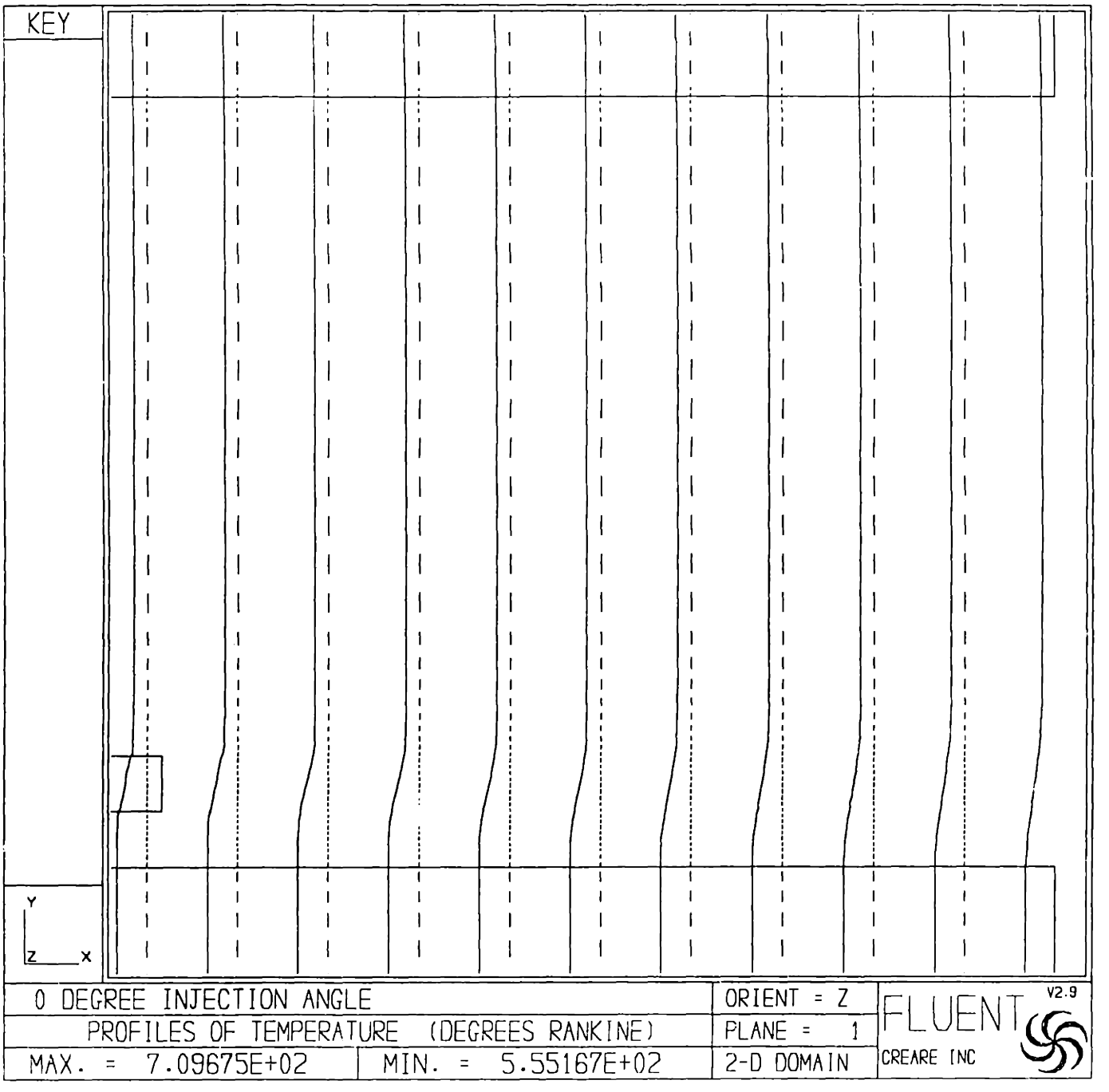

Figure 4-12: Temperature profile (M=1.0)

IV.4 Comparison with Experimental Results

Results from the computational simulations are shown in *Figure 4-13* where once film effectiveness (η) is plotted against blowing ratio (M). The experimental results for the same slot injection geometry are show in *Figure 4-14*. As can be seen, the numerically computed effectiveness increases much more rapidly as a function of blowing ratio, when compared to the experimental results. This trend is confirmed by the velocity vector plots shown in the previous section since for M ratios greater than 6 the flow basically corresponds to that of a free jet boundary with very little mixing between the coolant and the mainstream hot gas. The model developed to predict the film effectiveness for tangentially injected coolant is somewhat crude and therefore, close agreement with experimental results is not expected. The results obtained with Fluent are not completely discouraging. Parametric calculations need to be performed to study the effect of turbulence intensity, upstream starting length of the mainstream boundary layer, grid size, etc.

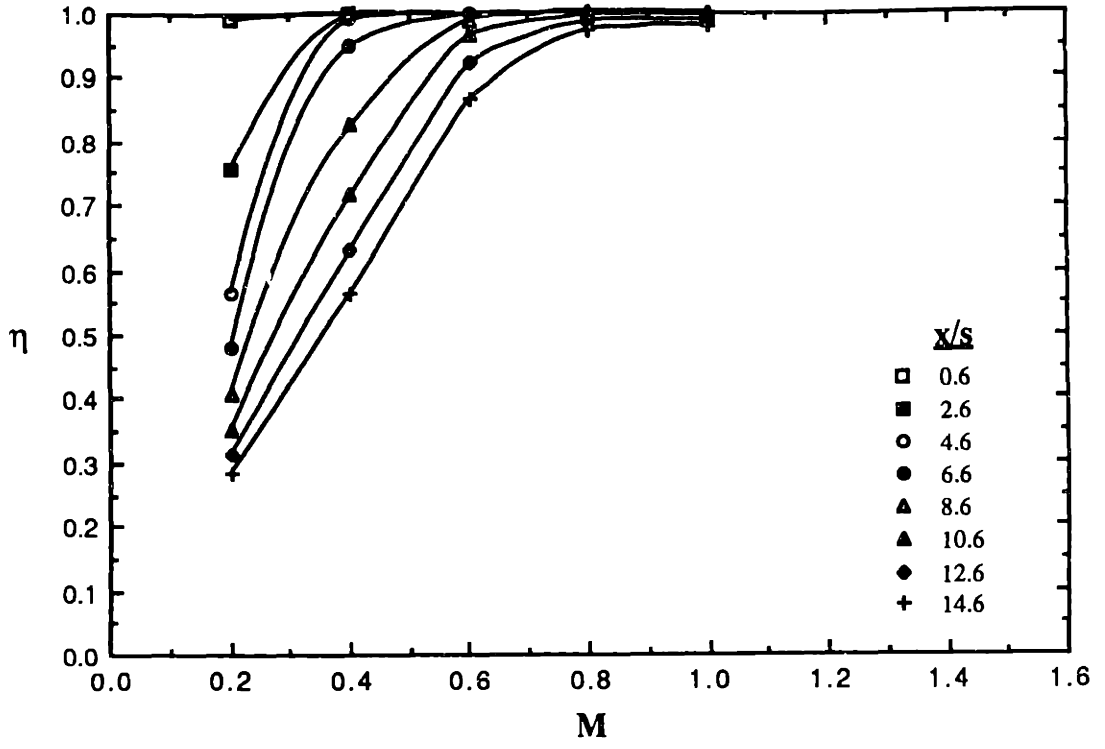

Figure 4-13: Numerical results (tangential injection)

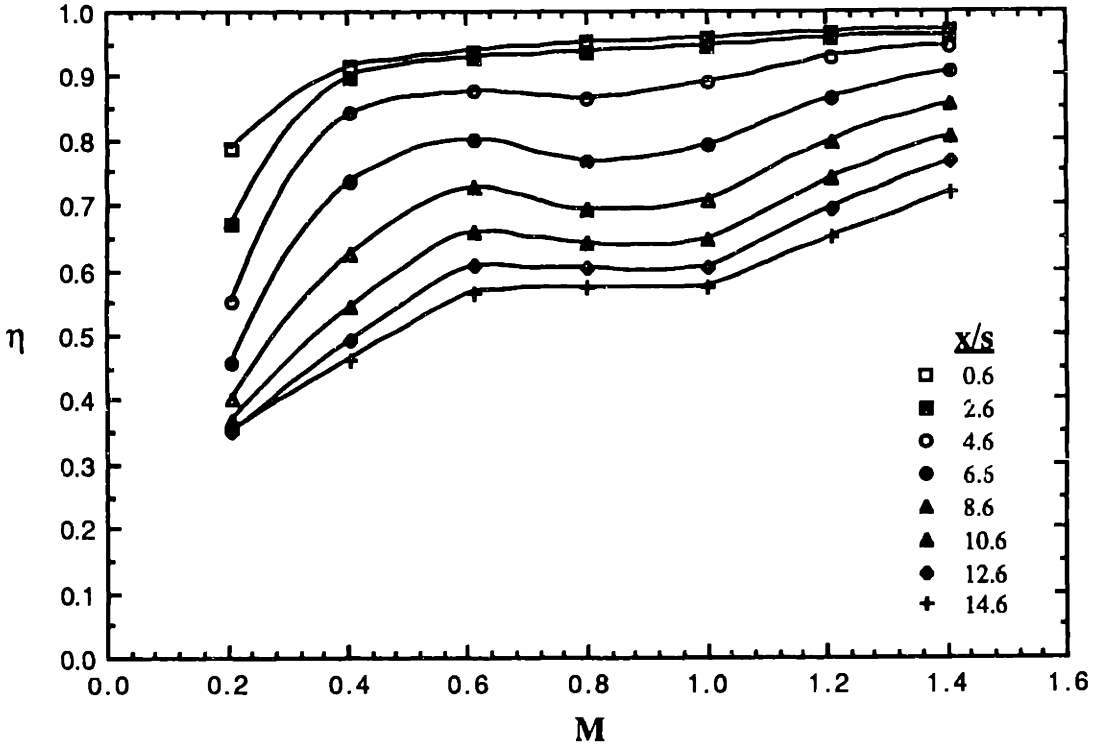

Figure 4-14: Experimental results (tangential injection)

V. Conclusions

Experimental results have been presented for adiabatic wall temperatures downstream of a multi-slot configuration through which air was injected into a mainstream for various injection angles. Because of the complex hydrodynamic behavior in the region immediately downstream of the slot, a purely empirical correlation of the results was performed.

Film effectiveness measurements showed a strong dependence on the blowing ratio, particularly at low values, and on the downstream distance from the slot. Correlations based on a parameter combining both these effects were relatively successful. An optimum injection angle was observed at 8.5°.

Although limited results were obtained for film effectiveness in the presence of strong acceleration factors, a reduction in film effectiveness was observed for typical gas turbine airfoil accelerations factors. An adjustment is needed for correlations based on (x/Ms) parameter to account for this drop in value.

The results of the numerical analysis performed with the commercially available CFD code, FLUENT, compared relatively well with experimental results for low blowing ratios but were much higher in value for increasing blowing ratios. A more refined turbulence model is needed to accurately describe in terms of film effectiveness the mixing region downstream of the injection slot.

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Appendix A: Conduction Error

The measured test plate surface temperature T_w is in fact slightly lower than the idealized adiabatic wall temperature T_{aw} because of the conduction across the test plate and uroethane insulation. In this appendix an upper bound estimate using a simple control volume approach and a 1-D conduction model is performed to evaluate the percent decrease in adiabatic wall temperature due to the heat flux across the test plate. Radiation losses and axial conduction across the grain of the maple test plate contribute significantly less to the overall heat losses to the environment and are neglected in this calculation.

A 1-D conduction model of the test plate is shown in *Figure A-1.*

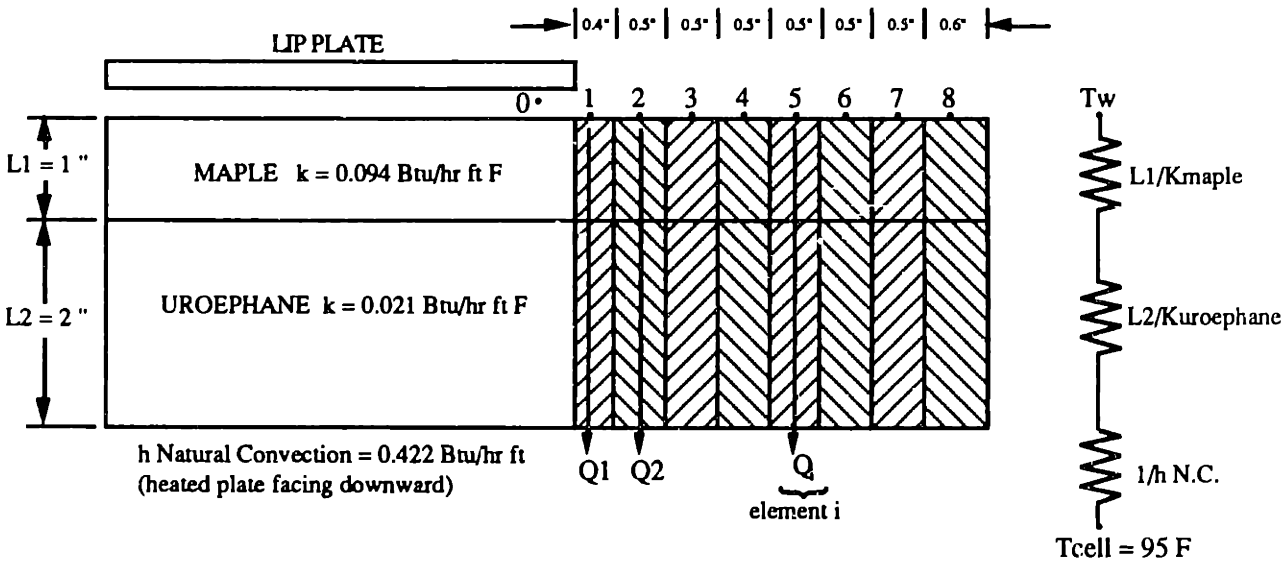


Figure A-1: 1-D conduction model

From the measured surface temperature at thermocouple locations 1 through 8 the heat flux q_i across the test plate for element i is given by:

$$q_i = \frac{T_{cell} - T_{wi}}{1/h_{N.C.} + L_1/K_{maple} + L_2/K_{uroephane}}$$

Substituting numerical values the following equation is obtained:

$$q_i = 0.08934\ (95 - T_{aw}) \qquad [Btu/hr\ ft^2]$$

Knowing the heat flux across the test plate, the decrease in adiabatic wall temperature can be estimated by performing an energy balance on a control volume as shown in *Figure A-2*.

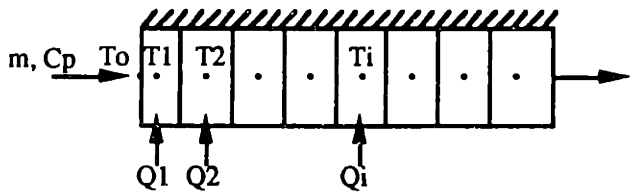


Figure A-2: Control volume

Energy balance: $$\Delta T_i = T_i - T_o = \Sigma \frac{A_i q_i}{\dot{m} C_p}$$

Results for the increase in temperature are presented in tabular form in *Table A-1* and indicated a maximum increase in temperature less than 2 percent.

Table A-1: Conduction error analysis

T/C #	1	2	3	4	5	6	7	8
T_w	139.3	155.5	172.5	186	193.95	198.64	201.1	200.7
q	3.976	5.405	6.924	8.130	8.84	9.259	9.479	9.443
ΔT	0.119	0.321	0.580	0.884	1.215	1.562	1.916	2.269

Appendix B: Error Analysis

According to reference 13, given a result R to be a linear function of n independent variables (v_1, v_2, ..., v_n) described by the uncertainty intervals (u_1, u_2, ..., u_n) then the uncertainty interval u_R for the result, based on the same odds as the intervals for each of the variables, is given by:

$$u_R = \left[\left(\frac{\partial R}{\partial v_1} u_1\right)^2 + \left(\frac{\partial R}{\partial v_2} u_2\right)^2 + \ldots\ldots + \left(\frac{\partial R}{\partial v_n} u_n\right)^2\right]^{1/2} \qquad \text{(B1)}$$

For product functions of the form $f = v_1^{n_1} v_2^{n_2} \ldots\ldots v_n^{n_n}$ the uncertainty interval is conveniently found by logarithmic differentiation:

$$\ln(f) = n_1\ln(v_1) + n_2\ln(v_2) + \ldots. + n_n\ln(v_n)$$

$$\frac{df}{f} = n_1\frac{dv_1}{v_1} + n_2\frac{dv_2}{v_2} + \ldots. + n_n\frac{dv_n}{v_n}$$

Thus, the relative uncertainty is given by:

$$u_R/R = \left[\left(n_1\frac{u_1}{v_1}\right)^2 + \left(n_2\frac{u_2}{v_2}\right)^2 + \ldots\ldots + \left(n_n\frac{u_n}{v_n}\right)^2\right]^{1/2} \qquad \text{(B2)}$$

Film Effectiveness Uncertainty

From Eq. B1 and Eq. 2, the film effectiveness uncertainty (u_η) is equal to:

$$u_\eta = \left[\left(\frac{Tg-Taw}{(Tg-Ts)^2} u_{Ts}\right)^2 + \left(\frac{1}{Tg-Ts} u_{Taw}\right)^2 + \left(\frac{Taw - Ts}{(Tg-Ts)^2} u_{Tg}\right)^2\right]^{1/2}$$

and the relative uncertainty is equal to:

$$u_\eta/\eta = \left[\left(\frac{u_{Ts}}{Tg-Ts}\right)^2 + \left(\frac{u_{Taw}}{Tg-Taw}\right)^2 + \left(\frac{(Taw-Ts)u_{Tg}}{(Tg-Ts)(Tg-Taw)}\right)^2\right]^{1/2}$$

The maximum relative uncertainty occurs for minimum values of (T_g-T_s) and (T_g-T_{aw}) or equivalently for maximum values of T_s and T_{aw} (i.e. low M ratio and high x/s ratio). *Table B-1* summarizes the uncertainty results for the different experimental tests.

Table B-1: Film effectiveness uncertainty analysis

$u_{T_s} = u_{T_{aw}} = u_{T_g} = \pm$ 1.0 deg. F

α deg	$Ka_{x=0}$ x 10^{-6}	T_{smax} ° F	T_g ° F	T_{awmax} ° F	$(u_\eta/\eta)_{max}$ %
0.0	0.0	113.9	251.	204.4	2.7
5.0	0.0	123.2	252	217.9	**3.7**
8.5	0.0	109.9	250	203.0	2.7
11.5	0.0	111.7	251	201.2	2.5
15.0	0.0	95.3	251	192.6	2.1
8.5	0.2 - 6.0	77.1	249	210.0	3.3

Mass Flow Rate Uncertainty

The equation to compute the air mass flow rate is given by Eq. 14 and is in the form of a product. Therefore, Eq. B2 may be used to determine the mass flow rate uncertainty u_m for which the results are conveniently summarized in *Table B-2*.

Table B-2: Mass flow rate uncertainty analysis

Component	v_i	u_i 20:1	u_i/v_i %	n_i	$(n_i u_i/v_i)^2$ $(\%)^2$
C	0.6169	0.005	0.811	1	0.658
Y	0.9983	0.001	0.100	1	0.01
d	0.644	0.001	0.155	2	0.096
F_s	1.0005	0.0005	0.05	1	0.0025
P_1	14.720	0.0088	0.06	0.5	0.009
T_1	97.7	1.0	1.02	-0.5	0.26
ΔP	0.3	0.0125	4.167	0.5	4.34
β	0.4	0.001	0.25	-2	0.25

$$u_m / m = \sqrt{\Sigma(n_i u_i/v_i)^2} = \mathbf{2.37}\ \%$$

Test Section Measurement Uncertainties

From the definition of the blowing ratio given by Eq. 4, the accuracy of measurements of the mainstream plenum area A_g and the slot area A_s will determine the accuracy of the calculated blowing ratio. The mainstream plenum area is equal to:

$$A_g = H\,W$$

where W is the total width of the plenum and h the height of the plenum as given in *Table 1*. The slot area is given by:

$$A_s = s\,(w1 + 7w + w2)$$

where s is the lip thickness, w is the slot width, and w1 and w2 are the widths of the first and last slot of the test plate having lengths 0.44 and 0.46 in. respectively (see *Figure 2-5*). *Table B-3* summarizes the uncertainty analysis performed on both areas.

Table B-3: Test section measurement uncertainty analysis

Component	v_i	u_i 20:1	u_i/v_i %	n_i	$(n_i u_i/v_i)^2$ (%)²
A_g					
H	2.90	0.01	0.34483	1	0.11891
W	11.65	0.01	0.08584	1	0.00737
			u_{Ag} / A_g = **0.355%**		

Component	v_i	u_i 20:1	u_i/v_i %	n_i	$(n_i u_i/v_i)^2$ (%)²
A_s					
s	0.18	0.01	5.55556	1	30.8642
w+7w2+w1luw	9.65	0.01	0.10363	7	0.52619
w+7w2+w1luw1	9.65	0.01	0.10363	1	0.01074
w+7w2+w1luw2	9.65	0.01	0.10363	1	0.01074
			u_{As} / A_s = **5.604%**		

Mass-Velocity Ratio Uncertainty

The mass-velocity ratio is calculated according to Eq. 4. From the results of the uncertainty analysis performed for the mass flow rates and test section measurements, the uncertainty interval for the mass velocity ratio may be calculated and the results are shown in *Table B-4*.

Table B-4: Mass-velocity uncertainty analysis

Component	v_i	u_i 20:1	u_i/v_i %	n_i	$(n_i u_i/v_i)^2$ $(\%)^2$
m_g	___	___	2.37	1	5.617
m_s	___	___	2.37	1	5.617
A_g	___	___	0.355	1	0.126
A_s	___	___	5.604	1	31.405

$u_M / M = \mathbf{6.54}$ %

Appendix C: Film Effectiveness Data

FILM EFFECTIVENESS TEST
ANGLED INJECTION WITH HOT ACCELERATING FLOW

INJECTION ANGLE = 0.0 DEG. NUMBER OF SLOTS = 8 SLOT WIDTH = 1.25 (IN.)
SLOT HEIGHT = 0.85 (IN.) LIP THICKNESS = 0.25 (IN.)
HOT SIDE AREA= 34.1350 (SQ.IN) COLD SIDE AREA= 3.4100 (SQ.IN.)

Y/C LOCATIONS

Y/C#	X/S	4R	5L	5M	5R	6L	6M
1	6.600	X	X	X	X	X	X
2	8.800	X	X	X	X	X	X
3	6.000	X	X	X	X	X	X
4	8.400	X	X	X	X	X	X
5	8.000	X	X	X	X	X	X
6	10.000	X	X	X	X	X	X
7	12.000	X	X	X	X	X	X
8	14.000	X	X	X	X	X	X

Note: D(X1,X2) = 100*(X2-X1)/X1
Note: EF = (Tgas - Tam)/(Tgas - Tcoolt)

FILM EFFECTIVENESS DATA

***** Column 4R *****

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
348	1	0.813	135.376	250.600	104.500	0.787	3.813
348	2	0.813	151.385	250.600	104.500	0.679	12.188
348	3	0.813	168.113	250.600	104.500	0.584	21.566
348	4	0.813	183.852	250.600	104.500	0.493	30.942
348	5	0.813	191.697	250.600	104.500	0.404	40.319
348	6	0.813	196.385	250.600	104.500	0.370	49.695
348	7	0.813	198.588	250.600	104.500	0.355	59.072
348	8	0.813	197.939	250.600	104.500	0.360	68.448

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
350	1	0.410	111.382	250.500	98.100	0.901	1.468
350	2	0.410	111.919	250.500	98.100	0.898	4.337
350	3	0.410	121.380	250.500	98.100	0.838	11.211
350	4	0.410	137.673	250.500	98.100	0.731	16.086
350	5	0.410	153.103	250.500	98.100	0.618	20.960
350	6	0.410	167.854	250.500	98.100	0.535	25.835
350	7	0.410	175.504	250.500	98.100	0.488	30.708
350	8	0.410	178.962	250.500	98.100	0.463	35.584

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
351	1	0.618	101.692	250.800	90.600	0.932	0.971
351	2	0.618	102.226	250.800	90.600	0.927	4.206
351	3	0.618	113.343	250.800	90.600	0.864	7.442
351	4	0.618	126.458	250.800	90.600	0.787	10.678
351	5	0.618	136.404	250.800	90.600	0.716	13.914
351	6	0.618	146.867	250.800	90.600	0.648	17.149
351	7	0.618	154.973	250.800	90.600	0.598	20.385
351	8	0.618	160.508	250.800	90.600	0.564	23.621

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
352	1	0.805	94.031	250.800	87.600	0.948	0.748
352	2	0.805	97.776	250.800	87.600	0.928	3.231
352	3	0.805	111.076	250.800	87.600	0.858	5.714
352	4	0.805	128.894	250.800	87.600	0.747	8.202
352	5	0.805	141.428	250.800	87.600	0.670	10.687
352	6	0.805	150.003	250.800	87.600	0.618	13.173
352	7	0.805	155.319	250.800	87.600	0.585	15.658
352	8	0.805	158.908	250.800	87.600	0.563	18.143

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
353	1	1.010	92.158	250.700	86.900	0.956	0.594
353	2	1.010	93.883	250.700	86.900	0.946	2.975
353	3	1.010	104.364	250.700	86.900	0.882	4.536
353	4	1.010	122.563	250.700	86.900	0.772	6.537
353	5	1.010	137.629	250.700	86.900	0.682	8.517
353	6	1.010	148.603	250.700	86.900	0.617	10.498
353	7	1.010	154.930	250.700	86.900	0.579	12.478
353	8	1.010	159.079	250.700	86.900	0.553	14.460

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
354	1	1.206	89.460	250.500	84.400	0.970	0.497
354	2	1.206	90.787	250.500	84.400	0.962	2.155
354	3	1.206	96.031	250.500	84.400	0.930	3.813
354	4	1.206	107.307	250.500	84.400	0.861	5.471
354	5	1.206	119.811	250.500	84.400	0.787	7.129
354	6	1.206	130.336	250.500	84.400	0.723	8.787
354	7	1.206	138.781	250.500	84.400	0.673	10.445
354	8	1.206	144.772	250.500	84.400	0.637	12.103

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
355	1	1.409	88.398	250.700	84.000	0.976	0.426
355	2	1.409	88.239	250.700	84.000	0.989	1.845
355	3	1.409	91.981	250.700	84.000	0.953	3.265
355	4	1.409	98.826	250.700	84.000	0.910	4.685
355	5	1.409	108.082	250.700	84.000	0.858	6.104
355	6	1.409	117.105	250.700	84.000	0.801	7.524
355	7	1.409	124.877	250.700	84.000	0.755	8.943
355	8	1.409	131.908	250.700	84.000	0.713	10. 3

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
356	1	1.212	90.389	250.600	84.100	0.974	0.495
356	2	1.212	91.539	250.600	84.100	0.967	2.145
356	3	1.211	96.872	250.600	84.100	0.936	3.796
356	4	1.212	107.198	250.600	84.100	0.872	5.446
356	5	1.211	118.263	250.600	84.100	0.798	7.096
356	6	1.212	129.360	250.600	84.100	0.728	8.747
356	7	1.211	137.347	250.600	84.100	0.680	10.397
356	8	1.211	143.931	250.600	84.100	0.640	12.047

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
357	1	0.996	93.284	250.700	88.800	0.971	0.603
357	2	0.996	94.812	250.700	88.800	0.962	2.411
357	3	0.996	104.488	250.700	88.800	0.902	4.219
357	4	0.996	122.038	250.700	88.800	0.794	6.028
357	5	0.996	136.581	250.700	88.800	0.704	8.836
357	6	0.996	147.150	250.700	88.800	0.639	10.645
357	7	0.996	153.763	250.700	88.800	0.598	12.453
357	8	0.996	158.561	250.700	88.800	0.569	14.262

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
358	1	0.799	98.088	250.600	87.300	0.943	0.751
358	2	0.799	112.212	250.600	92.500	0.875	3.757
358	3	0.799	129.548	250.600	92.500	0.766	8.260
358	4	0.799	141.513	250.600	92.500	0.690	10.763
358	5	0.799	150.089	250.600	92.500	0.636	13.267
358	6	0.799	155.865	250.600	92.500	0.600	15.770
358	7	0.799	159.946	250.600	92.500	0.573	18.273
358	8	0.799	158.844	250.600	92.500	0.581	20.777

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
359	1	0.805	102.553	250.700	93.900	0.957	0.893
359	2	0.805	103.571	250.700	93.900	0.950	4.287
359	3	0.805	118.805	250.700	93.900	0.852	7.680
359	4	0.805	134.865	250.700	93.900	0.817	10.807
359	5	0.805	135.796	250.700	93.900	0.742	14.213
359	6	0.805	146.415	250.700	93.900	0.674	17.318
359	7	0.805	153.018	250.700	93.900	0.618	20.833
359	8	0.805	161.563	250.700	93.900	0.576	24.138

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
360	1	0.401	111.120	250.700	102.200	0.940	1.493
360	2	0.402	111.513	250.700	102.200	0.937	8.471
360	3	0.402	118.374	250.700	102.200	0.884	11.448
360	4	0.402	135.401	250.700	102.200	0.776	16.426
360	5	0.402	153.266	250.700	102.200	0.656	21.404
360	6	0.402	166.427	250.700	102.200	0.567	26.381
360	7	0.402	175.072	250.700	102.200	0.508	31.359
360	8	0.401	180.088	250.700	102.200	0.478	36.336

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
361	1	0.204	140.804	250.800	113.900	0.803	2.940
361	2	0.204	154.183	250.800	113.800	0.691	13.739
361	3	0.204	173.176	250.800	113.900	0.573	22.538
361	4	0.204	188.683	250.800	113.900	0.470	32.337
361	5	0.204	194.610	250.900	113.900	0.411	42.136
361	6	0.204	199.496	250.800	113.900	0.375	51.935
361	7	0.204	202.067	250.900	113.900	0.357	61.734
361	8	0.204	202.177	250.900	113.900	0.356	71.534

***** Column 5L *****

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
348	1	0.213	134.843	250.400	104.550	0.778	2.813
348	2	0.213	154.671	250.400	104.500	0.656	12.188
348	3	0.213	172.348	250.400	104.500	0.535	21.564
348	4	0.213	186.639	250.400	104.500	0.438	30.942
348	5	0.213	193.270	250.400	104.500	0.392	40.319
348	6	0.213	197.307	250.400	104.500	0.363	49.695
348	7	0.213	199.830	250.400	104.500	0.339	59.072
348	8	0.213	198.199	250.400	104.500	0.350	68.448

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
350	1	0.410	113.649	250.500	98.100	0.893	1.468
350	2	0.410	117.671	250.500	98.100	0.860	6.337
350	3	0.410	128.065	250.500	98.100	0.793	11.211
350	4	0.410	144.200	250.500	98.100	0.688	16.088
350	5	0.410	158.474	250.500	98.100	0.596	20.960
350	6	0.410	169.582	250.500	98.100	0.526	25.835
350	7	0.410	176.215	250.500	98.100	0.488	30.709
350	8	0.410	179.284	250.500	98.100	0.461	35.584

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
351	1	0.618	102.863	250.800	90.600	0.923	0.971
351	2	0.618	104.432	250.800	90.600	0.912	4.206
351	3	0.618	112.363	250.800	90.600	0.864	7.442
351	4	0.618	123.610	250.800	90.600	0.796	10.678
351	5	0.618	133.333	250.800	90.600	0.730	13.914
351	6	0.618	148.018	250.800	90.600	0.634	17.149
351	7	0.618	144.600	250.800	90.600	0.683	20.385
351	8	0.618	160.268	250.800	90.600	0.565	23.621

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
352	1	0.805	97.666	250.800	87.600	0.840	0.748
352	2	0.805	99.835	250.800	87.600	0.825	3.231
352	3	0.805	109.884	250.800	87.600	0.863	5.714
352	4	0.805	123.824	250.800	87.600	0.784	8.202
352	5	0.805	134.135	250.800	87.600	0.713	10.687
352	6	0.805	142.913	250.800	87.600	0.651	13.173
352	7	0.805	148.127	250.800	87.600	0.616	15.658
352	8	0.805	154.714	250.800	87.600	0.588	18.143

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
353	1	1.010	93.330	250.700	86.900	0.948	0.594
353	2	1.010	95.874	250.700	86.900	0.934	2.975
353	3	1.010	106.136	250.700	86.900	0.872	4.536
353	4	1.010	121.208	250.700	86.900	0.781	-.537
353	5	1.010	133.855	250.700	86.900	0.706	8.517
353	6	1.010	143.044	250.700	86.900	0.648	10.498
353	7	1.010	151.953	250.700	86.900	0.636	12.478
353	8	1.010	154.454	250.700	86.900	0.580	14.460

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
354	1	1.206	90.831	250.500	84.400	0.961	0.497
354	2	1.206	92.778	250.500	84.400	0.950	2.155
354	3	1.206	99.636	250.500	84.400	0.908	3.813
354	4	1.206	111.293	250.500	84.400	0.838	5.471
354	5	1.206	122.038	250.500	84.400	0.773	7.129
354	6	1.206	130.903	250.500	84.400	0.720	8.787
354	7	1.206	136.353	250.500	84.400	0.688	10.445
354	8	1.206	144.886	250.500	84.400	0.637	12.103

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
355	1	1.409	89.583	250.700	84.000	0.966	0.426
355	2	1.409	91.009	250.700	84.000	0.958	1.845
355	3	1.409	96.988	250.700	84.000	0.924	3.265
355	4	1.409	102.686	250.700	84.000	0.888	4.685
355	5	1.409	111.285	250.700	84.000	0.834	6.104
355	6	1.409	118.884	250.700	84.000	0.786	7.524
355	7	1.409	126.149	250.700	84.000	0.747	8.943
355	8	1.409	132.995	250.700	84.000	0.709	10.363

ROW#	Y/C#	M	Tam	Tgas	Tcoolt	EF	x/Ms
356	1	1.212	91.672	250.600	84.100	0.966	0.495
356	2	1.212	93.387	250.600	84.100	0.954	2.145
356	3	1.212	99.889	250.600	84.100	0.914	3.796
356	4	1.212	111.428	250.600	84.100	0.846	5.446
356	5	1.212	124.601	250.600	84.100	0.784	7.096
356	6	1.212	130.375	250.600	84.100	0.731	8.747
356	7	1.212	136.397	250.600	84.100	0.706	10.397
356	8	1.212	144.540	250.600	84.100	0.666	12.047

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
337	1	0.998	86.835	250.700	88.800	0.963	0.803
337	2	0.998	96.491	250.700	88.800	0.868	2.811
337	3	0.998	104.578	250.700	88.800	0.809	4.819
337	4	0.998	130.615	250.700	88.800	0.801	6.828
337	5	0.998	132.813	250.700	88.800	0.731	8.836
337	6	0.998	141.166	250.700	88.800	0.676	10.845
337	7	0.998	141.734	250.700	88.800	0.678	12.853
337	8	0.998	153.765	250.700	88.800	0.588	14.862

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
338	1	0.788	89.687	250.600	92.500	0.896	0.751
338	2	0.788	101.836	250.600	92.500	0.960	2.256
338	3	0.788	111.130	250.600	92.500	0.883	3.757
338	4	0.788	125.217	250.600	92.500	0.806	5.260
338	5	0.788	136.048	250.600	92.500	0.737	10.769
338	6	0.788	148.695	250.600	92.500	0.683	13.867
338	7	0.788	163.648	250.600	92.500	0.676	15.770
338	8	0.788	185.698	250.600	92.500	0.602	18.873

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
339	1	0.605	103.926	250.700	95.900	0.868	0.992
339	2	0.605	106.825	250.700	95.900	0.833	4.887
339	3	0.605	113.906	250.700	95.900	0.808	7.808
339	4	0.605	126.396	250.700	95.900	0.816	10.907
339	5	0.605	136.013	250.700	95.900	0.761	14.813
339	6	0.605	146.415	250.700	95.900	0.674	17.918
339	7	0.605	167.150	250.700	95.900	0.668	20.823
339	8	0.605	181.716	250.700	95.900	0.578	24.128

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
340	1	0.403	112.998	250.700	102.300	0.927	1.483
340	2	0.403	119.330	250.700	102.300	0.883	6.471
340	3	0.403	128.588	250.700	102.300	0.838	11.448
340	4	0.403	144.427	250.700	102.300	0.718	16.426
340	5	0.403	158.301	250.700	102.300	0.628	21.404
340	6	0.403	169.130	250.700	102.300	0.549	26.381
340	7	0.403	181.156	250.700	102.300	0.605	31.359
340	8	0.403	190.777	250.700	102.300	0.471	36.336

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
341	1	0.204	142.040	250.800	113.900	0.785	2.960
341	2	0.204	159.295	250.800	113.900	0.649	12.758
341	3	0.204	178.425	250.800	113.900	0.569	22.538
341	4	0.204	189.736	250.800	113.900	0.447	32.337
341	5	0.204	196.898	250.800	113.900	0.399	42.136
341	8	0.204	200.630	250.800	113.900	0.367	51.935
341	7	0.204	177.498	250.800	113.900	0.536	61.734
341	8	0.204	802.550	250.800	113.900	0.354	71.534

***** Column 5H *****

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
349	1	0.813	133.567	250.400	104.500	0.801	2.813
349	2	0.813	149.181	250.400	104.500	0.694	12.189
349	3	0.813	168.854	250.400	104.500	0.577	21.566
349	4	0.813	181.901	250.400	104.500	0.498	30.943
349	5	0.813	190.935	250.400	104.500	0.408	40.319
349	6	0.813	196.340	250.400	104.500	0.371	49.695
349	7	0.813	198.718	250.400	104.500	0.354	59.072
349	8	0.813	197.680	250.400	104.500	0.381	68.448

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
350	1	0.410	111.307	250.500	96.100	0.902	1.462
350	2	0.410	112.363	250.500	96.100	0.883	6.337
350	3	0.410	119.985	250.500	96.100	0.849	11.211
350	4	0.410	133.693	250.500	96.100	0.766	16.086
350	5	0.410	153.882	250.500	96.100	0.626	20.960
350	6	0.410	167.205	250.500	96.100	0.539	25.835
350	7	0.410	175.376	250.500	96.100	0.487	30.709
350	8	0.410	178.873	250.500	96.100	0.486	35.584

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
351	1	0.618	101.003	250.800	90.600	0.835	0.971
351	2	0.618	102.353	250.800	90.600	0.825	6.206
351	3	0.618	111.908	250.800	90.600	0.867	7.442
351	4	0.618	129.610	250.800	90.600	0.786	10.878
351	5	0.618	135.183	250.800	90.600	0.732	13.916
351	6	0.618	145.464	250.800	90.600	0.638	17.149
351	7	0.618	156.185	250.800	90.600	0.603	20.385
351	8	0.618	158.900	250.800	90.600	0.567	23.621

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
352	1	0.805	95.653	250.800	87.600	0.951	0.748
352	2	0.805	98.041	250.800	87.600	0.936	3.231
352	3	0.805	111.033	250.800	87.600	0.856	5.716
352	4	0.805	129.419	250.800	87.600	0.746	8.202
352	5	0.805	141.446	250.800	87.600	0.669	10.687
352	6	0.805	148.037	250.800	87.600	0.620	13.173
352	7	0.805	153.103	250.800	87.600	0.589	15.658
352	8	0.805	158.431	250.800	87.600	0.566	18.143

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
353	1	1.010	91.806	250.700	84.900	0.958	0.594
353	2	1.010	94.060	250.700	84.900	0.945	2.575
353	3	1.010	103.748	250.700	84.900	0.888	4.556
353	4	1.010	121.427	250.700	84.900	0.780	6.537
353	5	1.010	137.017	250.700	84.900	0.684	8.517
353	6	1.010	148.014	250.700	84.900	0.618	10.498
353	7	1.010	153.103	250.700	84.900	0.577	12.479
353	8	1.010	158.848	250.700	84.900	0.553	14.460

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
354	1	1.208	89.238	250.500	84.600	0.971	0.497
354	2	1.208	90.787	250.500	84.600	0.963	2.136
354	3	1.208	95.399	250.500	84.600	0.936	3.813
354	4	1.208	105.782	250.500	84.600	0.871	5.471
354	5	1.208	118.630	250.500	84.600	0.798	7.129
354	6	1.208	128.832	250.500	84.600	0.734	8.787
354	7	1.208	137.654	250.500	84.600	0.681	10.445
354	8	1.208	144.081	250.500	84.600	0.641	12.103

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
355	1	1.408	88.000	250.700	84.000	0.978	0.426
355	2	1.408	89.259	250.700	84.000	0.969	1.845
355	3	1.408	91.648	250.700	84.000	0.955	3.265
355	4	1.408	97.511	250.700	84.000	0.919	4.685
355	5	1.408	106.225	250.700	84.000	0.867	6.104
355	6	1.408	115.178	250.700	84.000	0.813	7.524
355	8	1.408	130.510	250.700	84.000	0.721	10.363

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
356	1	1.212	90.035	250.600	86.100	0.876	0.495
356	2	1.212	91.685	250.600	86.100	0.867	3.145
356	3	1.212	99.587	250.600	86.100	0.862	3.796
356	4	1.212	105.782	250.600	86.100	0.880	5.446
356	5	1.212	117.453	250.600	86.100	0.809	7.096
356	6	1.212	127.936	250.600	86.100	0.746	8.747
356	7	1.212	136.976	250.600	86.100	0.691	10.397
356	8	1.212	143.822	250.600	86.100	0.648	12.047

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
357	1	0.998	91.910	250.700	88.600	0.973	0.807
357	2	0.998	94.857	250.700	88.600	0.961	2.811
357	3	0.998	106.057	250.700	88.600	0.905	4.819
357	4	0.998	121.470	250.700	88.600	0.787	6.828
357	5	0.998	136.650	250.700	88.600	0.705	8.836
357	6	0.998	146.977	250.700	88.600	0.640	10.845
357	7	0.998	156.109	250.700	88.600	0.598	12.853
357	8	0.998	158.733	250.700	88.600	0.587	14.862

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
358	1	0.798	97.589	250.600	88.500	0.968	0.751
358	2	0.798	99.863	250.600	92.300	0.853	3.256
358	3	0.798	111.819	250.600	92.300	0.878	5.757
358	4	0.798	128.884	250.600	88.300	0.770	8.260
358	5	0.798	140.991	250.600	88.300	0.693	10.763
358	6	0.798	149.181	250.600	92.300	0.641	13.267
358	7	0.798	155.166	250.600	88.300	0.604	15.770
358	8	0.798	159.395	250.600	88.300	0.578	18.273

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
359	1	0.605	101.878	250.700	95.900	0.961	0.992
359	2	0.605	103.615	250.700	95.900	0.950	4.887
359	3	0.605	111.688	250.700	95.900	0.898	7.803
359	4	0.605	123.256	250.700	95.900	0.830	10.907
359	5	0.605	133.967	250.700	95.900	0.757	14.313
359	6	0.605	144.400	250.700	95.900	0.683	17.518
359	7	0.605	154.195	250.700	95.900	0.693	20.823
359	8	0.605	161.111	250.700	95.900	0.578	24.128

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
360	1	0.403	110.816	250.700	102.300	0.862	1.483
360	2	0.403	112.518	250.700	102.300	0.731	6.471
360	3	0.403	119.048	250.700	102.300	0.998	11.448
360	4	0.403	136.510	250.700	102.300	0.784	16.426
360	5	0.403	152.553	250.700	102.300	0.661	21.404
360	6	0.403	166.670	250.700	102.300	0.567	26.381
360	7	0.403	175.461	250.700	102.300	0.507	31.359
360	8	0.403	180.258	250.700	102.300	0.474	36.336

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
361	1	0.204	138.982	250.900	113.900	0.817	2.960
361	2	0.204	156.108	250.900	113.900	0.707	12.758
361	3	0.204	170.748	250.900	113.900	0.585	22.538
361	4	0.204	185.316	250.900	113.900	0.479	32.337
361	5	0.204	193.702	250.900	113.900	0.419	42.136
361	8	0.204	179.237	250.900	113.900	0.377	51.935
361	7	0.204	202.004	250.900	113.900	0.357	61.734
361	8	0.204	201.748	250.900	113.900	0.359	71.534

***** Column 5R *****

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
348	1	0.213	136.693	250.400	104.500	0.781	2.813
349	2	0.213	151.429	250.400	104.500	0.678	12.189
349	3	0.213	168.885	250.400	104.500	0.532	21.566
349	4	0.213	183.630	250.400	104.500	0.458	30.943
349	5	0.213	192.016	250.400	104.500	0.400	40.319
349	6	0.213	196.426	250.400	104.500	0.270	49.695
349	7	0.213	198.977	250.400	104.500	0.352	59.072
349	8	0.213	197.594	250.400	104.500	0.382	68.448

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
350	1	0.410	113.653	250.500	96.100	0.886	1.462
350	2	0.410	115.444	250.500	96.100	0.875	6.337
350	3	0.410	125.706	250.500	96.100	0.809	11.211
350	4	0.410	141.035	250.500	96.100	0.709	16.086
350	5	0.410	156.832	250.500	96.100	0.607	20.960
350	6	0.410	168.502	250.500	96.100	0.531	25.835
350	7	0.410	175.720	250.500	96.100	0.484	30.709
350	8	0.410	178.918	250.500	96.100	0.484	35.584

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
351	1	0.618	103.613	250.800	90.600	0.819	0.971
351	2	0.618	104.765	250.800	90.600	0.812	4.209
351	3	0.618	113.430	250.800	90.600	0.864	7.442
351	4	0.618	131.898	250.800	90.600	0.783	10.678
351	5	0.618	135.401	250.800	90.600	0.720	13.916
351	6	0.618	145.507	250.800	90.600	0.657	17.149
351	7	0.618	153.719	250.800	90.600	0.606	20.385
351	8	0.618	160.075	250.800	90.600	0.566	23.621

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
352	1	0.805	97.997	250.800	87.600	0.936	0.748
352	2	0.805	100.076	250.800	87.600	0.924	3.231
352	3	0.805	110.118	250.800	87.600	0.862	5.716
352	4	0.805	123.828	250.800	87.600	0.778	8.202
352	5	0.805	135.358	250.800	87.600	0.707	10.687
352	6	0.805	143.951	250.800	87.600	0.655	13.173
352	7	0.805	150.521	250.800	87.600	0.614	15.658
352	8	0.805	155.751	250.800	87.600	0.582	18.143

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
353	1	1.010	93.839	250.700	84.900	0.946	0.594
353	2	1.010	98.184	250.700	84.900	0.932	2.575
353	3	1.010	105.561	250.700	84.900	0.875	4.556
353	4	1.010	119.418	250.700	84.900	0.782	6.537
353	5	1.010	131.777	250.700	84.900	0.717	8.517
353	6	1.010	141.166	250.700	84.900	0.661	10.498
353	7	1.010	148.317	250.700	84.900	0.618	12.479
353	8	1.010	153.493	250.700	84.900	0.585	14.460

ROW#	Y/C#	M	Tsw	Tgas	Tplat	HV	z/Mo
354	1	1.208	90.763	250.500	84.600	0.982	0.497
354	2	1.208	92.378	250.500	84.600	0.950	2.153
354	3	1.208	98.479	250.500	84.600	0.915	3.810

356	5	1.208	110.108	250.500	84.600	0.787	7.129
356	6	1.208	120.536	250.500	84.600	0.748	8.787
356	7	1.208	134.283	250.500	84.600	0.700	10.465
356	8	1.208	141.515	250.500	84.600	0.656	12.103

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
355	1	1.409	89.195	250.700	84.000	0.969	0.428
355	2	1.409	90.051	250.700	84.000	0.958	1.065
355	3	1.409	93.972	250.700	84.000	0.940	2.365
355	4	1.409	100.828	250.700	84.000	0.899	4.485
355	5	1.409	108.382	250.700	84.000	0.854	6.104
355	6	1.409	113.358	250.700	84.000	0.812	7.526
355	7	1.409	122.387	250.700	84.000	0.770	8.963
355	8	1.409	130.425	250.700	84.000	0.722	10.383

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
356	1	1.212	91.539	250.600	86.100	0.967	0.485
356	2	1.212	93.397	250.600	86.100	0.956	2.165
356	3	1.212	98.926	250.600	86.100	0.928	3.786
356	4	1.212	108.658	250.600	86.100	0.886	5.466
356	5	1.212	117.802	250.600	86.100	0.807	7.086
356	6	1.212	126.143	250.600	86.100	0.787	8.767
356	7	1.212	133.917	250.600	86.100	0.709	10.367
356	8	1.212	141.885	250.600	86.100	0.661	12.047

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
357	1	0.996	94.581	250.700	88.100	0.969	0.403
357	2	0.996	98.803	250.700	88.400	0.949	2.611
357	3	0.996	105.473	250.700	88.400	0.896	4.819
357	4	0.996	118.719	250.700	88.400	0.814	6.638
357	5	0.996	130.936	250.700	88.400	0.761	8.638
357	6	0.996	139.813	250.700	88.400	0.684	10.665
357	7	0.996	147.653	250.700	88.400	0.637	12.653
357	8	0.996	156.085	250.700	88.400	0.596	14.662

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
358	1	0.799	89.836	250.600	93.500	0.953	0.751
358	2	0.799	101.045	250.600	93.500	0.861	3.356
358	3	0.799	111.186	250.600	93.500	0.883	5.757
358	4	0.799	134.221	250.600	93.500	0.799	8.860
358	5	0.799	133.533	250.600	93.500	0.728	10.763
358	6	0.799	144.136	250.600	93.300	0.673	13.267
358	7	0.799	151.348	250.600	93.300	0.628	15.770
358	8	0.799	157.610	250.600	93.300	0.589	18.273

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
359	1	0.805	104.523	250.700	93.900	0.968	0.988
359	2	0.805	109.738	250.700	93.900	0.936	4.197
359	3	0.805	118.518	250.700	93.900	0.893	7.602
359	4	0.805	133.817	250.700	93.900	0.826	10.907
359	5	0.805	136.836	250.700	93.900	0.748	14.213
359	6	0.805	145.805	250.700	93.900	0.681	17.518
359	7	0.805	154.281	250.700	93.900	0.623	20.823
359	8	0.805	161.506	250.700	93.900	0.576	24.128

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
360	1	0.402	118.867	250.700	102.200	0.829	1.693
360	2	0.402	116.231	250.700	102.200	0.819	8.671
360	3	0.402	123.088	250.700	102.200	0.838	11.448
360	4	0.402	138.384	250.700	102.200	0.757	14.426
360	5	0.402	154.671	250.700	102.200	0.667	21.404
360	6	0.402	166.816	250.700	102.200	0.585	26.391
360	7	0.402	175.547	250.700	102.200	0.506	31.359
360	8	0.402	180.681	250.700	102.200	0.471	36.336

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
361	1	0.204	141.777	250.900	113.900	0.787	3.840
361	2	0.204	156.103	250.900	113.900	0.691	12.739
361	3	0.204	173.905	250.900	113.900	0.582	22.538
361	4	0.204	187.044	250.900	113.900	0.466	32.337
361	5	0.204	195.086	250.900	113.900	0.407	42.136
361	6	0.204	199.339	250.900	113.900	0.375	51.935
361	7	0.204	203.586	250.900	113.900	0.353	61.734
361	8	0.204	203.177	250.900	113.900	0.356	71.536

***** Column 6L *****

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
348	1	0.213	139.157	250.400	104.500	0.781	2.813
348	2	0.213	157.330	250.400	104.500	0.638	12.188
348	3	0.213	174.896	250.400	104.500	0.520	21.566
348	4	0.213	186.629	250.400	104.500	0.438	30.982
348	5	0.213	193.862	250.400	104.500	0.387	40.319
348	6	0.213	198.069	250.400	104.500	0.359	49.695
348	7	0.213	200.880	250.400	104.500	0.362	59.072
348	8	0.213	198.755	250.400	104.500	0.367	68.448

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
350	1	0.410	113.218	250.500	86.100	0.888	1.482
350	2	0.410	116.832	250.500	86.100	0.879	8.357
350	3	0.410	124.615	250.500	86.100	0.813	11.811
350	4	0.410	141.996	250.500	86.100	0.703	18.086
350	5	0.410	156.858	250.500	86.100	0.597	20.960
350	6	0.410	170.374	250.500	86.100	0.580	35.835
350	7	0.410	177.493	250.500	86.100	0.472	50.709
350	8	0.410	180.777	250.500	86.100	0.452	55.584

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
351	1	0.418	103.084	250.800	90.600	0.922	0.871
351	2	0.418	104.387	250.800	90.600	0.914	6.206
351	3	0.418	113.173	250.800	90.600	0.859	7.662
351	4	0.418	125.175	250.800	90.600	0.782	10.679
351	5	0.418	137.410	250.800	90.600	0.708	13.914
351	6	0.418	138.014	250.800	90.600	0.662	17.148
351	7	0.418	156.087	250.800	90.600	0.581	20.385
351	8	0.418	161.975	250.800	90.600	0.554	23.621

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
352	1	0.805	87.555	250.800	87.600	0.939	0.746
352	2	0.805	88.634	250.800	87.600	0.926	3.231
352	3	0.805	111.904	250.800	87.600	0.851	5.716
352	4	0.805	128.589	250.800	87.600	0.748	8.202
352	5	0.805	140.906	250.800	87.600	0.673	10.687
352	6	0.805	148.985	250.800	87.600	0.624	13.173
352	7	0.805	154.843	250.800	87.600	0.588	15.658
352	8	0.805	158.908	250.800	87.600	0.563	18.145

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
353	1	1.010	93.609	250.700	84.600	0.935	2.571
353	2	1.010	104.236	250.700	84.900	0.883	6.336
353	4	1.010	121.165	250.700	84.900	0.781	8.537
353	5	1.010	135.270	250.700	84.900	0.696	8.517
353	6	1.010	145.550	250.700	84.900	0.636	10.698
353	7	1.010	152.380	250.700	84.900	0.583	12.479
353	8	1.010	156.818	250.700	84.900	0.546	14.660

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
354	1	1.208	90.787	250.500	86.600	0.982	0.487
354	2	1.208	92.881	250.500	86.600	0.952	2.155
354	3	1.208	98.605	250.500	86.600	0.928	3.813
354	4	1.208	107.619	250.500	86.600	0.861	5.471
354	5	1.206	118.413	250.500	86.600	0.795	7.128
354	6	1.206	128.327	250.500	86.600	0.736	8.787
354	7	1.206	136.275	250.500	86.600	0.688	10.465
354	8	1.206	142.849	250.500	86.600	0.648	12.103

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
355	1	1.409	88.660	250.700	84.000	0.967	0.426
355	2	1.409	90.634	250.700	84.000	0.940	1.843
355	3	1.409	93.513	250.700	84.000	0.949	3.365
355	4	1.409	99.457	250.700	84.000	0.907	4.685
355	5	1.405	107.507	250.700	84.000	0.859	6.104
355	6	1.409	115.709	250.700	84.000	0.810	7.526
355	7	1.409	123.174	250.700	84.000	0.765	8.963
355	8	1.408	130.433	250.700	84.000	0.722	10.383

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
356	1	1.212	91.638	250.600	86.100	0.966	0.485
356	2	1.212	92.846	250.600	86.100	0.958	2.165
356	3	1.212	98.759	250.600	86.100	0.935	3.796
356	4	1.213	107.198	250.600	86.100	0.872	5.466
356	5	1.212	117.758	250.600	86.100	0.809	7.086
356	6	1.212	127.653	250.600	86.100	0.748	8.767
356	7	1.212	135.665	250.600	86.100	0.700	10.387
356	8	1.212	142.520	250.600	86.100	0.657	12.047

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
357	1	0.996	96.633	250.700	88.800	0.963	0.603
357	2	0.996	98.360	250.700	88.600	0.953	2.611
357	3	0.996	104.884	250.700	88.800	0.899	4.819
357	4	0.996	121.121	250.700	88.600	0.789	6.638
357	5	0.996	134.659	250.700	88.600	0.716	8.636
357	6	0.996	144.210	250.700	88.600	0.657	10.665
357	7	0.996	151.582	250.700	88.600	0.613	12.653
357	8	0.996	156.659	250.700	88.800	0.580	14.662

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
358	1	0.799	98.501	250.600	92.300	0.936	0.751
358	2	0.799	101.536	250.600	92.500	0.863	3.356
358	3	0.799	113.042	250.600	92.500	0.870	5.757
358	4	0.799	128.614	250.600	92.500	0.773	8.260
358	5	0.799	140.118	250.600	92.500	0.696	10.763
358	6	0.798	148.317	250.600	92.500	0.647	13.267
358	7	0.798	154.757	250.600	92.300	0.606	15.770
358	8	0.799	159.814	250.600	92.500	0.574	18.273

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
359	1	0.805	104.057	250.700	93.900	0.967	0.993
359	2	0.805	105.517	250.700	93.900	0.938	4.207
359	3	0.805	113.216	250.700	93.900	0.888	7.602
359	4	0.805	126.527	250.700	93.900	0.813	10.907
359	5	0.805	136.850	250.700	93.900	0.738	14.213
359	6	0.805	147.409	250.700	93.900	0.667	17.518
359	7	0.805	156.270	250.700	93.900	0.610	20.823
359	8	0.805	163.273	250.700	93.900	0.565	24.128

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
360	1	0.402	112.931	250.700	102.200	0.828	1.693
360	2	0.402	115.783	250.700	102.200	0.908	8.671
360	3	0.402	124.702	250.700	102.200	0.848	11.448
360	4	0.402	141.253	250.700	102.200	0.737	14.426
360	5	0.402	157.853	250.700	102.200	0.627	21.404
360	6	0.402	169.453	250.700	102.200	0.547	26.381
360	7	0.402	177.579	250.700	102.200	0.492	31.359
360	8	0.403	182.420	250.700	102.200	0.460	36.336

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
361	1	0.204	144.688	250.900	113.900	0.775	3.840
361	2	0.204	161.932	250.900	113.900	0.669	12.739
361	3	0.204	178.400	250.900	113.900	0.538	22.538
361	4	0.204	189.422	250.900	113.900	0.448	32.337
361	5	0.204	188.859	250.900	113.900	0.386	42.136
361	6	0.204	200.446	250.900	113.900	0.364	51.935
361	7	0.204	203.777	250.900	113.900	0.346	61.734
361	8	0.204	203.906	250.900	113.900	0.343	71.536

***** Column 6M *****

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
348	1	0.213	137.672	250.400	104.500	0.773	2.813
348	2	0.213	153.660	250.400	104.500	0.664	12.188
348	3	0.213	170.058	250.400	104.500	0.551	21.566
348	4	0.213	184.321	250.400	104.500	0.453	30.982
348	5	0.213	192.751	250.400	104.500	0.393	40.319
348	6	0.213	197.983	250.400	104.500	0.359	49.695
348	7	0.213	200.381	250.400	104.500	0.363	59.072
348	8	0.213	200.381	250.400	104.500	0.363	68.448

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
350	1	0.410	113.391	250.500	86.100	0.888	1.482
350	2	0.410	116.994	250.500	86.100	0.882	8.357
350	3	0.410	123.741	250.500	86.100	0.821	11.811
350	4	0.410	140.934	250.500	86.100	0.713	18.086
350	5	0.410	157.480	250.500	86.100	0.602	20.960
350	6	0.410	170.404	250.500	86.100	0.519	25.835
350	7	0.410	178.270	250.500	86.100	0.468	30.709
350	8	0.410	181.771	250.500	86.100	0.445	35.584

BOW#	Y/C#	M	Vav	Vgas	Valet	HV	s/Mm
351	1	0.418	103.173	250.800	90.600	0.922	0.871
351	2	0.418	104.898	250.800	90.600	0.911	6.206
351	3	0.418	115.968	250.800	90.600	0.842	7.662
351	4	0.418	128.832	250.800	90.600	0.763	10.678
351	5	0.418	138.987	250.800	90.600	0.692	13.914
351	6	0.418	150.003	250.800	90.600	0.628	17.149
351	7	0.418	158.085	250.800	90.600	0.579	20.385
351	8	0.418	163.618	250.800	90.600	0.546	23.621

RUN#	T/C#	M	Tss	Tgas	Tslat	EF	s/Mm
332	1	0.803	97.843	250.800	87.600	0.938	0.746
332	2	0.803	100.288	250.800	87.600	0.833	3.831
332	3	0.803	114.090	250.800	87.600	0.838	5.716
332	4	0.803	128.813	250.800	87.600	0.787	8.302
332	5	0.803	144.738	250.800	87.600	0.650	10.687
332	6	0.803	153.028	250.800	87.600	0.589	13.173
332	7	0.803	158.301	250.800	87.600	0.567	15.658
332	8	0.803	161.932	250.800	87.600	0.545	18.143

RUN#	T/C#	M	Tss	Tgas	Tslat	EF	s/Mm
333	1	1.010	83.574	250.700	84.9(	0.948	0.584
333	2	1.010	85.741	250.700	84.9(	0.935	3.573
333	3	1.010	105.252	250.700	84.900	0.877	6.556
333	4	1.010	121.888	250.700	84.800	0.770	9.537
333	5	1.010	136.500	250.700	84.900	0.688	0.517
333	6	1.010	147.982	250.700	84.900	0.615	10.498
333	7	1.010	156.843	250.700	84.900	0.578	18.479
333	8	1.010	159.668	250.700	84.900	0.550	14.460

RUN#	T/C#	M	Tss	Tgas	Tslat	EF	s/Mm
334	1	1.206	90.031	250.500	82.600	0.961	0.697
334	2	1.206	93.130	250.500	84.600	0.933	3.155
334	3	1.206	98.638	250.500	84.600	0.926	5.613
334	4	1.206	108.536	250.500	84.600	0.867	8.671
334	5	1.206	117.046	250.500	84.600	0.799	7.128
334	6	1.206	128.132	250.500	84.600	0.737	9.787
334	7	1.206	136.843	250.500	84.600	0.684	10.645
334	8	1.206	143.822	250.500	84.600	0.648	18.103

RUN#	T/C#	M	Tss	Tgas	Tslat	EF	s/Mm
335	1	1.408	88.549	250.700	84.000	0.957	0.686
335	2	1.408	90.478	250.700	84.000	0.951	1.845
335	3	1.408	99.046	250.700	84.000	0.947	5.863
335	4	1.408	99.059	250.700	84.000	0.910	4.605
335	5	1.408	107.586	250.700	84.000	0.858	6.104
335	6	1.408	116.406	250.700	84.000	0.805	7.524
335	7	1.408	124.571	250.700	84.000	0.757	8.963
335	8	1.408	131.080	250.700	84.000	0.719	10.383

RUN#	T/C#	M	Tss	Tgas	Tslat	EF	s/Mm
336	1	1.212	91.672	250.800	86.100	0.966	0.685
336	2	1.212	93.046	250.800	86.100	0.959	2.165
336	3	1.212	96.980	250.800	86.100	0.934	3.786
336	4	1.212	106.557	250.800	86.100	0.877	5.466
336	5	1.212	117.147	250.800	86.100	0.811	7.094
336	6	1.212	127.610	250.800	86.100	0.748	8.747
336	7	1.212	136.231	250.800	86.100	0.695	10.387
336	8	1.212	143.519	250.800	86.100	0.651	12.047

RUN#	T/C#	M	Tss	Tgas	Tslat	EF	s/Mm
337	1	0.996	84.633	250.700	88.800	0.963	0.605
337	2	0.996	86.960	250.700	88.600	0.938	2.611
337	3	0.996	103.960	250.700	88.600	0.887	4.615
337	4	0.996	121.939	250.700	88.600	0.798	6.628
337	5	0.996	135.689	250.700	88.600	0.711	8.636
337	6	0.996	146.588	250.700	88.600	0.643	10.645
337	7	0.996	153.936	250.700	88.600	0.587	12.653
337	8	0.996	159.555	250.700	88.600	0.562	14.662

RUN#	T/C#	M	Tss	Tgas	Tslat	EF	s/Mm
338	1	0.798	99.590	250.600	92.500	0.935	0.751
338	2	0.798	101.834	250.600	92.500	0.940	3.254
338	3	0.798	115.007	250.600	93.300	0.839	5.757
338	4	0.798	132.313	250.600	92.500	0.769	8.260
338	5	0.798	144.513	250.600	93.300	0.671	10.763
338	6	0.798	152.013	250.600	92.500	0.619	13.267
338	7	0.798	158.631	250.600	92.500	0.583	15.770
338	8	0.798	162.926	250.600	93.300	0.555	18.273

RUN#	T/C#	M	Tss	Tgas	Tslat	EF	s/Mm
339	1	0.605	104.190	250.700	95.900	0.966	0.992
339	2	0.605	105.782	250.700	95.900	0.936	4.287
339	3	0.605	113.444	250.700	95.900	0.874	7.603
339	4	0.605	127.235	250.700	95.900	0.798	10.907
339	5	0.605	138.589	250.700	95.900	0.724	14.213
339	6	0.605	148.441	250.700	95.900	0.656	17.518
339	7	0.605	156.215	250.700	95.900	0.587	20.823
339	8	0.605	165.066	250.700	95.900	0.553	24.129

RUN#	T/C#	M	Tss	Tgas	Tslat	EF	s/Mm
340	1	0.402	113.085	250.700	102.200	0.927	1.493
340	2	0.402	116.177	250.700	102.200	0.819	6.671
340	3	0.402	132.475	250.700	102.200	0.843	11.448
340	4	0.402	138.786	250.700	102.200	0.756	16.626
340	5	0.402	156.183	250.700	102.200	0.636	21.404
340	6	0.402	169.539	250.700	102.200	0.567	26.581
340	7	0.402	178.087	250.700	102.200	0.488	31.359
340	8	0.402	182.841	250.700	102.200	0.454	36.336

RUN#	T/C#	M	Tss	Tgas	Tslat	EF	s/Mm
341	1	0.204	142.807	250.900	113.900	0.790	2.960
341	2	0.204	157.653	250.900	113.900	0.681	12.739
341	3	0.204	173.732	250.900	113.900	0.583	22.338
341	4	0.204	187.174	250.900	113.900	0.485	32.337
341	5	0.2(4	195.519	250.900	113.900	0.408	42.136
341	6	0.204	200.998	250.900	113.900	0.364	51.935
341	7	0.204	203.890	250.906	113.900	0.345	61.734
341	8	0.204	204.425	250.900	113.900	0.339	71.534

FILM EFFECTIVENESS TEST
ANGLED INJECTION WITH NON-ACCELERATING FLOW

INJECTION ANGLE = 0.0 DEG. NUMBER OF SLOTS = 9 SLOT WIDTH = 1.25 (IN.)
SLOT HEIGHT = 0.25 (IN.) LIP THICKNESS = 0.25 (IN.)
HOT SIDE AREA= 34.1350 (SQ.IN) COLD SIDE AREA= 2.4100 (SQ.IN.)

T/C LOCATIONS

T/C#	X/S	4R	5L	5M	5R	6L	6M
1	0.600	X	X	X	X	X	X
2	2.600	X	X	X	X	X	X
3	4.600	X	X	X	X	X	X
4	6.600	X	X	X	X	X	X
5	8.600	X	X	X	X	X	X
6	10.600	X	X	X	X	X	X
7	12.600	X	X	X	X	X	X
8	14.600	X	X	X	X	X	X

Note: D(X1,X2) = 100*(X2-X1)/X1
Note: EF = (Tgas - Taw)/(Tgas - Tslot)

FILM EFFECTIVENESS DATA

SPANWISE AVERAGED EFFECTIVENESS DATA

***** Columns 4R-5L, 5L-5R, 5M-6L ****

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.209	139.340	0.787	0.600	2.875
2	0.209	155.482	0.673	2.600	12.458
3	0.209	172.454	0.553	4.600	22.041
4	0.209	186.009	0.457	6.600	31.624
5	0.209	193.950	0.401	8.600	41.207
6	0.209	198.638	0.368	10.600	50.791
7	0.209	201.072	0.351	12.600	60.374
8	0.209	200.696	0.353	14.600	69.957

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.406	112.432	0.913	0.600	1.478
2	0.406	114.472	0.899	2.600	6.403
3	0.406	123.436	0.840	4.600	11.329
4	0.406	139.539	0.734	6.600	16.254
5	0.406	156.116	0.624	8.600	21.180
6	0.406	168.480	0.543	10.600	26.105
7	0.406	176.264	0.491	12.600	31.031
8	0.406	190.458	0.463	14.600	35.956

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.612	103.025	0.938	0.600	0.981
2	0.612	104.452	0.929	2.600	4.251
3	0.612	113.013	0.875	4.600	7.521
4	0.612	124.604	0.801	6.600	10.791
5	0.612	136.255	0.727	8.600	14.061
6	0.612	146.782	0.660	10.600	17.332
7	0.612	155.232	0.607	12.600	20.602
8	0.612	161.684	0.566	14.600	23.872

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.802	98.021	0.951	0.600	0.748
2	0.802	100.170	0.937	2.600	3.243
3	0.802	111.832	0.865	4.600	5.737
4	0.802	127.627	0.766	6.600	8.231
5	0.802	139.514	0.692	8.600	10.725
6	0.802	147.923	0.640	10.600	13.219
7	0.802	154.213	0.601	12.600	15.714
8	0.802	158.598	0.573	14.600	18.208

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	1.003	93.590	0.958	0.600	0.598
2	1.003	95.596	0.946	2.600	2.593
3	1.003	105.013	0.889	4.600	4.587
4	1.003	121.121	0.790	6.600	6.582
5	1.003	134.845	0.707	8.600	8.576
6	1.003	144.968	0.645	10.600	10.571
7	1.003	151.796	0.603	12.600	12.565
8	1.003	156.937	0.572	14.600	14.560

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	1.209	90.736	0.967	0.600	0.496
2	1.209	92.258	0.958	2.600	2.150
3	1.209	97.227	0.928	4.600	3.804
4	1.209	107.825	0.863	6.600	5.459
5	1.209	118.843	0.797	8.600	7.113
6	1.209	128.513	0.738	10.600	8.767
7	1.209	136.010	0.693	12.600	10.421
8	1.209	143.465	0.648	14.600	12.075

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	1.409	89.038	0.970	0.600	0.426
2	1.409	90.235	0.963	2.600	1.845
3	1.409	92.944	0.946	4.600	3.265
4	1.409	99.777	0.905	6.600	4.685
5	1.409	108.220	0.855	8.600	6.104
6	1.409	116.470	0.805	10.600	7.524
7	1.409	123.473	0.763	12.600	8.943
8	1.409	131.340	0.716	14.600	10.363

FILM EFFECTIVENESS TEST
ANGLED INJECTION WITH NON-ACCELERATING FLOW

INJECTION ANGLE = 0.0 DEG. NUMBER OF SLOTS = 8 SLOT WIDTH = 1.25 (IN.)
SLOT HEIGHT = 0.175 (IN.) LIP THICKNESS = 0.175 (IN.)
HOT SIDE AREA= 36.7170 (SQ.IN) COLD SIDE AREA= 1.6670 (SQ.IN.)

Y/C LOCATIONS

Y/C#	X/S	4R	3L	3M	3R	4L	4M
1	0.857	X	X	X	X	X	X
2	3.714	X	X	X	X	X	X
3	6.571	X	X	X	X	X	X
4	9.428	X	X	X	X	X	X
5	12.286	X	X	X	X	X	X
6	15.143	X	X	X	X	X	X
7	18.000	X	X	X	X	X	X
8	20.857	X	X	X	X	X	X

Note: D(X1,X2) = 100*(X2-X1)/X1
Note: EF = (Tgas - Taw)/(Tgas - Talet)

FILM EFFECTIVENESS DATA

***** Column 4R *****

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
362	1	0.207	157.653	251.700	122.800	0.730	4.139
362	2	0.207	173.048	251.700	122.800	0.564	17.935
362	3	0.207	193.088	251.700	122.800	0.438	31.731
362	4	0.207	205.031	251.700	122.800	0.362	45.527
362	5	0.207	210.348	251.700	122.800	0.321	59.323
362	6	0.207	213.588	251.700	122.800	0.296	73.119
362	7	0.207	215.537	251.700	122.800	0.281	86.915
362	8	0.207	219.575	251.700	122.800	0.278	100.710

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
363	1	0.415	135.794	251.700	116.600	0.838	2.064
363	2	0.415	150.354	251.700	116.600	0.930	8.968
363	3	0.415	158.864	251.700	116.600	0.678	15.867
363	4	0.415	170.400	251.700	116.600	0.583	22.709
363	5	0.415	180.113	251.700	116.600	0.458	29.590
363	6	0.415	187.161	251.700	116.600	0.406	36.471
363	7	0.415	201.328	251.700	116.600	0.371	43.353
363	8	0.415	206.128	251.700	116.600	0.353	50.234

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
364	1	0.412	138.362	251.800	113.000	0.804	1.601
364	2	0.412	151.020	251.800	113.000	0.886	6.078
364	3	0.412	169.913	251.800	113.000	0.758	10.743
364	4	0.412	183.704	251.800	113.000	0.655	15.414
364	5	0.412	174.726	251.800	113.000	0.553	20.085
364	6	0.412	188.895	251.800	113.000	0.486	24.755
364	7	0.412	188.680	251.800	113.000	0.453	29.426
364	8	0.412	193.335	251.800	113.000	0.427	34.097

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
365	1	0.802	120.668	251.800	110.100	0.927	1.068
365	2	0.802	126.056	251.800	110.100	0.887	4.830
365	3	0.802	147.334	251.800	110.100	0.738	8.592
365	4	0.802	148.364	251.800	110.100	0.631	11.753
365	5	0.802	171.700	251.800	110.100	0.565	15.315
365	6	0.802	178.097	251.800	110.100	0.520	18.877
365	7	0.802	188.592	251.800	110.100	0.488	22.438
365	8	0.802	186.180	251.800	110.100	0.463	26.000

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
366	1	1.013	119.818	251.700	107.500	0.944	0.868
366	2	1.013	130.588	251.700	107.500	0.923	3.888
366	3	1.013	131.827	251.700	107.500	0.836	8.488
366	4	1.013	148.619	251.700	107.500	0.730	9.310
366	5	1.013	157.884	251.700	107.500	0.651	12.132
366	6	1.013	166.134	251.700	107.500	0.593	14.955
366	7	1.013	171.816	251.700	107.500	0.533	17.776
366	8	1.013	176.966	251.700	107.500	0.518	20.598

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
367	1	1.205	112.668	251.800	105.700	0.952	0.711
367	2	1.205	114.788	251.800	105.700	0.938	3.081
367	3	1.205	123.213	251.800	105.700	0.887	5.452
367	4	1.205	135.174	251.800	105.700	0.812	7.822
367	5	1.205	143.778	251.800	105.700	0.738	10.192
367	6	1.205	152.380	251.800	105.700	0.680	12.563
367	7	1.205	159.388	251.800	105.700	0.633	14.933
367	8	1.205	166.811	251.800	105.700	0.588	17.303

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
368	1	1.402	110.138	251.700	104.200	0.960	0.611
368	2	1.402	111.863	251.700	104.200	0.948	2.849
368	3	1.402	118.798	251.700	104.200	0.915	5.086
368	4	1.402	125.315	251.700	104.200	0.857	6.723
368	5	1.402	134.834	251.700	104.200	0.793	8.760
368	6	1.402	143.216	251.700	104.200	0.735	10.798
368	7	1.402	150.807	251.700	104.200	0.685	12.835
368	8	1.402	158.366	251.700	104.200	0.633	14.872

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
369	1	1.190	111.626	251.800	105.500	0.858	0.730
369	2	1.190	113.367	251.800	105.500	0.846	3.130
369	3	1.190	120.684	251.800	105.500	0.898	5.530
369	4	1.190	131.646	251.800	105.500	0.821	7.931
369	5	1.190	142.901	251.800	105.500	0.748	10.321
369	6	1.190	150.780	251.800	105.500	0.690	12.721
369	7	1.190	157.739	251.800	105.500	0.645	15.121
369	8	1.190	164.858	251.800	105.500	0.594	17.521

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
370	1	1.005	115.809	251.800	107.300	0.858	0.853
370	2	1.005	116.404	251.800	107.300	0.837	3.695
370	3	1.005	128.676	251.800	107.300	0.852	6.537
370	4	1.005	143.649	251.800	107.300	0.748	9.379
370	5	1.005	154.865	251.800	107.300	0.671	12.221
370	6	1.005	163.013	251.800	107.300	0.614	15.063
370	7	1.005	168.193	251.800	107.300	0.572	17.905
370	8	1.005	175.029	251.800	107.300	0.531	20.747

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
371	1	0.781	117.652	251.800	108.600	0.865	1.097
371	2	0.781	123.392	251.800	108.600	0.803	4.739
371	3	0.781	143.735	251.800	108.600	0.780	8.410
371	4	0.781	158.474	251.800	108.600	0.656	12.068
371	5	0.781	167.637	251.800	108.600	0.582	15.733
371	6	0.781	174.166	251.800	108.600	0.546	19.378
371	7	0.781	179.637	251.800	108.600	0.509	23.036
371	8	0.781	186.565	251.800	108.600	0.474	26.693

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
372	1	0.698	119.723	251.900	110.900	0.837	1.227
372	2	0.698	126.274	251.900	110.900	0.881	5.313
372	3	0.699	145.891	251.900	110.900	0.756	9.404
372	4	0.698	158.777	251.900	110.900	0.660	13.493
372	5	0.699	168.383	251.900	110.900	0.593	17.581
372	6	0.699	175.763	251.900	110.900	0.540	21.670
372	7	0.699	181.662	251.900	110.900	0.498	25.758
372	8	0.699	186.699	251.900	110.900	0.462	29.847

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
373	1	0.595	128.568	252.100	112.400	0.827	1.440
373	2	0.595	137.977	252.100	112.400	0.888	6.240
373	3	0.595	146.627	252.100	112.400	0.771	11.041
373	4	0.595	159.078	252.100	112.400	0.666	15.841
373	5	0.595	170.706	252.100	112.400	0.583	20.641
373	6	0.565	178.637	252.100	112.400	0.520	25.442
373	7	0.595	183.907	252.100	112.400	0.473	30.242
373	8	0.595	191.381	252.100	112.400	0.435	35.042

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
374	1	0.396	131.627	252.100	115.700	0.883	1.163
374	2	0.396	136.561	252.100	115.700	0.867	9.375
374	3	0.396	157.610	252.100	115.700	0.893	16.588
374	4	0.396	174.688	252.100	115.700	0.554	23.798
374	5	0.396	187.909	252.100	115.700	0.471	31.009
374	6	0.396	196.936	252.100	115.700	0.419	38.220
374	7	0.396	199.798	252.100	115.700	0.383	45.432
374	8	0.396	203.604	252.100	115.700	0.356	52.643

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
375	1	0.197	137.888	253.000	123.200	0.730	4.355
375	2	0.197	181.582	253.000	123.200	0.548	18.873
375	3	0.197	188.288	253.000	123.200	0.432	33.391
375	4	0.197	205.885	253.000	123.200	0.358	47.909
375	5	0.197	210.954	253.000	123.200	0.318	62.427
375	6	0.197	214.154	253.000	123.200	0.294	76.945
375	7	0.197	216.316	253.000	123.200	0.277	91.463
375	8	0.197	217.915	253.000	123.200	0.265	105.981

***** Column 3L *****

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
361	1	0.207	136.171	251.700	122.800	0.726	4.139
361	2	0.207	180.302	251.700	122.800	0.534	17.935
361	3	0.207	186.340	251.700	122.800	0.429	31.731
361	4	0.207	206.457	251.700	122.800	0.351	45.527
361	5	0.207	210.382	251.700	122.800	0.320	59.323
361	6	0.207	213.158	251.700	122.800	0.297	73.119
361	7	0.207	188.840	251.700	122.800	0.488	86.915
361	8	0.207	216.358	251.700	122.800	0.276	100.710

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
363	1	0.415	135.052	251.700	116.600	0.863	2.064
363	2	0.415	144.688	251.700	116.600	0.792	8.966
363	3	0.415	165.882	251.700	116.600	0.637	15.867
363	4	0.415	183.370	251.700	116.600	0.506	22.709
363	5	0.415	193.335	251.700	116.600	0.438	29.590
363	6	0.415	198.631	251.700	116.600	0.393	36.471
363	7	0.415	180.648	251.700	116.600	0.526	43.353
363	8	0.415	205.117	251.700	116.600	0.345	50.234

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
364	1	0.412	137.453	251.800	115.000	0.806	1.601
364	2	0.412	154.877	251.800	115.000	0.882	8.072
364	3	0.412	151.040	251.800	115.000	0.726	10.743
364	4	0.418	168.859	251.800	115.000	0.613	15.414
364	5	0.412	177.276	251.800	115.000	0.537	20.085
364	6	0.413	185.973	251.800	115.000	0.479	24.755
364	7	0.412	173.851	251.800	115.000	0.570	29.426
364	8	0.412	194.783	251.800	115.000	0.411	34.097

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
365	1	0.802	122.256	251.800	110.100	0.914	1.068
365	2	0.802	129.089	251.800	110.100	0.868	4.830
365	3	0.802	144.154	251.800	110.100	0.780	8.592
365	4	0.802	157.738	251.800	110.100	0.666	11.753
365	5	0.802	168.070	251.800	110.100	0.591	15.315
365	6	0.802	175.783	251.800	110.100	0.537	18.877
365	7	0.802	166.790	251.800	110.100	0.600	22.438
365	8	0.802	188.569	251.800	110.100	0.480	26.000

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
366	1	1.013	117.409	252.700	107.500	0.931	0.868
366	2	1.013	122.737	251.700	107.500	0.896	3.668
366	3	1.013	138.537	251.700	107.500	0.789	8.488
366	4	1.013	148.527	251.700	107.500	0.708	9.310
366	5	1.013	159.123	251.700	107.500	0.642	12.132
366	6	1.013	164.600	251.700	107.500	0.590	14.953
366	7	1.013	161.370	251.700	107.500	0.626	17.776
366	8	1.013	178.789	251.700	107.500	0.506	20.596

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
367	1	1.205	114.483	251.800	105.700	0.940	0.711
367	2	1.205	118.457	251.800	105.700	0.913	3.081
367	3	1.205	129.697	251.800	105.700	0.838	5.452
367	4	1.205	141.078	251.800	105.700	0.758	7.822
367	5	1.205	150.175	251.800	105.700	0.696	10.192
367	6	1.205	157.826	251.800	105.700	0.643	12.563
367	7	1.205	155.469	251.800	105.700	0.659	14.933
367	8	1.205	171.484	251.800	105.700	0.550	17.303

ROW#	Y/C#	M	Taw	Tgas	Talet	EF	x/Mm
368	1	1.402	111.819	251.700	104.200	0.948	0.611
368	2	1.402	114.701	251.700	104.200	0.928	2.949
368	3	1.402	122.955	251.700	104.200	0.873	4.886
368	4	1.403	132.388	251.700	104.200	0.809	6.723
368	5	1.402	140.338	251.700	104.200	0.755	8.760
368	6	1.402	147.558	251.700	104.200	0.706	10.798
368	7	1.403	148.619	251.700	104.200	0.699	12.835
368	8	1.403	162.494	251.700	104.200	0.605	14.872

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
369	1	1.190	113.085	251.800	105.300	0.868	0.720
369	2	1.190	119.838	251.800	105.300	0.822	3.120
369	3	1.190	128.109	251.800	105.300	0.843	5.520
369	4	1.190	139.481	251.800	105.500	0.766	7.921
369	5	1.190	148.146	251.800	105.300	0.709	10.321
369	6	1.190	155.708	251.800	105.900	0.657	12.721
369	7	1.190	163.503	251.800	105.500	0.672	15.121
369	8	1.190	170.015	251.800	105.500	0.559	17.521

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
370	1	1.005	115.356	251.800	107.300	0.868	0.853
370	2	1.005	120.533	251.800	107.300	0.908	3.685
370	3	1.005	133.690	251.800	107.300	0.817	6.537
370	4	1.005	146.901	251.800	107.300	0.729	9.378
370	5	1.005	156.054	251.800	107.300	0.669	11.221
370	6	1.005	163.767	251.800	107.300	0.609	13.063
370	7	1.005	169.858	251.800	107.290	0.640	17.905
370	8	1.005	177.876	251.800	107.900	0.516	20.747

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
371	1	0.781	119.113	251.800	109.600	0.833	1.087
371	2	0.781	125.925	251.800	109.600	0.885	4.753
371	3	0.781	140.647	251.900	109.600	0.782	8.410
371	4	0.781	154.671	251.800	108.800	0.685	12.066
371	5	0.781	166.741	251.800	109.600	0.618	15.723
371	6	0.781	172.651	251.800	109.600	0.587	19.379
371	7	0.781	186.439	251.800	109.600	0.454	23.036
371	8	0.781	189.939	251.800	109.600	0.447	26.692

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
372	1	0.699	121.398	251.900	110.900	0.938	1.827
372	2	0.699	128.638	251.900	110.900	0.878	5.315
372	3	0.699	143.216	251.900	110.900	0.771	8.804
372	4	0.699	157.739	251.900	110.900	0.668	12.293
372	5	0.699	168.189	251.900	110.900	0.594	15.781
372	6	0.699	176.348	251.900	110.800	0.538	19.270
372	7	0.699	184.686	251.900	110.900	0.486	22.758
372	8	0.699	188.647	251.900	110.900	0.468	26.247

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
373	1	0.595	123.872	252.100	112.600	0.818	1.460
373	2	0.595	131.777	252.100	112.600	0.861	4.840
373	3	0.595	147.581	252.100	112.600	0.748	11.041
373	4	0.595	163.376	252.100	112.600	0.636	15.861
373	5	0.595	176.894	252.100	112.600	0.557	20.681
373	6	0.595	182.680	252.100	112.600	0.499	23.462
373	7	0.595	170.360	252.100	112.600	0.589	30.242
373	8	0.595	184.005	252.100	112.600	0.416	35.062

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
374	1	0.398	130.947	252.100	115.700	0.888	2.183
374	2	0.398	141.558	252.100	115.700	0.810	8.375
374	3	0.398	163.315	252.100	115.700	0.651	16.388
374	4	0.398	181.338	252.100	115.700	0.518	23.798
374	5	0.398	190.843	252.100	115.700	0.453	31.000
374	6	0.398	198.383	252.100	115.700	0.408	38.380
374	7	0.398	176.828	252.100	115.700	0.537	45.638
374	8	0.398	204.641	252.100	115.700	0.368	52.843

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
375	1	0.197	138.215	252.000	123.200	0.728	4.355
375	2	0.197	168.680	252.000	123.200	0.500	18.873
375	3	0.197	197.680	252.000	123.200	0.422	33.391
375	4	0.197	207.452	252.000	123.200	0.348	47.908
375	5	0.197	211.170	252.000	123.200	0.317	62.427
375	6	0.197	213.884	252.000	123.200	0.296	76.945
375	7	0.197	188.361	252.000	123.200	0.484	91.463
375	8	0.197	217.743	252.000	123.800	0.288	105.981

***** Column 3R *****

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
362	1	0.807	154.584	251.700	121.800	0.753	4.138
362	2	0.807	175.201	251.700	122.800	0.593	17.835
362	3	0.807	202.578	251.700	121.800	0.459	31.731
362	4	0.807	208.912	251.700	122.800	0.378	45.627
362	5	0.807	209.933	251.700	122.800	0.333	59.523
362	6	0.807	211.998	251.700	122.800	0.308	73.119
362	7	0.807	214.024	251.700	122.800	0.283	86.815
362	8	0.807	213.765	251.700	122.800	0.284	100.710

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
363	1	0.415	133.305	251.700	116.600	0.876	2.044
363	2	0.415	137.740	251.700	116.600	0.863	8.844
363	3	0.415	156.745	251.700	116.600	0.703	15.827
363	4	0.415	175.763	251.700	116.600	0.582	22.709
363	5	0.415	188.298	251.700	116.600	0.469	29.590
363	6	0.415	183.884	251.700	116.600	0.413	36.471
363	7	0.415	200.318	251.700	116.600	0.380	43.352
363	8	0.415	201.031	251.700	116.600	0.368	50.234

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
364	1	0.412	126.758	251.800	113.000	0.916	1.401
364	2	0.412	130.991	251.800	113.000	0.870	6.072
364	3	0.412	146.906	251.800	113.000	0.758	10.743
364	4	0.412	160.851	251.800	113.000	0.655	15.414
364	5	0.412	172.369	251.800	113.000	0.573	20.085
364	6	0.412	180.907	251.800	113.000	0.511	24.733
364	7	0.412	186.958	251.800	113.000	0.467	29.436
364	8	0.412	190.070	251.800	113.000	0.445	34.097

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
365	1	0.802	119.582	251.800	110.100	0.933	1.068
365	2	0.802	126.145	251.800	110.100	0.887	4.830
365	3	0.802	146.415	251.800	110.100	0.746	8.192
365	4	0.802	161.384	251.800	110.100	0.639	11.753
365	5	0.802	170.874	251.800	110.100	0.575	15.315
365	6	0.802	178.368	251.800	110.100	0.532	18.877
365	7	0.802	180.967	251.800	110.100	0.500	22.438
365	8	0.802	183.630	251.800	110.100	0.481	26.000

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
366	1	1.013	113.007	251.700	107.300	0.868	0.868
366	2	1.013	118.888	251.700	107.300	0.921	3.668
366	3	1.013	132.894	251.700	107.300	0.825	6.489
366	4	1.013	146.376	251.700	107.300	0.715	9.310
366	5	1.013	160.248	251.700	107.300	0.636	12.132
366	6	1.013	168.199	251.700	107.300	0.578	14.953
366	7	1.013	175.688	251.700	107.300	0.541	17.774
366	8	1.013	177.535	251.700	107.300	0.516	20.596

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
367	1	1.205	113.081	251.800	105.700	0.839	0.711
367	2	1.205	116.838	251.800	105.700	0.837	3.081
367	3	1.205	122.544	251.800	105.700	0.886	5.452
367	4	1.205	134.135	251.800	105.700	0.805	7.822
367	5	1.205	145.161	251.800	105.700	0.730	10.192
367	6	1.205	154.065	251.800	105.700	0.688	12.563
367	7	1.205	161.197	251.800	105.700	0.620	14.933
367	8	1.205	167.468	251.800	105.700	0.577	17.303

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
368	1	1.402	109.675	251.700	104.200	0.863	3.611
368	2	1.402	111.819	251.700	104.200	0.868	3.869
368	3	1.402	116.404	251.700	104.200	0.817	4.886
368	4	1.402	125.188	251.700	104.200	0.859	6.723
368	5	1.402	134.836	251.700	104.200	0.792	8.760
368	6	1.402	143.346	251.700	104.200	0.735	10.798
368	7	1.402	150.780	251.700	104.200	0.684	12.835
368	8	1.402	158.171	251.700	104.200	0.636	14.872

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
369	1	1.190	110.771	251.800	105.300	0.844	0.720
369	2	1.190	115.391	251.800	105.300	0.846	3.120
369	3	1.190	120.771	251.800	105.300	0.884	5.520
369	4	1.190	132.438	251.800	105.300	0.816	7.921
369	5	1.190	143.260	251.800	105.300	0.742	10.321
369	6	1.190	152.350	251.800	105.900	0.680	12.721
369	7	1.190	158.395	251.800	105.500	0.631	15.121
369	8	1.190	166.311	251.800	105.900	0.585	17.521

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
370	1	1.005	112.911	251.800	107.300	0.861	0.853
370	2	1.005	118.625	251.800	107.300	0.835	3.685
370	3	1.005	130.293	251.800	107.300	0.841	6.537
370	4	1.005	144.189	251.800	107.300	0.731	9.378
370	5	1.005	157.653	251.800	107.300	0.658	12.221
370	6	1.005	165.390	251.800	107.300	0.588	15.063
370	7	1.005	171.311	251.800	107.300	0.557	17.905
370	8	1.005	178.023	251.800	107.300	0.526	20.747

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
371	1	0.781	116.406	251.800	109.600	0.938	1.087
371	2	0.781	123.748	251.800	109.600	0.903	4.753
371	3	0.781	143.068	251.800	109.600	0.765	8.410
371	4	0.781	158.961	251.800	109.600	0.667	12.066
371	5	0.781	169.682	251.800	109.600	0.606	15.723
371	6	0.781	179.303	251.800	109.600	0.558	19.379
371	7	0.781	177.785	251.800	108.900	0.580	23.036
371	8	0.781	181.987	251.800	108.600	0.491	26.692

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
372	1	0.699	118.457	251.900	110.900	0.946	1.827
372	2	0.699	125.488	251.900	110.900	0.887	5.315
372	3	0.699	140.173	251.900	110.800	0.771	8.804
372	4	0.699	154.954	251.900	110.900	0.680	12.293
372	5	0.699	165.649	251.900	110.900	0.613	15.781
372	6	0.699	173.429	251.900	110.800	0.557	19.270
372	7	0.699	178.785	251.900	110.800	0.511	22.758
372	8	0.699	184.276	251.900	110.900	0.480	26.247

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
373	1	0.595	120.946	252.100	112.600	0.839	1.460
373	2	0.595	126.798	252.100	112.600	0.897	4.240
373	3	0.595	141.386	252.100	112.600	0.783	11.041
373	4	0.595	155.786	252.100	112.600	0.689	12.841
373	5	0.595	169.113	252.100	112.600	0.601	20.641
373	6	0.595	177.492	252.100	112.600	0.536	25.642
373	7	0.595	184.451	252.100	112.600	0.496	30.242
373	8	0.595	188.830	252.100	112.600	0.453	35.062

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
374	1	0.398	129.113	252.100	115.700	0.902	2.183
374	2	0.398	134.484	252.100	115.700	0.842	8.375
374	3	0.398	154.800	252.100	115.700	0.713	16.388
374	4	0.398	174.121	252.100	115.700	0.571	23.798
374	5	0.398	186.137	252.100	115.700	0.484	31.008
374	6	0.395	193.702	252.100	115.700	0.428	38.220
374	7	0.398	199.674	252.100	115.700	0.393	45.438
374	8	0.398	201.228	252.100	115.700	0.375	52.643

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
375	1	0.197	124.541	252.000	123.200	0.757	4.355
375	2	0.197	177.148	252.000	123.200	0.581	18.873
375	3	0.197	193.832	252.000	123.200	0.452	33.391
375	4	0.197	205.560	252.000	123.200	0.376	47.908
375	5	0.197	208.885	252.000	123.200	0.334	62.427
375	6	0.197	212.511	252.000	123.200	0.307	76.945
375	7	0.197	214.673	252.000	123.200	0.290	91.463
375	8	0.197	214.846	252.000	123.800	0.288	105.981

***** Column 3R *****

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
362	1	0.207	157.568	251.700	122.800	0.730	4.139
362	2	0.807	178.227	251.700	122.800	0.570	17.835
362	3	0.207	194.324	251.700	122.800	0.464	31.731
362	4	0.207	202.955	251.700	122.800	0.378	45.527
362	5	0.207	208.187	251.700	122.800	0.338	59.523
362	6	0.207	211.257	251.700	122.800	0.314	73.119
362	7	0.807	213.721	251.700	122.800	0.283	86.815
362	8	0.807	214.543	251.700	122.800	0.288	100.710

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
363	1	0.415	133.327	251.700	116.600	0.862	2.044
363	2	0.415	138.865	251.700	116.600	0.827	8.844
363	3	0.415	156.777	251.700	116.600	0.688	15.827
363	4	0.415	175.417	251.700	116.600	0.565	22.709
363	5	0.415	188.785	251.700	116.600	0.480	29.590
363	6	0.415	183.842	251.700	116.600	0.427	36.471
363	7	0.415	198.831	251.700	116.600	0.393	43.353
363	8	0.415	201.228	251.700	116.600	0.374	50.234

BDH#	Y/C#	M	Tsw	Tgas	Tslat	HT	z/Hs
364	1	0.412	126.318	251.800	113.000	0.906	1.401
364	2	0.412	131.427	251.800	113.000	0.867	6.072
364	3	0.412	145.484	251.800	113.000	0.768	10.743
364	4	0.412	159.078	251.800	113.000	0.668	15.414

804

364	5	0.613	148.071	251.800	113.000	0.590	10.081
364	6	0.613	170.087	251.800	113.000	0.531	24.735
364	7	0.613	186.019	251.800	113.000	0.488	35.428
364	8	0.613	198.596	251.800	113.000	0.457	44.087

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
365	1	0.008	130.553	251.900	110.100	0.926	1.068
365	2	0.008	125.668	251.900	110.100	0.888	4.630
365	3	0.008	140.467	251.900	110.100	0.788	8.192
365	4	0.008	156.238	251.900	110.100	0.688	11.753
365	5	0.008	166.196	251.800	110.100	0.619	15.315
365	6	0.008	171.182	251.800	110.100	0.588	18.877
365	7	0.008	176.671	251.900	110.100	0.550	22.438
365	8	0.008	181.553	251.900	110.100	0.498	26.000

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
366	1	1.013	115.888	251.700	107.500	0.941	0.868
366	2	1.013	119.083	251.700	107.500	0.915	5.668
366	3	1.013	138.548	251.700	107.500	0.867	6.488
366	4	1.013	141.734	251.700	107.500	0.783	8.310
366	5	1.013	153.077	251.700	107.500	0.691	12.138
366	6	1.013	159.900	251.700	107.500	0.637	14.953
366	7	1.013	168.670	251.700	107.500	0.591	17.776
366	8	1.013	173.824	251.700	107.500	0.547	20.598

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
367	1	1.205	113.089	251.800	105.700	0.948	0.711
367	2	1.205	116.361	251.800	105.700	0.927	5.081
367	3	1.205	131.994	251.800	105.700	0.888	5.458
367	4	1.205	150.880	251.800	105.700	0.838	7.802
367	5	1.205	159.749	251.800	105.700	0.767	10.198
367	6	1.205	167.106	251.800	105.700	0.717	12.563
367	7	1.205	174.065	251.800	105.700	0.668	14.933
367	8	1.205	182.109	251.800	105.700	0.614	17.303

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
368	1	1.402	110.586	251.700	104.300	0.957	0.611
368	2	1.402	113.304	251.700	104.300	0.938	3.448
368	3	1.402	117.190	251.700	104.200	0.912	6.886
368	4	1.402	126.965	251.700	104.200	0.866	8.723
368	5	1.402	131.951	251.700	104.200	0.812	8.760
368	6	1.402	138.784	251.700	104.200	0.766	10.798
368	7	1.402	145.853	251.700	104.200	0.718	12.835
368	8	1.402	154.873	251.700	104.200	0.658	14.872

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
369	1	1.190	111.819	251.800	105.500	0.957	0.720
369	2	1.190	114.745	251.800	105.500	0.937	3.120
369	3	1.190	130.335	251.900	105.500	0.898	5.520
369	4	1.190	148.988	251.800	105.500	0.838	7.931
369	5	1.190	157.672	251.800	105.500	0.780	10.321
369	6	1.190	165.118	251.800	105.500	0.728	12.721
369	7	1.190	172.423	251.800	105.500	0.679	15.121
369	8	1.190	181.264	251.800	105.500	0.619	17.531

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
370	1	1.005	114.003	251.800	107.300	0.954	0.853
370	2	1.005	117.384	251.800	107.300	0.933	3.493
370	3	1.005	136.755	251.800	107.300	0.865	6.537
370	4	1.005	150.371	251.800	107.300	0.785	9.378
370	5	1.005	168.663	251.800	107.300	0.716	13.321
370	6	1.005	156.328	251.800	107.300	0.638	15.063
370	7	1.005	183.706	251.800	107.300	0.610	17.905
370	8	1.005	171.008	251.800	107.300	0.559	20.747

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
371	1	0.781	117.584	251.800	108.600	0.966	1.087
371	2	0.781	122.826	251.800	108.600	0.907	4.755
371	3	0.781	137.081	251.800	108.600	0.807	8.410
371	4	0.781	150.135	251.900	108.600	0.715	12.066
371	5	0.781	159.816	251.800	108.600	0.647	15.723
371	6	0.781	167.076	251.900	108.600	0.586	19.378
371	7	0.781	173.688	251.800	108.600	0.568	23.036
371	8	0.781	179.826	251.800	108.600	0.508	26.692

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
372	1	0.699	119.856	251.900	110.900	0.936	1.327
372	2	0.699	125.319	251.900	110.900	0.898	5.315
372	3	0.699	138.808	251.900	110.900	0.802	9.404
372	4	0.699	151.515	251.900	110.900	0.718	13.493
372	5	0.699	161.543	251.900	110.900	0.661	17.581
372	6	0.699	169.453	251.900	110.900	0.585	21.670
372	7	0.699	176.239	251.900	110.900	0.537	25.758
372	8	0.699	188.506	251.900	110.900	0.492	29.847

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
373	1	0.595	122.949	252.100	112.600	0.927	1.460
373	2	0.595	127.628	252.100	112.600	0.881	5.260
373	3	0.595	140.662	252.100	112.600	0.788	11.061
373	4	0.595	156.152	252.100	112.600	0.701	15.961
373	5	0.595	165.383	252.100	112.600	0.619	20.661
373	6	0.595	174.394	252.100	112.600	0.557	25.462
373	7	0.595	181.511	252.100	112.600	0.503	30.262
373	8	0.595	187.456	252.100	112.600	0.463	35.062

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
374	1	0.396	131.253	252.100	115.700	0.886	3.169
374	2	0.396	137.489	252.100	115.700	0.840	9.375
374	3	0.396	157.091	252.100	115.700	0.697	16.388
374	4	0.396	173.773	252.100	115.700	0.574	23.798
374	5	0.396	186.710	252.100	115.700	0.494	31.009
374	6	0.396	191.886	252.100	115.700	0.441	38.220
374	7	0.396	197.281	252.100	115.700	0.402	45.433
374	8	0.396	201.182	252.100	115.700	0.373	52.643

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
375	1	0.197	157.855	252.000	123.200	0.730	4.353
375	2	0.197	180.308	252.000	123.200	0.556	18.873
375	3	0.197	195.886	252.000	123.200	0.438	33.351
375	4	0.197	203.606	252.000	123.200	0.378	47.908
375	5	0.197	208.706	252.000	123.200	0.336	62.427
375	6	0.197	211.819	252.000	123.200	0.312	76.965
375	7	0.197	214.543	252.000	123.200	0.291	91.483
375	8	0.197	215.710	252.000	123.200	0.282	105.981

----- Column 61 -----

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
382	1	0.307	157.480	251.700	122.800	0.731	4.139
382	2	0.307	177.868	251.700	122.800	0.571	17.935
382	3	0.307	186.958	251.700	122.800	0.460	31.731
382	4	0.307	203.647	251.700	122.800	0.373	45.527
382	5	0.307	209.101	251.700	122.800	0.330	59.323
382	6	0.307	212.145	251.700	122.800	0.307	73.118
382	7	0.307	214.563	251.700	122.800	0.288	86.915
382	8	0.307	215.667	251.700	122.800	0.280	100.710

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
383	1	0.415	134.615	251.700	116.600	0.867	2.068
383	2	0.415	138.887	251.700	116.600	0.837	8.968
383	3	0.415	160.160	251.700	116.600	0.678	15.827
383	4	0.415	178.819	251.700	116.600	0.589	22.709
383	5	0.415	190.638	251.700	116.600	0.453	28.590
383	6	0.415	197.481	251.700	116.600	0.408	36.471
383	7	0.415	201.701	251.700	116.600	0.370	43.353
383	8	0.415	204.358	251.700	116.600	0.351	50.234

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
384	1	0.613	116.318	251.800	113.000	0.904	1.601
384	2	0.613	132.170	251.800	113.000	0.843	6.073
384	3	0.613	147.652	251.800	113.000	0.753	10.743
384	4	0.613	168.840	251.800	113.000	0.661	15.414
384	5	0.613	178.683	251.800	113.000	0.556	20.085
384	6	0.613	185.563	251.800	113.000	0.492	24.755
384	7	0.613	189.182	251.800	113.000	0.451	29.426
384	8	0.613	193.140	251.800	113.000	0.423	34.097

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
385	1	0.802	120.868	251.800	110.100	0.933	1.068
385	2	0.802	127.148	251.800	110.100	0.880	4.630
385	3	0.802	145.378	251.800	110.100	0.791	8.192
385	4	0.802	159.166	251.800	110.100	0.656	11.753
385	5	0.802	168.881	251.800	110.100	0.585	15.315
385	6	0.802	175.936	251.800	110.100	0.533	18.877
385	7	0.802	181.133	251.800	110.100	0.488	22.438
385	8	0.802	185.488	251.800	110.100	0.448	26.000

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
386	1	1.013	118.186	251.700	107.500	0.940	0.868
386	2	1.013	120.117	251.700	107.500	0.913	3.668
386	3	1.013	134.170	251.700	107.500	0.814	6.489
386	4	1.013	149.461	251.700	107.500	0.709	9.310
386	5	1.013	159.887	251.700	107.500	0.636	12.132
386	6	1.013	167.046	251.700	107.500	0.586	14.953
386	7	1.013	173.046	251.700	107.500	0.545	17.774
386	8	1.013	178.270	251.700	107.500	0.508	20.596

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
387	1	1.205	113.380	251.800	105.700	0.948	0.711
387	2	1.205	116.055	251.800	105.700	0.929	5.081
387	3	1.205	126.003	251.800	105.700	0.875	5.458
387	4	1.205	136.712	251.800	105.700	0.788	7.822
387	5	1.205	146.965	251.800	105.700	0.717	10.193
387	6	1.205	155.535	251.800	105.700	0.658	12.563
387	7	1.205	163.082	251.800	105.700	0.614	14.933
387	8	1.205	169.020	251.800	105.700	0.587	17.303

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
388	1	1.402	110.727	251.700	4.200	0.958	0.611
388	2	1.402	113.956	251.700	104.200	0.941	2.668
388	3	1.402	117.190	251.700	104.200	0.913	6.088
388	4	1.402	126.711	251.700	104.200	0.867	8.723
388	5	1.402	135.883	251.700	104.200	0.787	8.760
388	6	1.402	143.733	251.700	104.200	0.732	10.798
388	7	1.402	150.694	251.700	104.200	0.685	12.835
388	8	1.402	159.079	251.700	104.200	0.628	14.872

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
389	1	1.190	111.906	251.800	105.500	0.956	0.726
389	2	1.190	114.614	251.800	105.500	0.938	3.130
389	3	1.190	122.606	251.800	105.500	0.883	5.535
389	4	1.190	134.965	251.800	105.500	0.799	7.931
389	5	1.190	145.378	251.800	105.500	0.727	10.321
389	6	1.190	153.719	251.800	105.500	0.670	12.721
389	7	1.190	160.619	251.800	105.500	0.623	15.121
389	8	1.190	167.985	251.800	105.500	0.573	17.531

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
370	1	1.005	114.321	251.800	107.300	0.952	0.853
370	2	1.005	118.030	251.800	107.300	0.926	3.493
370	3	1.005	131.820	251.800	107.300	0.830	6.537
370	4	1.005	146.326	251.800	107.300	0.730	9.378
370	5	1.005	156.788	251.800	107.300	0.658	12.221
370	6	1.005	164.180	251.800	107.300	0.606	15.063
370	7	1.005	170.374	251.800	107.300	0.566	17.905
370	8	1.005	176.498	251.800	107.300	0.521	20.747

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
371	1	0.781	117.868	251.800	108.600	0.962	1.087
371	2	0.781	124.067	251.800	108.600	0.898	4.753
371	3	0.781	141.384	251.800	108.600	0.776	8.410
371	4	0.781	154.191	251.800	108.600	0.684	12.066
371	5	0.781	164.308	251.800	108.600	0.615	15.723
371	6	0.781	171.765	251.800	108.600	0.563	19.378
371	7	0.781	178.087	251.800	108.600	0.518	23.036
371	8	0.781	183.868	251.800	108.600	0.478	26.692

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
372	1	0.699	120.028	251.900	110.900	0.935	1.327
372	2	0.699	126.574	251.900	110.900	0.891	5.315
372	3	0.699	141.852	251.900	110.900	0.780	9.404
372	4	0.699	155.103	251.900	110.900	0.687	13.493
372	5	0.699	166.081	251.900	110.900	0.609	17.581
372	6	0.699	174.553	251.900	110.900	0.549	21.670
372	7	0.699	181.186	251.900	110.900	0.502	25.758
372	8	0.699	186.872	251.900	110.900	0.461	29.847

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
373	1	0.595	122.649	252.100	112.600	0.927	1.460
373	2	0.595	128.239	252.100	112.600	0.887	5.260
373	3	0.595	142.782	252.100	112.600	0.783	11.061
373	4	0.595	158.213	252.100	112.600	0.672	15.861
373	5	0.595	170.765	252.100	112.600	0.582	20.661
373	6	0.595	179.513	252.100	112.600	0.517	25.462
373	7	0.595	186.836	252.100	112.600	0.468	30.262
373	8	0.595	193.059	252.100	112.600	0.430	35.062

BCH#	Y/C#	M	Tau	Tgas	Talet	EY	s/Mm
374	1	0.396	130.379	252.100	115.700	0.892	2.163

374	8	0.396	136.713	252.100	115.700	0.866	9.375
374	9	0.396	158.085	252.100	115.700	0.699	16.386
374	6	0.396	176.671	252.100	115.700	0.593	25.798
374	5	0.396	187.895	252.100	115.700	0.470	31.069
374	6	0.396	194.836	252.100	115.700	0.420	38.280
374	7	0.396	199.862	252.100	115.700	0.383	45.432
374	8	0.396	803.404	858.100	115.700	0.358	58.643

ROW#	Y/C#	M	Tav	Tgas	Tslat	HF	s/Mm
375	1	0.197	157.739	252.000	123.300	0.738	6.355
375	2	0.197	178.856	252.000	123.300	0.559	18.973
375	3	0.197	193.894	252.000	123.200	0.435	33.781
375	4	0.197	203.893	252.000	123.200	0.378	47.908
375	5	0.197	209.311	252.000	123.200	0.331	62.487
375	6	0.197	213.381	252.000	123.200	0.308	76.965
375	7	0.197	216.975	252.000	123.200	0.287	91.469
375	8	0.197	816.878	852.000	123.200	0.273	105.881

***** Column 6H *****

ROW#	Y/C#	M	Tav	Tgas	Tslat	HF	s/Mm
368	1	0.207	135.837	251.700	122.800	0.744	6.136
368	2	0.207	176.068	251.700	122.800	0.507	17.933
368	3	0.207	192.691	251.700	122.800	0.458	31.731
368	4	0.207	808.436	251.700	122.800	0.382	45.887
368	5	0.207	208.230	251.700	122.800	0.337	59.383
368	6	0.207	813.078	251.700	122.800	0.307	73.119
368	7	0.207	816.867	251.700	122.800	0.282	86.918
368	8	0.827	814.889	791.700	122.800	0.288	100.710

ROW#	Y/C#	M	Tav	Tgas	Tslat	HF	s/Mm
363	1	0.415	134.387	251.700	116.600	0.868	5.966
363	2	0.415	139.900	251.700	116.600	0.638	8.946
363	3	0.415	138.733	851.700	116.600	0.698	13.887
363	4	0.415	176.871	251.100	116.600	0.595	88.709
363	5	0.415	188.600	251.700	116.600	0.497	33.590
363	6	0.415	196.253	251.700	116.600	0.410	38.471
363	7	0.415	200.663	251.700	116.600	0.378	43.353
363	8	0.418	803.919	251.700	116.600	0.341	58.254

ROW#	Y/C#	M	Tav	Tgas	Tslat	HF	s/Mm
364	1	0.612	136.743	251.800	113.000	0.905	1.401
364	2	0.612	133.611	251.800	113.000	0.852	4.078
364	3	0.612	150.635	251.800	113.000	0.730	10.742
364	4	0.612	166.093	251.800	113.000	0.633	15.416
364	5	0.618	174.883	251.800	113.000	0.536	20.089
364	6	0.612	180.598	251.800	113.000	0.499	26.755
364	7	0.613	188.148	251.700	113.000	0.458	29.428
364	8	0.618	191.583	251.800	113.000	0.436	34.087

ROW#	Y/C#	M	Tav	Tgas	Tslat	HF	s/Mm
365	1	0.802	130.815	251.800	110.100	0.826	1.068
365	2	0.802	127.903	251.800	110.100	0.875	4.630
365	3	0.802	147.458	251.800	110.100	0.736	8.192
365	4	0.802	161.366	251.800	110.100	0.691	11.753
365	5	0.802	171.914	251.800	110.100	0.566	15.315
365	6	0.802	177.838	251.800	110.100	0.522	18.877
365	7	0.802	182.117	251.800	110.100	0.492	22.438
365	8	0.802	185.516	251.800	110.100	0.469	26.000

ROW#	Y/C#	M	Tav	Tgas	Tslat	HF	s/Mm
366	1	1.013	116.089	251.700	107.500	0.960	0.866
366	2	1.013	130.073	251.700	107.500	0.913	3.668
366	3	1.013	138.519	251.700	107.500	0.826	6.469
366	4	1.013	147.432	251.700	107.500	0.733	9.310
366	5	1.013	159.036	251.700	107.500	0.645	12.138
366	6	1.013	167.900	251.700	107.500	0.583	14.953
366	7	1.013	173.170	251.700	107.500	0.543	17.774
366	8	1.013	177.038	251.700	107.500	0.518	20.596

ROW#	Y/C#	M	Tav	Tgas	Tslat	HF	s/Mm
367	1	1.203	115.173	251.800	105.700	0.969	0.711
367	2	1.205	115.880	251.800	105.700	0.930	3.081
367	3	1.203	122.868	251.800	105.700	0.883	5.452
367	4	1.205	134.135	251.800	105.700	0.805	7.823
367	5	1.203	146.772	251.800	105.700	0.733	10.193
367	6	1.203	156.865	251.800	105.700	0.961	12.563
367	7	1.205	160.851	251.800	105.700	0.633	14.933
367	8	1.203	167.596	251.800	105.700	0.574	17.303

ROW#	Y/C#	M	Tav	Tgas	Tslat	HF	s/Mm
368	1	1.403	110.884	251.700	104.200	0.956	0.611
368	2	1.403	112.780	251.700	104.200	0.962	2.669
368	3	1.403	118.972	251.700	104.200	0.913	4.886
368	4	1.403	125.095	251.700	104.200	0.838	6.723
368	5	1.402	136.081	251.700	104.200	0.797	8.760
368	6	1.408	114.838	251.700	104.200	0.829	10.798
368	7	1.402	149.786	251.700	104.200	0.691	12.835
368	8	1.408	157.738	851.700	104.200	0.637	14.872

ROW#	Y/C#	M	Tav	Tgas	Tslat	HF	s/Mm
369	1	1.190	111.950	251.800	105.500	0.956	0.720
369	2	1.190	114.386	251.800	105.500	0.939	3.130
369	3	1.190	121.386	251.800	105.500	0.898	5.520
369	4	1.190	132.344	251.800	105.500	0.817	7.921
369	5	1.190	142.913	251.800	105.500	0.766	10.331
369	6	1.190	114.483	251.800	105.500	0.939	12.731
369	7	1.190	159.122	251.800	105.500	0.633	15.121
369	8	1.190	166.514	251.800	105.500	0.583	17.521

ROW#	Y/C#	M	Tav	Tgas	Tslat	HF	s/Mm
370	1	1.005	114.177	251.800	107.300	0.932	0.853
370	2	1.005	117.844	251.800	107.300	0.927	3.695
370	3	1.005	128.863	251.800	107.300	0.863	6.537
370	4	1.005	146.663	251.800	107.300	0.762	9.379
370	5	1.005	156.056	251.800	107.300	0.663	12.221
370	6	1.005	113.709	251.800	107.300	0.962	15.063
370	7	1.005	170.535	251.800	107.300	0.563	17.805
370	8	1.005	176.238	251.800	107.300	0.523	20.747

ROW#	Y/C#	M	Tav	Tgas	Tslat	HF	s/Mm
371	1	0.781	117.802	251.800	109.600	0.962	1.087
371	2	0.781	124.966	251.800	109.600	0.893	4.753
371	3	0.781	146.126	251.800	109.600	0.757	8.410
371	4	0.781	158.062	251.800	109.600	0.658	12.066
371	5	0.781	168.773	251.800	109.600	0.598	15.723
371	6	0.781	113.268	251.800	109.600	0.963	19.379
371	7	0.781	178.573	252.800	109.600	0.513	23.036
371	8	0.781	183.587	251.800	109.600	0.483	26.692

ROW#	Y/C#	M	Tav	Tgas	Tslat	HF	s/Mm
372	1	0.698	119.963	251.900	110.900	0.939	1.337
372	2	0.698	137.697	251.900	110.900	0.883	5.313
372	3	0.698	149.378	251.900	110.900	0.795	9.406
372	4	0.698	158.315	251.900	110.900	0.666	13.693
372	5	0.698	167.508	251.900	110.900	0.599	17.981
372	6	0.698	114.701	251.900	110.900	0.973	21.670
372	7	0.698	180.736	251.900	110.900	0.505	23.758
372	8	0.698	185.661	251.900	110.900	0.470	29.847

ROW#	Y/C#	M	Tav	Tgas	Tslat	HF	s/Mm
373	1	0.595	123.673	252.100	113.600	0.928	1.440
373	2	0.595	139.382	252.100	113.600	0.879	4.240
373	3	0.595	146.663	252.100	113.600	0.769	11.041
373	4	0.595	158.364	258.100	113.600	0.671	15.841
373	5	0.595	169.583	254.100	113.600	0.591	20.641
373	6	0.593	114.847	252.100	113.600	0.997	25.442
373	7	0.595	185.099	258.100	113.600	0.480	30.242
373	8	0.595	190.157	252.100	113.600	0.443	35.047

ROW#	Y/C#	M	Tav	Tgas	Tslat	HF	s/Mm
374	1	0.396	130.379	253.100	115.700	0.892	2.163
374	2	0.396	136.581	252.100	115.700	0.847	9.375
374	3	0.396	153.837	252.100	115.700	0.706	16.586
374	4	0.396	173.981	252.100	115.700	0.573	23.798
374	5	0.396	185.781	252.100	115.700	0.486	31.009
374	6	0.396	113.815	252.100	115.700	1.013	38.220
374	7	0.396	198.965	252.100	113.700	0.393	45.432
374	8	0.396	802.177	852.100	115.700	0.368	58.643

ROW#	Y/C#	M	Tav	Tgas	Tslat	HF	s/Mm
375	1	0.197	134.140	252.000	123.200	0.766	6.355
375	2	0.197	177.881	252.000	123.200	0.575	18.973
375	3	0.197	193.388	252.000	123.200	0.453	33.381
375	4	0.197	203 696	252.000	123.200	0.383	47.908
375	5	0.197	209.273	252.000	123.200	0.336	62.627
375	6	0.197	113.633	253.000	123.200	1.076	76.965
375	7	0.197	214.327	253.000	123.200	0.288	91.483
375	8	0.197	215.989	252.000	123.200	0.280	105.881

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
395	5	1.217	102.907	230.900	92.400	0.935	4.341
395	6	1.217	106.082	230.900	92.400	0.915	5.351
395	7	1.217	111.120	230.900	92.400	0.883	6.361
395	8	1.217	119.942	230.900	92.400	0.827	7.370

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
396	1	1.437	96.670	231.000	92.800	0.978	0.234
396	2	1.437	97.897	231.000	92.800	0.967	1.111
396	3	1.437	98.351	231.000	92.800	0.965	1.866
396	4	1.437	99.811	231.000	92.800	0.956	2.821
396	5	1.437	101.757	231.000	92.800	0.943	3.676
396	6	1.437	104.323	231.000	92.800	0.927	4.530
396	7	1.437	108.369	231.000	92.800	0.900	5.385
396	8	1.437	[illegible].578	231.000	92.800	0.850	6.240

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
397	1	1.190	98.661	230.800	94.800	0.975	0.310
397	2	1.190	99.888	230.800	94.800	0.967	1.342
397	3	1.190	100.430	230.800	94.800	0.964	2.375
397	4	1.190	101.978	230.800	94.800	0.954	3.408
397	5	1.190	104.057	230.800	94.800	0.941	4.440
397	6	1.190	107.154	230.800	94.800	0.921	5.473
397	7	1.190	112.125	230.800	94.800	0.888	6.505
397	8	1.190	120.815	230.800	94.800	0.833	7.538

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
398	1	1.000	100.474	231.000	96.100	0.972	0.368
398	2	1.000	101.934	231.000	96.100	0.962	1.398
398	3	1.000	102.508	231.000	96.100	0.958	2.826
398	4	1.000	104.234	231.000	96.100	0.947	4.055
398	5	1.000	105.977	231.000	96.100	0.930	5.284
398	6	1.000	111.078	231.000	96.100	0.903	6.513
398	7	1.000	117.434	231.000	96.100	0.864	7.742
398	8	1.000	128.842	231.000	96.100	0.802	8.971

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
399	1	0.784	103.305	231.200	98.600	0.969	0.470
399	2	0.784	104.842	231.200	98.600	0.958	2.037
399	3	0.784	105.782	231.200	98.600	0.953	3.604
399	4	0.784	107.738	231.200	98.600	0.940	5.172
399	5	0.784	110.858	231.200	98.600	0.920	6.739
399	6	0.784	115.400	231.200	98.600	0.890	8.306
399	7	0.784	122.125	231.200	98.600	0.846	9.873
399	8	0.784	132.313	231.200	98.600	0.780	11.440

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
400	1	0.590	107.108	230.900	101.800	0.944	0.625
400	2	0.590	109.200	230.900	101.800	0.931	2.709
400	3	0.590	110.336	230.900	101.800	0.943	4.793
400	4	0.590	112.833	230.900	101.800	0.928	6.877
400	5	0.590	116.710	230.900	101.800	0.900	8.961
400	6	0.590	122.855	230.900	101.800	0.858	11.045
400	7	0.590	132.038	230.900	101.800	0.797	13.129
400	8	0.590	143.433	230.900	101.800	0.721	15.213

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
401	1	0.402	112.234	231.100	105.400	0.953	0.917
401	2	0.402	114.701	231.100	105.400	0.936	3.974
401	3	0.402	114.788	231.100	105.400	0.922	7.030
401	4	0.402	121.121	231.100	105.400	0.892	10.087
401	5	0.402	130.447	231.100	105.400	0.828	13.144
401	6	0.402	143.648	231.100	105.400	0.737	16.201
401	7	0.402	156.370	231.100	105.400	0.651	19.257
401	8	0.402	166.903	231.100	105.400	0.578	22.314

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
402	1	0.205	125.313	230.900	111.700	0.902	1.798
402	2	0.205	133.688	230.900	111.700	0.842	7.790
402	3	0.205	148.311	230.900	111.700	0.730	13.783
402	4	0.205	167.856	230.900	111.700	0.587	19.776
402	5	0.205	180.850	230.900	111.700	0.503	25.769
402	6	0.205	183.076	230.900	111.700	0.444	31.761
402	7	0.205	185.815	230.900	111.700	0.400	37.754
402	8	0.205	190.545	230.900	111.700	0.378	43.747

***** Column 6L *****

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
390	1	0.202	113.268	230.500	99.100	0.883	1.826
390	2	0.202	133.573	230.500	99.100	0.825	7.914
390	3	0.202	143.000	230.500	99.100	0.710	14.002
390	4	0.202	163.618	230.500	99.100	0.574	20.089
390	5	0.202	178.270	230.500	99.100	0.477	26.177
390	6	0.202	187.390	230.500	99.100	0.417	32.265
390	7	0.202	193.816	230.500	99.100	0.376	38.353
390	8	0.202	197.204	230.500	99.100	0.352	44.440

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
391	1	0.406	108.879	230.600	97.400	0.925	0.909
391	2	0.406	114.618	230.600	97.400	0.888	3.938
391	3	0.406	119.4[illegible]	230.600	97.400	0.856	6.966
391	4	0.406	1[illegible]8.414	230.600	97.400	0.798	9.995
391	5	0.406	[illegible].127	230.600	97.400	0.708	13.024
391	6	0.406	150.356	230.600	97.400	0.615	16.053
391	7	0.406	167.078	230.600	97.400	0.545	19.082
391	8	0.406	176.768	230.600	97.400	0.495	22.111

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
392	1	0.592	104.765	230.900	95.200	0.938	0.623
392	2	0.592	107.881	230.900	95.200	0.918	2.698
392	3	0.592	110.727	230.900	95.200	0.900	4.773
392	4	0.592	113.668	230.900	95.200	0.889	6.848
392	5	0.592	123.098	230.900	95.200	0.821	8.923
392	6	0.592	134.004	230.900	95.200	0.751	10.998
392	7	0.592	144.340	230.900	95.200	0.684	13.074
392	8	0.592	154.109	230.900	95.200	0.622	15.149

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
393	1	0.797	101.447	231.000	93.500	0.950	0.463
393	2	0.797	103.615	231.000	93.500	0.936	2.003
393	3	0.797	105.075	231.000	93.500	0.927	3.547
393	4	0.797	108.081	231.000	93.500	0.907	5.089
393	5	0.797	112.736	231.000	93.500	0.878	6.631
393	6	0.797	119.654	231.000	93.500	0.833	8.174
393	7	0.797	128.108	231.000	93.500	0.780	9.716
393	8	0.797	137.718	231.000	93.500	0.716	11.258

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
394	1	0.988	98.390	230.900	92.900	0.958	0.373
394	2	0.982	101.271	230.900	92.900	0.947	1.626
394	3	0.982	102.189	230.900	92.900	0.941	2.876
394	4	0.982	104.544	230.900	92.900	0.926	4.127
394	5	0.982	107.894	230.900	92.900	0.904	5.378
394	6	0.982	113.367	230.900	92.900	0.871	6.628
394	7	0.982	120.160	230.900	92.900	0.827	7.878
394	8	0.982	128.982	230.900	92.900	0.772	9.130

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
395	1	1.217	98.439	230.900	92.600	0.963	0.303
395	2	1.217	99.898	230.900	92.600	0.954	1.313
395	3	1.217	100.474	230.900	92.600	0.950	2.322
395	4	1.217	102.730	230.900	92.600	0.936	3.332
395	5	1.217	106.225	230.900	92.600	0.914	4.341
395	6	1.217	111.076	230.900	92.600	0.883	5.351
395	7	1.217	117.278	230.900	92.600	0.844	6.361
395	8	1.217	123.575	230.900	92.600	0.792	7.370

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
396	1	1.437	97.387	231.000	92.800	0.967	0.234
396	2	1.437	99.234	231.000	92.800	0.958	1.111
396	3	1.437	99.655	231.000	92.800	0.955	1.966
396	4	1.437	102.155	231.000	92.800	0.941	2.821
396	5	1.437	105.738	231.000	92.800	0.919	3.676
396	6	1.437	110.532	231.000	92.800	0.888	4.530
396	7	1.437	116.142	231.000	92.800	0.852	5.385
396	8	1.437	123.918	231.000	92.900	0.803	6.240

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
397	1	1.190	100.032	230.800	94.800	0.966	0.310
397	2	1.190	101.358	230.800	94.800	0.958	1.342
397	3	1.190	101.934	230.800	94.800	0.954	2.375
397	4	1.190	103.880	230.800	94.800	0.942	3.408
397	5	1.190	107.065	230.800	94.800	0.921	4.440
397	6	1.190	111.601	230.800	94.800	0.892	5.473
397	7	1.190	117.452	230.800	94.800	0.855	6.505
397	8	1.190	125.532	230.800	94.800	0.803	7.538

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
398	1	1.000	101.934	231.000	96.100	0.962	0.368
398	2	1.000	103.394	231.000	96.100	0.953	1.398
398	3	1.000	104.101	231.000	96.100	0.948	2.826
398	4	1.000	106.004	231.000	96.100	0.936	4.055
398	5	1.000	109.011	231.000	96.100	0.917	5.284
398	6	1.000	113.939	231.000	96.100	0.885	6.513
398	7	1.000	120.309	231.000	96.100	0.842	7.742
398	8	1.000	129.156	231.000	96.100	0.787	8.971

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
399	1	0.784	104.898	231.200	98.600	0.951	0.470
399	2	0.784	106.578	231.200	98.600	0.946	2.037
399	3	0.784	107.484	231.200	98.600	0.940	3.604
399	4	0.784	109.852	231.200	98.600	0.926	5.172
399	5	0.784	113.478	231.200	98.600	0.903	6.739
399	6	0.784	119.382	231.200	98.600	0.862	8.306
399	7	0.784	127.715	231.200	98.600	0.809	9.873
399	8	0.784	137.780	231.200	98.600	0.743	11.440

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
400	1	0.590	108.879	230.900	101.800	0.953	0.625
400	2	0.590	111.428	230.900	101.800	0.935	2.709
400	3	0.590	113.347	230.900	101.800	0.923	4.793
400	4	0.590	118.972	230.900	101.800	0.898	6.877
400	5	0.590	123.523	230.900	101.800	0.854	8.961
400	6	0.590	133.587	230.900	101.800	0.787	11.045
400	7	0.590	144.167	230.900	101.800	0.716	13.129
400	8	0.590	154.887	230.900	101.800	0.644	15.213

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
401	1	0.402	114.658	231.100	105.400	0.934	0.917
401	2	0.402	119.287	231.100	105.400	0.905	3.974
401	3	0.402	122.082	231.100	105.400	0.889	7.030
401	4	0.402	128.2[illegible]	231.100	105.400	0.835	10.087
401	5	0.402	142.640	231.100	105.400	0.769	13.144
401	6	0.402	155.465	231.100	105.400	0.655	16.201
401	7	0.402	168.946	231.100	105.400	0.578	19.257
401	8	0.402	175.838	231.100	105.400	0.514	22.314

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
402	1	0.205	128.283	230.900	111.700	0.881	1.798
402	2	0.205	137.934	230.900	111.700	0.812	7.790
402	3	0.205	153.763	230.900	111.700	0.698	13.783
402	4	0.205	170.965	230.900	111.700	0.574	19.776
402	5	0.205	183.343	230.900	111.700	0.484	25.769
402	6	0.205	191.324	230.900	111.700	0.428	31.761
402	7	0.205	197.291	230.900	111.700	0.385	37.754
402	8	0.205	201.182	230.900	111.700	0.357	43.747

***** Column 6M *****

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
390	1	0.202	113.586	230.300	99.100	0.904	1.826
390	2	0.202	121.470	230.300	99.100	0.852	7.914
390	3	0.202	138.886	230.300	99.100	0.750	14.001
390	4	0.202	159.887	230.300	99.100	0.598	20.089
390	5	0.202	170.585	230.300	99.100	0.488	26.177
390	6	0.202	187.001	230.300	99.100	0.419	32.265
390	7	0.202	183.010	230.300	99.100	0.380	38.353
390	8	0.202	196.642	230.300	99.100	0.356	44.440

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
391	1	0.406	108.658	230.600	97.400	0.927	0.909
391	2	0.406	112.307	230.600	97.400	0.902	3.938
391	3	0.406	116.230	230.600	97.400	0.877	6.966
391	4	0.406	122.344	230.600	97.400	0.837	9.995
391	5	0.406	134.659	230.600	97.400	0.757	13.024
391	6	0.406	150.303	230.600	97.400	0.655	16.053
391	7	0.405	163.488	230.600	97.400	0.589	19.082
391	8	0.406	172.282	230.600	97.400	0.511	22.111

ROW#	T/C#	M	Tsw	Tgas	Tslot	EF	x/Ms
392	1	0.592	104.721	230.900	95.200	0.939	0.623
392	2	0.592	107.339	230.900	95.200	0.922	2.698
392	3	0.592	108.763	230.900	95.200	0.908	4.773
392	4	0.592	112.898	230.900	95.200	0.886	6.848
392	5	0.592	118.937	230.900	95.200	0.848	8.923
392	6	0.592	128.632	230.900	95.200	0.785	10.998
392	7	0.592	140.484	230.900	95.200	0.710	13.074
392	8	0.592	150.651	230.900	95.200	0.644	15.149

RUN#	T/C#	M	Tsw	Tgse	Tplat	HT	m/Ms
383	1	0.787	101.447	251.000	93.500	0.950	0.463
383	2	0.787	103.394	251.000	93.500	0.937	2.005
383	3	0.787	104.982	251.000	93.500	0.927	3.547
383	4	0.787	107.375	251.000	93.500	0.912	5.088
383	5	0.787	111.513	251.000	93.500	0.886	6.631
383	6	0.787	117.877	251.000	93.500	0.845	8.174
383	7	0.787	126.711	251.000	93.500	0.789	9.716
383	8	0.787	135.148	251.000	93.500	0.730	11.258

RUN#	T/C#	M	Tsw	Tgse	Tplat	HT	m/Ms
384	1	0.982	98.590	250.900	92.900	0.958	0.373
384	2	0.982	101.049	250.900	92.900	0.949	1.924
384	3	0.982	102.189	250.900	92.900	0.941	3.476
384	4	0.982	104.057	250.900	92.900	0.929	4.127
384	5	0.982	107.586	250.900	92.900	0.907	5.578
384	6	0.982	113.240	250.900	92.900	0.871	6.628
384	7	0.982	120.815	250.900	92.900	0.823	7.879
384	8	0.982	128.375	250.900	92.900	0.768	9.130

RUN#	T/C#	M	Tsw	Tgse	Tplat	HT	m/Ms
385	1	1.217	98.435	250.900	93.600	0.963	0.383
385	2	1.217	99.580	250.900	93.600	0.956	1.313
385	3	1.217	100.543	250.900	93.600	0.950	2.522
385	4	1.217	102.188	250.900	93.600	0.939	3.532
385	5	1.217	105.340	250.900	93.600	0.920	4.341
385	6	1.217	110.378	250.900	93.600	0.888	5.351
385	7	1.217	117.016	250.900	93.600	0.846	6.541
385	8	1.217	124.788	250.900	93.600	0.797	7.370

RUN#	T/C#	M	Tsw	Tgse	Tplat	HT	m/Ms
386	1	1.437	98.088	251.000	93.800	0.967	0.256
386	2	1.437	99.015	251.000	93.800	0.961	1.111
386	3	1.437	99.833	251.000	93.800	0.955	1.866
386	4	1.437	101.492	251.000	93.800	0.945	2.821
386	5	1.437	104.544	251.000	93.800	0.926	3.674
386	6	1.437	109.056	251.000	93.800	0.897	4.330
386	7	1.437	114.007	251.000	93.800	0.860	5.385
386	8	1.437	121.888	251.000	93.800	0.819	6.240

RUN#	T/C#	M	Tsw	Tgse	Tplat	HT	m/Ms
387	1	1.190	100.074	250.800	94.800	0.966	0.310
387	2	1.190	101.178	250.800	94.800	0.959	1.348
387	3	1.190	101.978	250.800	94.800	0.954	2.375
387	4	1.190	103.482	250.800	94.800	0.944	3.408
387	5	1.190	106.337	250.800	94.800	0.926	4.440
387	6	1.190	111.166	250.800	94.800	0.895	5.473
387	7	1.190	117.496	250.800	94.800	0.855	6.505
387	8	1.190	125.270	250.800	94.800	0.805	7.538

RUN#	T/C#	M	Tsw	Tgse	Tplat	HT	m/Ms
388	1	1.000	103.067	251.000	96.100	0.961	0.388
388	2	1.000	103.241	251.000	96.100	0.956	1.598
388	3	1.000	104.234	251.000	96.100	0.947	2.826
388	4	1.000	105.782	251.000	96.100	0.937	4.055
388	5	1.000	108.836	251.000	96.100	0.918	5.284
388	6	1.000	113.915	251.000	96.100	0.885	6.513
388	7	1.000	121.034	251.000	96.100	0.838	7.742
388	8	1.000	129.531	251.000	96.100	0.785	8.971

RUN#	T/C#	M	Tsw	Tgse	Tplat	HT	m/Ms
399	1	0.784	103.030	251.200	98.600	0.938	0.470
399	2	0.784	104.648	251.200	98.600	0.928	2.037
399	3	0.784	107.598	251.200	98.600	0.841	3.604
399	4	0.784	109.333	251.200	98.600	0.930	5.171
399	5	0.784	113.343	251.300	98.600	0.910	6.738
399	6	0.784	117.877	251.200	98.600	0.873	8.306
399	7	0.784	126.316	251.200	98.600	0.818	9.873
399	8	0.784	136.057	251.200	98.600	0.755	11.440

RUN#	T/C#	M	Tsw	Tgse	Tplat	HT	m/Ms
400	1	0.590	108.823	250.900	101.800	0.953	0.625
400	2	0.590	110.727	250.900	101.800	0.940	2.709
400	3	0.590	112.258	250.900	101.800	0.930	4.793
400	4	0.590	114.526	250.900	101.800	0.915	6.877
400	5	0.590	118.374	250.900	101.800	0.889	8.961
400	6	0.590	124.458	250.900	101.800	0.851	11.045
400	7	0.590	140.182	250.900	101.800	0.763	13.129
400	8	0.590	151.181	250.900	101.800	0.668	15.213

RUN#	T/C#	M	Tsw	Tgse	Tplat	HT	m/Ms
401	1	0.402	114.133	251.100	105.400	0.940	0.817
401	2	0.402	116.885	251.100	105.400	0.921	3.974
401	3	0.408	118.158	251.100	105.400	0.908	7.030
401	4	0.402	123.828	251.100	105.400	0.874	10.087
401	5	0.402	135.870	251.100	105.400	0.795	13.144
401	6	0.402	150.521	251.100	105.400	0.690	16.201
401	7	0.402	163.704	251.100	105.400	0.600	19.257
401	8	0.402	173.679	251.100	105.400	0.535	22.314

RUN#	T/C#	M	Tsw	Tgse	Tplat	HT	m/Ms
402	1	0.205	126.187	250.900	111.700	0.888	1.798
402	2	0.205	133.742	250.900	111.700	0.842	7.790
402	3	0.205	148.403	250.900	111.700	0.736	13.783
402	4	0.205	168.070	250.900	111.700	0.595	19.775
402	5	0.205	182.031	250.900	111.700	0.495	25.768
402	6	0.205	191.151	250.900	111.700	0.429	31 761
402	7	0.205	196.773	250.900	111.700	0.389	37.754
402	8	0.205	200.577	250.900	111.700	0.362	43.747

FILM EFFECTIVENESS TEST
ANGLED INJECTION WITH NON-ACCELERATING FLOW

INJECTION ANGLE = 11.5 DEG NUMBER OF SLOTS =9 SLOT WIDTH = 1.25 (IN.)
SLOT HEIGHT = 0.407 (IN.) LIP THICKNESS = 0.407 (IN.)
HOT SIDE AREA= 33.7850 (SQ.IN) COLD SIDE AREA= 3.9240 (SQ.IN.)

T/C LOCATIONS

T/C#	X/S	4R	5L	5M	5R	6L	6M
1	0.369	X	X	X	X	X	X
2	1.597	X	X	X	X	X	X
3	2.826	X	X	X	X	X	X
4	4.054	X	X	X	X	X	X
5	5.283	X	X	X	X	X	X
6	6.511	X	X	X	X	X	X
7	7.740	X	X	X	X	X	X
8	8.968	X	X	X	X	X	X

Note: D(X1,X2) = 100*(X2-X1)/X1
Note: EF = (Tgas - Taw)/(Tgas - Tslot)

FILM EFFECTIVENESS DATA

SPANWISE AVERAGED FILM EFFECTIVENESS DATA

***** Columns 4R-5L, 5L-5R, 5M-6L ****

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.203	120.216	0.898	0.369	1.812
2	0.203	129.495	0.834	1.597	7.852
3	0.203	145.619	0.723	2.826	13.892
4	0.203	166.123	0.582	4.054	19.931
5	0.203	180.251	0.485	5.283	25.971
6	0.203	189.105	0.424	6.511	32.011
7	0.203	194.573	0.387	7.740	38.051
8	0.203	197.925	0.363	8.968	44.091

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.404	110.846	0.937	0.369	0.913
2	0.404	114.729	0.911	1.597	3.956
3	0.404	118.160	0.888	2.826	6.998
4	0.404	124.256	0.848	4.054	10.041
5	0.404	135.993	0.769	5.283	13.084
6	0.404	150.155	0.674	6.511	16.126
7	0.404	160.871	0.603	7.740	19.169
8	0.404	170.964	0.535	8.968	22.212

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.591	106.094	0.950	0.369	0.624
2	0.591	108.620	0.934	1.597	2.703
3	0.591	110.881	0.919	2.826	4.783
4	0.591	114.204	0.897	4.054	6.863
5	0.591	119.849	0.860	5.283	8.942
6	0.591	128.499	0.804	6.511	11.022
7	0.591	137.157	0.747	7.740	13.101
8	0.591	148.933	0.669	8.968	15.181

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.790	102.482	0.959	0.369	0.466
2	0.790	104.239	0.947	1.597	2.021
3	0.790	105.691	0.938	2.826	3.576
4	0.790	108.000	0.923	4.054	5.130
5	0.790	112.229	0.896	5.283	6.685
6	0.790	118.406	0.856	6.511	8.239
7	0.790	125.523	0.810	7.740	9.794
8	0.790	135.409	0.746	8.968	11.348

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.991	100.122	0.964	0.369	0.372
2	0.991	101.514	0.955	1.597	1.612
3	0.991	102.567	0.948	2.826	2.851
4	0.991	104.331	0.937	4.054	4.091
5	0.991	107.851	0.915	5.283	5.331
6	0.991	113.223	0.880	6.511	6.570
7	0.991	119.892	0.838	7.740	7.810
8	0.991	128.828	0.781	8.968	9.050

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	1.203	98.641	0.969	0.369	0.306
2	1.203	99.826	0.961	1.597	1.327
3	1.203	100.664	0.956	2.826	2.348
4	1.203	102.141	0.946	4.054	3.369
5	1.203	104.945	0.928	5.283	4.390
6	1.203	109.230	0.901	6.511	5.411
7	1.203	114.475	0.868	7.740	6.432
8	1.203	122.966	0.814	8.968	7.453

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	1.437	97.458	0.971	0.369	0.256
2	1.437	98.491	0.964	1.597	1.111
3	1.437	99.279	0.959	2.826	1.966
4	1.437	100.776	0.950	4.054	2.821
5	1.437	103.459	0.933	5.283	3.676
6	1.437	107.213	0.909	6.511	4.530
7	1.437	111.475	0.882	7.740	5.385
8	1.437	119.406	0.832	8.968	6.240

FILM EFFECTIVENESS TEST
ANGLED INJECTION WITH NON-ACCELERATING FLOW

INJECTION ANGLE = 15.0 DEG NUMBER OF SLOTS = 8 SLOT WIDTH = 1.25 (IN.)
SLOT HEIGHT = 0.536 (IN.) LIP THICKNESS = 0.536 (IN.)
HOT SIDE AREA= 54.1350 (SQ.IN.) COLD SIDE AREA= 5.1670 (SQ.IN.)

Y/C LOCATIONS

Y/C#	X/S	4R	5L	5M	5R	6L	6M
1	0.260	X	X	X	X	X	X
2	1.213	X	X	X	X	X	X
3	3.146	X	X	X	X	X	X
4	5.078	X	X	X	X	X	X
5	6.011	X	X	X	X	X	X
6	6.944	X	X	X	X	X	X
7	8.877	X	X	X	X	X	X
8	9.810	X	X	X	X	X	X

Note: D(X1,X2) = 100*(X2-X1)/X1
Note: EF = (Tgas - Taw)/(Tgas - Tplat)

FILM EFFECTIVENESS DATA

***** Column 4R *****

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
402	1	0.200	89.869	250.300	84.900	0.809	1.388
402	2	0.200	105.894	250.300	84.900	0.874	5.060
402	3	0.200	116.798	250.300	84.900	0.907	10.722
402	4	0.200	138.085	250.300	84.800	0.678	15.384
402	5	0.200	160.348	250.300	84.900	0.544	20.046
402	6	0.200	174.585	250.300	84.900	0.458	24.708
402	7	0.200	183.384	250.300	84.800	0.405	29.370
402	8	0.200	187.808	250.300	84.800	0.377	34.031

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
404	1	0.398	90.384	250.500	79.800	0.835	0.702
404	2	0.398	93.785	250.500	79.800	0.818	3.041
404	3	0.398	98.758	250.500	79.800	0.801	5.380
404	4	0.398	89.501	250.500	79.800	0.845	7.719
404	5	0.398	105.581	250.500	79.800	0.768	10.058
404	6	0.398	117.738	250.500	79.800	0.770	12.397
404	7	0.398	132 313	250.500	79.800	0.693	14.736
404	8	0.398	144 888	250.500	79.800	0.618	17.075

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
405	1	0.404	85.812	250.700	78.700	0.848	0.684
405	2	0.404	87.248	250.700	78.700	0.839	2.006
405	3	0.404	89.135	250.700	78.700	0.828	3.353
405	4	0.404	90.689	250.700	78.700	0.820	5.100
405	5	0.404	93.574	250.700	78.700	0.803	6.445
405	6	0.404	99.058	250.700	78.700	0.771	9.191
405	7	0.404	107.588	250.700	78.700	0.722	9.736
405	8	0.404	117 803	250 700	78.700	0.744	11.282

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
406	1	0.404	82.206	250.800	75.100	0.860	0.348
406	2	0.404	83.267	250.800	75.100	0.854	1.509

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
406	3	0.404	84.384	250.800	75.100	0.848	2.669
406	4	0.404	85.789	250.800	75.100	0.839	3.829
406	5	0.404	89.150	250.800	75.100	0.820	4.990
406	6	0.404	95.741	250.800	75.100	0.[illegible]	6.150
406	7	0.404	103.782	250.800	75.100	[illegible]	7.310
406	8	0.404	113.139	250.800	75.100	[illegible]	8.471

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
407	1	1.003	80.474	250.700	74.300	0.865	0.279
407	2	1.003	81.233	250.700	74.300	0.861	1.208
407	3	1.003	82.284	250.700	74.300	0.855	2.138
407	4	1.003	83.135	250.700	74.300	0.850	3.068
407	5	1.003	85.037	250.700	74.300	0.838	3.998
407	6	1.003	88.874	250.700	74.300	0.817	4.927
407	7	1.003	93.899	250.700	74.300	0.788	5.857
407	8	1.003	100.571	250.700	74.300	0.756	6.787

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
408	1	1.215	80.070	250.800	75.200	0.872	0.230
408	2	1.215	80.319	250.900	75.200	0.870	0.998
408	3	1.215	81.191	250.900	75.200	0.865	1.766
408	4	1.215	81.740	250.900	75.200	0.862	2.534
408	5	1.215	83.135	250.900	75.200	0.855	3.301
408	6	1.215	85.181	250.900	75.200	0.843	4.069
408	7	1.215	89.416	250.900	75.200	0.819	4.837
408	8	1.215	95.853	250.900	75.100	0.784	5.605

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
409	1	0.990	83.938	250.900	78.100	0.912	0.183
409	2	0.990	83.933	250.900	78.100	0.968	1.233
409	3	0.990	84.328	250.900	78.100	0.966	2.167
409	4	0.990	85.168	250.900	78.100	0.959	3.108
409	5	0.990	86.983	250.900	78.100	0.949	4.053
409	6	0.990	90.878	250.900	78.100	0.928	4.984
409	7	0.990	97.201	250.900	78.100	0.889	5.939
409	8	0.990	105.809	250.900	78.100	0.841	6.878

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
410	1	0.793	86.744	251.000	81.300	0.910	0.353
410	2	0.793	87.118	251.000	81.300	0.868	1.528
410	3	0.793	88.000	251.000	81.300	0.861	2.704
410	4	0.793	88.818	251.000	81.300	0.857	3.880
410	5	0.793	92.203	251.000	81.300	0.838	5.056
410	6	0.793	97.688	251.000	81.300	0.803	6.231
410	7	0.793	105.473	251.000	81.300	0.758	7.407
410	8	0.793	114.814	251.000	81.300	0.704	8.583

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
411	1	0.608	89.847	251.100	84.100	0.843	0.439
411	2	0.608	91.053	251.100	84.100	0.836	1.881
411	3	0.608	92.158	251.100	84.100	0.830	3.322
411	4	0.608	93.530	251.100	84.100	0.822	4.764
411	5	0.608	95.870	251.100	84.100	0.810	6.205
411	6	0.608	100.362	251.100	84.100	0.787	7.647
411	7	0.608	108.481	251.100	84.100	0.754	9.088
411	8	0.608	118.261	251.100	84.100	0.708	11.180

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
412	1	0.402	83.611	251.000	88.100	0.958	0.197
412	2	0.402	87.378	251.000	88.100	0.945	3.030

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
412	3	0.402	98.059	251.000	88.100	0.915	5.362
412	4	0.402	101.271	251.000	88.100	0.921	7.695
412	5	0.402	109.249	251.000	88.100	0.891	8.908
412	6	0.402	117.409	251.000	88.100	0.852	12.711
412	7	0.402	132.126	251.000	88.100	0.732	14.834
412	8	0.402	144.242	251.000	88.100	0.645	16.958

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
413	1	0.198	107.586	251.000	85.300	0.921	1.411
413	2	0.198	113.128	251.000	85.300	0.895	4.110
413	3	0.198	126.789	251.000	85.300	0.811	10.814
413	4	0.198	145.181	251.000	85.300	0.680	15.516
413	5	0.198	164.871	251.000	85.300	0.553	20.218
413	6	0.198	177.465	251.000	85.300	0.471	24.920
413	7	0.198	183.877	251.000	85.300	0.430	29.621
413	8	0.198	188.762	251.000	85.300	0.387	34.323

***** Column 5L *****

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
403	1	0.200	102.907	250.300	84.800	0.881	1.389
403	2	0.200	114.177	250.300	84.900	0.823	5.060
403	3	0.200	127.453	250.300	84.900	0.747	10.722
403	4	0.200	147.083	250.300	84.900	0.624	15.384
403	5	0.200	168.396	250.300	84.800	0.518	20.046
403	6	0.200	175.938	250.300	84.800	0.450	24.708
403	7	0.200	183.272	250.300	84.800	0.524	29.370
403	8	0.200	187.317	250.300	84.900	0.381	34.031

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
404	1	0.398	82.426	250.500	79.800	0.924	0.702
404	2	0.398	87.853	250.500	79.800	0.894	3.041
404	3	0.398	102.818	250.500	79.800	0.865	5.380
404	4	0.398	108 146	250 500	79 800	0.828	7 719
404	5	0.398	118.501	250 500	79.800	0.773	10 058
404	6	0.398	130.0774	250.500	79.800	0.705	12.397
404	7	0.398	136 626	250 500	79 800	0 667	14 736
404	8	0.398	149.788	250.500	79 800	0 590	17 075

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
405	1	0.404	86.340	250.700	78.700	0.845	0.684
405	2	0.404	88.443	250.700	78.700	0.833	2.006
405	3	0.404	90.300	250.700	78.700	0.822	3.535
405	4	0.404	93.2477	250.700	78.700	0.811	5.100
405	5	0.404	97.555	250.700	78.700	0.787	6.445
405	6	0.404	104.387	250.700	78.700	0.841	9.191
405	7	0.404	113 880	250 700	78.700	0.753	9 736
405	8	0.404	122.213	250.700	78.700	0.758	11.282

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
406	1	0.404	82.781	250.800	75.100	0.856	0.348
406	2	0.404	84.152	250.800	75.100	0.848	1.509
406	3	0.404	85.258	250.800	75.100	0.842	2.669
406	4	0.404	85.366	250.800	75.100	0.838	3.829
406	5	0.404	89.283	250.800	75.100	0.819	4.990
406	6	0.404	93.793	250.800	75.100	0.796	6.150
406	7	0.404	102.188	250.800	75.100	0.749	7.310
406	8	0.404	108 171	250.800	75.100	0.812	8.471

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
407	1	1.003	81.011	250.700	74.300	0.862	0.279
407	2	1.003	81.863	250.700	74.300	0.858	1.208
407	3	1.003	82.825	250.700	74.300	0.853	2.138
407	4	1.003	83.223	250.700	74.300	0.849	3.068
407	5	1.003	86.010	250.700	74.300	0.834	3.998
407	6	1.003	89.149	250.700	74.300	0.814	4.927
407	7	1.003	109.454	250.700	74.300	0.801	5.857
407	8	1.003	101.696	250.700	74.300	0.843	6.787

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
408	1	1.215	80.424	250.900	75.200	0.870	0.230
408	2	1.215	81.188	250.900	75.200	0.866	0.998
408	3	1.215	81.763	250.900	75.200	0.863	1.766
408	4	1.215	82.338	250.900	75.200	0.859	2.534
408	5	1.215	84.948	250.900	75.200	0.845	3.301
408	6	1.215	88.231	250.900	75.200	0.826	4.069
408	7	1.215	108.392	250.900	75.200	0.811	4.837
408	8	1.215	98.855	250.900	75.200	0.865	5.605

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
409	1	0.990	83.356	250.900	78.100	0.970	0.183
409	2	0.990	84.283	250.900	78.100	0.964	1.233
409	3	0.990	84.893	250.900	78.100	0.960	2.167
409	4	0.990	85.478	250.900	78.100	0.957	3.108
409	5	0.990	87.912	250.900	78.100	0.943	4.053
409	6	0.990	91.087	250.900	78.100	0.925	4.984
409	7	0.990	110.814	250.900	78.100	0.811	5.939
409	8	0.990	101.859	250.900	78.100	0.862	6.878

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
410	1	0.793	86.718	251.000	81.300	0.868	0.353
410	2	0.793	87.668	251.000	81.300	0.861	1.528
410	3	0.793	88.787	251.000	81.300	0.856	2.704
410	4	0.793	89.589	251.000	81.300	0.851	3.880
410	5	0.793	92.668	251.000	81.300	0.834	5.056
410	6	0.793	98.483	251.000	81.300	0.810	6.231
410	7	0.793	115.666	251.000	81.300	0.789	7.407
410	8	0.793	111.039	251.000	81.300	0.825	8.583

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
411	1	0.608	90.522	251.100	84.100	0.862	0.439
411	2	0.608	92.158	251.100	84.100	0.853	1.881
411	3	0.608	93.530	251.100	84.100	0.846	3.322
411	4	0.608	95.367	251.100	84.100	0.837	4.764
411	5	0.608	98.767	251.100	84.100	0.820	6.205
411	6	0.608	105.815	251.100	84.100	0.869	7.647
411	7	0.608	122.100	251.100	84.100	0.771	9.088
411	8	0.608	133.816	251.100	84.100	0.742	11.180

ROW#	Y/C#	M	Taw	Tgas	Tplat	EF	x/Mm
412	1	0.402	87.334	251.000	88.100	0.946	0.197
412	2	0.402	101.836	251.000	88.100	0.918	3.030
412	3	0.402	105.686	251.000	88.100	0.894	5.362
412	4	0.402	110.869	251.000	88.100	0.862	7.695
412	5	0.402	118.376	251.000	88.100	0.815	8.908
412	6	0.402	139.863	251.000	88.100	0.745	12.711
412	7	0.402	139.576	251.000	88.100	0.687	14.834
412	8	0.402	151.040	251.000	88.100	0.619	16.958

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
413	1	0.198	111.444	231.000	95.300	0.895	1.411
413	2	0.198	122.169	231.000	95.300	0.827	6.112
413	3	0.198	135.008	231.000	95.300	0.745	10.814
413	4	0.198	153.978	231.000	95.300	0.623	15.516
413	5	0.198	168.977	231.000	95.300	0.527	20.218
413	6	0.198	179.307	231.000	95.300	0.460	24.920
413	7	0.198	167.854	231.000	95.300	0.534	29.621
413	8	0.198	190.257	231.000	95.300	0.391	34.323

***** Column 5M *****

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
403	1	0.200	99.853	230.300	84.900	0.910	1.399
403	2	0.200	107.463	230.300	84.900	0.864	6.060
403	3	0.200	119.287	230.300	84.900	0.792	10.722
403	4	0.200	141.359	230.300	84.900	0.657	15.384
403	5	0.200	162.969	230.300	84.900	0.528	20.046
403	6	0.200	176.455	230.300	84.900	0.446	24.708
403	7	0.200	184.451	230.300	84.900	0.398	29.370
403	8	0.200	188.125	230.300	84.900	0.376	34.031

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
404	1	0.399	91.362	230.500	79.800	0.932	0.702
404	2	0.399	94.988	230.500	79.800	0.911	3.041
404	3	0.399	98.484	230.500	79.800	0.891	5.380
404	4	0.399	101.934	230.500	79.800	0.870	7.719
404	5	0.399	109.840	230.500	79.800	0.823	10.058
404	6	0.399	124.003	230.500	79.800	0.741	12.397
404	7	0.399	139.601	230.500	79.800	0.649	14.736
404	8	0.399	151.402	230.500	79.800	0.579	17.075

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
405	1	0.604	85.921	230.700	76.700	0.947	0.464
405	2	0.604	88.221	230.700	76.700	0.934	2.009
405	3	0.604	90.212	230.700	76.700	0.922	3.555
405	4	0.604	91.893	230.700	76.700	0.913	5.100
405	5	0.604	95.453	230.700	76.700	0.891	6.645
405	6	0.604	102.774	230.700	76.700	0.850	8.181
405	7	0.604	113.409	230.700	76.700	0.788	9.736
405	8	0.604	124.012	230.700	76.700	0.717	11.282

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
406	1	0.804	82.471	230.800	75.100	0.958	0.348
406	2	0.804	84.064	230.800	75.100	0.949	1.508
406	3	0.804	85.391	230.800	75.100	0.941	2.669
406	4	0.804	86.561	230.800	75.100	0.935	3.829
406	5	0.804	89.549	230.800	75.100	0.918	4.990
406	6	0.804	95.078	230.800	75.100	0.886	6.150
406	7	0.804	103.482	230.800	75.100	0.838	7.310
406	8	0.804	114.221	230.800	75.100	0.777	8.471

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
407	1	1.003	80.698	230.700	74.300	0.966	0.279
407	2	1.003	81.888	230.700	74.300	0.957	1.209
407	3	1.003	82.913	230.700	74.300	0.951	2.138
407	4	1.003	83.842	230.700	74.300	0.946	3.068
407	5	1.003	86.384	230.700	74.300	0.932	3.998
407	6	1.003	91.097	230.700	74.300	0.905	4.927
407	7	1.003	98.041	230.700	74.300	0.865	5.857
407	8	1.003	107.773	230.700	74.300	0.810	6.787

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
408	1	1.215	80.160	230.900	75.200	0.972	0.230
408	2	1.215	81.036	230.900	75.200	0.967	0.998
408	3	1.215	81.858	230.900	75.200	0.962	1.766
408	4	1.215	82.692	230.900	75.200	0.957	2.534
408	5	1.215	85.169	230.900	75.200	0.943	3.301
408	6	1.215	89.504	230.900	75.200	0.918	4.069
408	7	1.215	95.633	230.900	75.200	0.884	4.837
408	8	1.215	104.508	230.900	75.200	0.833	5.605

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
409	1	0.990	83.002	230.900	78.100	0.972	0.283
409	2	0.990	84.064	230.900	78.100	0.965	1.225
409	3	0.990	84.904	230.900	78.100	0.961	2.167
409	4	0.990	85.709	230.900	78.100	0.956	3.109
409	5	0.990	88.177	230.900	78.100	0.942	4.052
409	6	0.990	92.845	230.900	78.100	0.916	4.994
409	7	0.990	99.634	230.900	78.100	0.878	5.936
409	8	0.990	109.631	230.900	78.100	0.818	6.878

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
410	1	0.793	86.364	231.000	81.300	0.970	0.353
410	2	0.793	87.550	231.000	81.300	0.963	1.528
410	3	0.793	88.709	231.000	81.300	0.956	2.704
410	4	0.793	89.401	231.000	81.300	0.951	3.880
410	5	0.793	92.281	231.000	81.300	0.935	5.056
410	6	0.793	97.422	231.000	81.300	0.905	6.231
410	7	0.793	105.738	231.000	81.300	0.856	7.407
410	8	0.793	116.988	231.000	81.300	0.790	8.583

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
411	1	0.609	90.079	231.100	84.100	0.964	0.459
411	2	0.609	91.672	231.100	84.100	0.955	1.991
411	3	0.609	93.043	231.100	84.100	0.946	3.522
411	4	0.609	94.370	231.100	84.100	0.938	5.054
411	5	0.609	97.555	231.100	84.100	0.919	6.585
411	6	0.609	104.323	231.100	84.100	0.879	8.117
411	7	0.609	115.102	231.100	84.100	0.814	9.648
411	8	0.609	128.327	231.100	84.100	0.735	11.180

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
412	1	0.403	95.785	231.000	88.500	0.955	0.697
412	2	0.403	98.395	231.000	88.500	0.939	3.020
412	3	0.403	100.838	231.000	88.500	0.924	5.342
412	4	0.403	103.630	231.000	88.500	0.908	7.665
412	5	0.403	110.553	231.000	88.500	0.864	9.988
412	6	0.403	126.222	231.000	88.500	0.780	12.311
412	7	0.403	140.188	231.000	88.500	0.682	14.634
412	8	0.403	153.503	231.000	88.500	0.600	16.956

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
413	1	0.198	108.018	231.000	95.300	0.918	1.411
413	2	0.198	115.869	231.000	95.300	0.873	6.112
413	3	0.198	128.370	231.000	95.300	0.788	10.814
413	4	0.198	148.783	231.000	95.300	0.650	15.516
413	5	0.198	168.198	231.000	95.300	0.532	20.218
413	6	0.198	178.826	231.000	95.300	0.457	24.920
413	7	0.198	187.390	231.000	95.300	0.409	29.621
413	8	0.198	181.497	231.000	95.300	0.382	34.323

***** Column 5R *****

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
403	1	0.200	99.855	230.300	84.900	0.910	1.399
403	2	0.200	108.423	230.300	84.900	0.869	6.060
403	3	0.200	119.854	230.300	84.900	0.789	10.722
403	4	0.200	140.511	230.300	84.900	0.664	15.384
403	5	0.200	160.592	230.300	84.900	0.542	20.046
403	6	0.200	173.473	230.300	84.900	0.464	24.708
403	7	0.200	181.866	230.300	84.900	0.413	29.370
403	8	0.200	186.137	230.300	84.900	0.388	34.031

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
404	1	0.399	90.345	230.500	79.800	0.938	0.702
404	2	0.399	93.839	230.500	79.800	0.918	3.041
404	3	0.399	[illegible].382	230.500	79.800	0.902	5.380
404	4	0.399	[illegible]74	230.500	79.800	0.878	7.719
404	5	0.399	[illegible]3	230.500	79.800	0.837	10.058
404	6	0.399	[illegible]	230.500	79.800	0.771	12.397
404	7	0.399	[illegible]	230.500	79.800	0.684	14.736
404	8	0.399	[illegible]	230.500	79.800	0.620	17.075

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
405	1	0.604	[illegible].983	230.700	76.700	0.952	0.464
405	2	0.604	[illegible].423	230.700	76.700	0.938	2.009
405	3	0.604	[illegible]841	230.700	76.700	0.930	3.555
405	4	0.604	[illegible]097	230.700	76.700	0.917	5.100
405	5	0.604	[illegible]459	230.700	76.700	0.888	6.645
405	6	0.604	[illegible]678	230.700	76.700	0.888	8.191
405	7	0.604	[illegible]861	230.700	76.700	0.821	9.736
405	8	0.604	[illegible]787	230.700	76.700	0.752	11.282

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
406	1	0.804	81.931	230.800	75.100	0.963	0.348
406	2	0.804	83.400	230.800	75.100	0.953	1.509
406	3	0.804	84.132	230.800	75.100	0.948	2.669
406	4	0.804	85.921	230.800	75.100	0.939	3.829
406	5	0.804	89.841	230.800	75.100	0.922	4.990
406	6	0.804	93.374	230.800	75.100	0.895	6.150
406	7	0.804	100.828	230.800	75.100	0.854	7.310
406	8	0.804	112.299	230.800	75.100	0.788	8.471

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
407	1	1.003	79.881	230.700	74.300	0.968	0.279
407	2	1.003	81.410	230.700	74.300	0.960	1.209
407	3	1.003	81.852	230.700	74.300	0.957	2.138
407	4	1.003	83.223	230.700	74.300	0.948	3.068
407	5	1.003	85.346	230.700	74.300	0.937	3.998
407	6	1.003	88.575	230.700	74.300	0.919	4.927
407	7	1.003	94.149	230.700	74.300	0.887	5.857
407	8	1.003	104.809	230.700	74.300	0.827	6.787

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
408	1	1.215	79.488	230.900	75.200	0.976	0.230
408	2	1.215	80.653	230.900	75.200	0.968	0.998
408	3	1.215	80.877	230.900	75.200	0.968	1.766
408	4	1.215	82.028	230.900	75.200	0.961	2.534
408	5	1.215	83.710	230.900	75.200	0.952	3.301
408	6	1.215	86.143	230.900	75.200	0.938	4.069
408	7	1.215	90.546	230.900	75.200	0.913	4.837
408	8	1.215	100.032	230.900	75.200	0.859	5.605

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
409	1	0.990	82.383	230.900	78.100	0.975	0.283
409	2	0.990	83.377	230.900	78.100	0.968	1.225
409	3	0.990	83.931	230.900	78.100	0.966	2.167
409	4	0.990	85.169	230.900	78.100	0.959	3.109
409	5	0.820	87.204	230.900	78.100	0.947	4.052
409	6	0.990	90.300	230.900	78.100	0.929	4.994
409	7	0.990	95.962	230.900	78.100	0.897	5.936
409	8	0.990	106.578	230.900	78.100	0.835	6.878

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
410	1	0.793	85.746	231.000	81.300	0.974	0.353
410	2	0.793	87.072	231.000	81.300	0.966	1.528
410	3	0.793	87.514	231.000	81.300	0.963	2.704
410	4	0.793	89.010	231.000	81.300	0.955	3.880
410	5	0.793	91.539	231.000	81.300	0.940	5.056
410	6	0.793	95.887	231.000	81.300	0.915	6.231
410	7	0.793	102.686	231.000	81.300	0.874	7.407
410	8	0.793	114.396	231.000	81.300	0.805	8.583

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
411	1	0.609	89.372	231.100	84.100	0.968	0.459
411	2	0.609	90.920	231.100	84.100	0.959	1.991
411	3	0.609	91.718	231.100	84.100	0.954	3.522
411	4	0.609	93.441	231.100	84.100	0.944	5.054
411	5	0.609	96.184	231.100	84.100	0.928	6.585
411	6	0.609	100.072	231.100	84.100	0.900	8.117
411	7	0.609	109.188	231.100	84.100	0.850	9.648
411	8	0.609	121.994	231.100	84.100	0.773	11.180

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
412	1	0.403	95.122	231.000	88.500	0.958	0.697
412	2	0.403	97.466	231.000	88.500	0.945	3.020
412	3	0.403	98.970	231.000	88.500	0.936	5.342
412	4	0.403	101.845	231.000	88.500	0.918	7.665
412	5	0.403	107.773	231.000	88.500	0.881	9.988
412	6	0.403	118.344	231.000	88.500	0.815	12.311
412	7	0.403	132.363	231.000	88.500	0.728	14.634
412	8	0.403	148.867	231.000	88.500	0.641	16.956

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
413	1	0.198	107.994	231.000	95.300	0.918	1.411
413	2	0.198	115.138	231.000	95.300	0.877	6.112
413	3	0.198	129.288	231.000	95.300	0.783	10.814
413	4	0.198	149.354	231.000	95.300	0.653	15.516
413	5	0.198	166.800	231.000	95.300	0.542	20.218
413	6	0.198	177.535	231.000	95.300	0.472	24.920
413	7	0.198	185.818	231.000	95.300	0.420	29.621
413	8	0.198	190.418	231.000	95.300	0.389	34.323

***** Column 4L *****

ROW#	T/C#	M	Tw	Tgas	Tinlet	EF	x/Ms
403	1	0.200	102.398	230.300	84.900	0.883	1.399

403	2	0.200	112.288	250.300	84.900	0.836	6.040
403	3	0.200	123.741	250.300	84.900	0.745	10.722
403	4	0.200	143.087	250.300	84.900	0.648	13.384
403	5	0.200	162.148	250.300	84.900	0.533	20.066
403	6	0.200	175.115	250.300	84.900	0.455	24.706
403	7	0.200	183.714	250.300	84.900	0.403	28.370
403	8	0.200	188.903	250.300	84.900	0.371	34.031

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
404	1	0.399	92.367	250.500	78.800	0.927	0.702
404	2	0.398	96.870	250.500	78.800	0.801	3.041
404	3	0.398	100.861	250.500	78.800	0.876	5.380
404	4	0.399	107.418	250.500	78.800	0.838	7.718
404	5	0.398	117.365	250.500	78.800	0.780	10.058
404	6	0.398	131.753	250.500	78.800	0.686	12.387
404	7	0.398	146.338	250.500	78.800	0.621	14.736
404	8	0.398	155.146	250.500	78.800	0.559	17.075

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
405	1	0.404	86.718	250.700	76.700	0.842	0.464
405	2	0.404	88.150	250.700	76.700	0.928	2.009
405	3	0.404	90.831	250.700	76.700	0.918	3.553
405	4	0.404	93.708	250.700	76.700	0.902	5.100
405	5	0.404	97.897	250.700	76.700	0.878	6.643
405	6	0.404	104.092	250.700	76.700	0.831	8.191
405	7	0.404	114.055	250.700	76.700	0.776	9.736
405	8	0.404	127.844	250.700	76.700	0.708	11.282

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
406	1	0.804	83.178	250.800	75.100	0.856	0.348
406	2	0.804	83.037	250.800	75.100	0.843	1.589
406	3	0.804	85.968	250.800	75.100	0.938	2.665
406	4	0.804	87.868	250.800	75.100	0.837	3.838
406	5	0.804	90.345	250.800	75.100	0.913	4.990
406	6	0.804	94.988	250.800	75.100	0.887	6.150
406	7	0.804	102.022	250.800	75.100	0.847	7.310
406	8	0.804	112.288	250.800	75.100	0.788	8.471

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
407	1	1.003	81.365	250.700	74.300	[illegible]40	0.278
407	2	1.003	82.813	250.700	74.300	[illegible]51	1.309
407	3	1.003	85.498	250.700	74.300	[illegible]48	2.138
407	4	1.003	89.168	250.700	74.300	0.838	3.068
407	5	1.003	97.357	250.700	74.300	0.926	3.998
407	6	1.003	91.228	250.700	74.300	0.804	4.927
407	7	1.003	86.681	250.700	74.300	0.872	5.857
407	8	1.003	105.859	250.700	74.300	0.831	6.787

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
408	1	1.215	80.787	250.900	75.200	0.968	0.230
408	2	1.215	81.983	250.900	75.200	0.981	0.998
408	3	1.215	83.339	250.900	75.200	0.959	1.766
408	4	1.215	83.831	250.800	75.200	0.930	2.534
408	5	1.215	86.231	250.900	75.200	0.937	3.301
408	6	1.215	90.035	250.900	75.200	0.916	4.069
408	7	1.215	93.433	250.900	75.200	0.885	4.837
408	8	1.215	104.278	250.900	75.200	0.834	5.605

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
409	1	0.990	83.685	250.800	78.100	0.968	0.283

409	2	0.990	84.968	250.900	78.100	0.960	1.235
409	3	0.990	86.393	250.900	78.100	0.958	2.187
409	4	0.990	88.830	250.900	78.100	0.948	3.109
409	5	0.990	88.885	250.900	78.100	0.938	4.052
409	6	0.990	92.556	250.900	78.100	0.916	4.994
409	7	0.990	98.251	250.900	78.100	0.883	5.936
409	8	0.990	107.861	250.900	78.100	0.828	6.878

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
410	1	0.793	87.072	251.000	81.300	0.966	0.353
410	2	0.793	88.643	251.000	81.300	0.958	1.528
410	3	0.793	89.185	251.000	81.300	0.953	2.704
410	4	0.793	90.810	251.000	81.300	0.945	3.880
410	5	0.793	93.934	251.000	81.300	0.931	5.056
410	6	0.793	97.594	251.000	81.300	0.906	6.231
410	7	0.793	104.765	251.000	81.300	0.868	7.407
410	8	0.793	115.487	251.000	81.300	0.788	8.583

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
411	1	0.808	90.831	251.100	84.100	0.960	0.459
411	2	0.808	92.318	251.100	84.100	0.950	1.808
411	3	0.808	93.818	251.100	84.100	0.943	3.158
411	4	0.808	95.493	251.100	84.100	0.931	5.056
411	5	0.808	99.501	251.100	84.100	0.908	6.385
411	6	0.808	106.932	251.100	84.100	0.869	8.117
411	7	0.808	117.878	251.100	84.100	0.801	9.848
411	8	0.808	130.074	251.100	84.100	0.725	11.580

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
412	1	0.402	86.847	251.000	88.500	0.969	0.497
412	2	0.402	100.562	251.000	88.500	0.927	3.020
412	3	0.402	103.305	251.000	88.500	0.908	5.342
412	4	0.402	108.811	251.000	88.500	0.879	7.665
412	5	0.402	117.396	251.000	88.500	0.823	9.988
412	6	0.402	131.054	251.000	88.500	0.738	12.311
412	7	0.402	144.816	251.000	88.500	0.693	14.634
412	8	0.402	156.918	251.000	88.500	0.579	16.956

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
413	1	0.198	111.336	251.000	93.300	0.867	1.411
413	2	0.198	119.862	251.000	93.300	0.848	4.113
413	3	0.198	131.777	251.000	93.300	0.788	10.814
413	4	0.198	150.305	251.000	93.300	0.647	15.516
413	5	0.198	167.508	251.000	93.300	0.538	20.218
413	6	0.198	178.702	251.000	93.300	0.464	24.920
413	7	0.198	186.671	251.000	93.300	0.413	29.621
413	8	0.198	193.1	251.000	93.300	0.375	34.323

***** Column

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
403	1	0.200	100.881	250.300	84.900	0.905	1.380
403	2	0.200	107.194	555.370	84.900	0.863	8.040
403	3	0.200	117.167	-50.300	84.900	0.805	10.722
403	4	0.200	137.105	250.300	84.900	0.686	15.384
403	5	0.200	159.511	250.300	84.900	0.548	20.046
403	6	0.200	176.623	250.300	84.900	0.459	24.708
403	7	0.200	183.441	250.300	84.900	0.403	29.370
403	8	0.200	188.188	250.300	84.900	0.370	34.031

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
404	1	0.399	92.370	250.500	78.800	0.928	0.702
404	2	0.398	95.476	250.300	78.800	0.808	3.041
404	3	0.399	98.882	250.500	79.800	0.888	5.380
404	4	0.398	103.040	250.300	78.800	0.864	7.718
404	5	0.399	110.640	250.300	78.800	0.818	10.058
404	6	0.398	124.484	250.300	78.800	0.738	12.387
404	7	0.399	140.283	250 300	79.800	0.648	14.736
404	8	0.398	152.250	250.500	78.800	0.576	17.075

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
405	1	0.404	88.673	250.700	76.700	0.963	0.464
405	2	0.404	88.018	250.700	76.700	0.929	2.009
405	3	0.404	90.878	250.700	76.700	0.818	3.553
405	4	0.404	93.087	250.700	76.700	0.804	5.100
405	5	0.404	96.628	250.700	76.700	0.885	6.643
405	6	0.404	103.571	250.700	76.700	0.868	8.191
405	7	0.404	114.483	250.700	76.700	0.783	9.736
405	8	0.404	126.648	250.700	76.700	0.716	11.282

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
406	1	0.804	83.178	250.800	75.100	0.856	0.348
406	2	0.804	84.615	250.800	75.100	0.865	1.589
406	3	0.804	86.034	250.800	75.100	0.838	2.665
406	4	0.804	87.491	250.800	75.100	0.928	3.838
406	5	0.804	90.345	250.800	75.100	0.813	4.990
406	6	0.804	95.432	250.800	75.100	0.884	6.150
406	7	0.804	103.615	250.800	75.100	0.838	7.310
406	8	0.804	113.815	250.800	75.100	0.779	8.471

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
407	1	1.003	81.365	250.700	74.300	0.860	0.278
407	2	1.003	82.448	250.700	74.300	0.853	1.209
407	3	1.003	83.621	250.700	74.300	0.847	2.138
407	4	1.003	86.893	250.700	74.300	0.839	3.068
407	5	1.003	87.381	250.700	74.300	0.826	3.998
407	6	1.003	91.604	250.700	74.300	0.801	4.927
407	7	1.003	86.748	250.700	74.300	0.841	5.857
407	8	1.003	107.808	250.700	74.300	0.809	6.787

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
408	1	1.215	80.922	250.900	75.200	0.867	0.230
408	2	1.215	81.718	250.900	75.200	0.963	0.998
408	3	1.215	82.471	250.900	75.200	0.959	1.766
408	4	1.215	83.754	250.900	75.200	0.851	2.534
408	5	1.215	86.160	250.900	75.200	0.837	3.301
408	6	1.215	90.256	250.800	75.200	0.914	4.069
408	7	1.215	96.449	250.900	75.200	0.878	4.837
408	8	1.215	105.050	250.900	75.200	0.830	5.605

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
409	1	0.990	83.788	250.900	78.100	0.867	0.283
409	2	0.990	84.771	250.900	78.100	0.961	1.235
409	3	0.990	85.567	250.900	78.100	0.957	2.187
409	4	0.990	86.762	250.900	78.100	0.950	3.109
409	5	0.990	89.062	250.900	78.100	0.917	4.052
409	6	0.990	93.308	250.900	78.100	0.912	4.994
409	7	0.990	100.253	250.900	78.100	0.872	5.936
409	8	0.990	109.808	250.900	78.100	0.817	6.878

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
410	1	0.793	87.206	251.000	81.300	0.963	0.353
410	2	0.793	88.398	251.000	81.300	0.958	1.528
410	3	0.793	89.327	251.000	81.300	0.953	2.704
410	4	0.793	90.654	251.000	81.300	0.945	3.880
410	5	0.793	93.087	251.000	81.300	0.931	5.056
410	6	0.793	97.987	251.000	81.300	0.902	6.231
410	7	0.793	106.357	251.000	81.300	0.852	7.407
410	8	0.793	117.356	251.000	81.300	0.788	8.583

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
411	1	0.808	90.944	251.100	84.100	0.958	0.459
411	2	0.808	92.[illegible]12	251.100	84.100	0.950	1.808
411	3	0.808	93.[illegible]18	251.100	84.100	0.943	3.522
411	4	0.808	95.[illegible]93	251.100	84.100	0.933	5.056
411	5	0.808	99.[illegible]01	251.100	84.100	0.915	6.565
411	6	0.808	106.010	251.100	84.100	0.877	8.117
411	7	0.808	116.088	251.100	84.100	0.808	9.648
411	8	0.808	128.025	251.100	84.100	0.731	11.180

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
412	1	0.402	88.758	251.000	88.500	0.969	0.497
412	2	0.402	89.015	251.000	88.500	0.935	3.020
412	3	0.402	101.139	251.000	88.500	0.922	5.542
412	4	0.402	104.057	251.000	88.500	0.904	7.665
412	5	0.402	111.120	251.000	88.500	0.861	9.988
412	6	0.402	124.866	251.000	88.500	0.776	12.311
412	7	0.402	141.287	251.000	88.500	0.675	14.634
412	8	0.402	154.671	251.000	88.500	0.593	16.956

ROW#	Y/C#	M	Tsw	Tgas	Talet	HF	s/Ms
413	1	0.198	109.011	251.000	93.300	0.912	1.411
413	2	0.198	113.313	251.000	93.300	0.871	4.112
413	3	0.198	123.488	251.000	93.300	0.806	10.814
413	4	0.198	145.998	251.000	93.300	0.675	15.516
413	5	0.198	165.965	251.000	93.300	0.547	20.218
413	6	0.198	178.139	251.000	93.300	0.465	24.920
413	7	0.198	188.568	251.000	93.300	0.416	29.621
413	8	0.198	191.913	251.000	93.300	0.378	34.323

FILM EFFECTIVENESS TEST
ANGLED INJECTION WITH NON-ACCELERATING FLOW

INJECTION ANGLE = 15.0 DEG NUMBER OF SLOTS = 9 SLOT WIDTH = 1.25 (IN.)
SLOT HEIGHT = 0.536 (IN.) LIP THICKNESS = 0.536 (IN.)
HOT SIDE AREA= 34.1350 (SQ.IN) COLD SIDE AREA= 5.1670 (SQ.IN.)

T/C LOCATIONS

T/C#	X/S	4R	5L	5M	5R	6L	6M
1	0.280	X	X	X	X	X	X
2	1.213	X	X	X	X	X	X
3	2.146	X	X	X	X	X	X
4	3.078	X	X	X	X	X	X
5	4.011	X	X	X	X	X	X
6	4.944	X	X	X	X	X	X
7	5.877	X	X	X	X	X	X
8	6.810	X	X	X	X	X	X

Note: D(X1,X2) = 100*(X2-X1)/X1
Note: EF = (Tgas - Taw)/(Tgas - Tslot)

FILM EFFECTIVENESS DATA

SPANWISE AVERAGED FILM EFFECTIVENESS DATA

***** Columns 4R-5L, 5L-5R, 5M-6L ****

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.199	105.186	0.906	0.280	1.405
2	0.199	112.977	0.858	1.213	6.086
3	0.199	124.993	0.783	2.146	10.768
4	0.199	145.147	0.657	3.078	15.450
5	0.199	164.272	0.538	4.011	20.131
6	0.199	176.739	0.461	4.944	24.813
7	0.199	184.691	0.411	5.877	29.495
8	0.199	189.515	0.381	6.810	34.177

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.400	93.906	0.942	0.280	0.699
2	0.400	97.263	0.922	1.213	3.030
3	0.400	100.290	0.904	2.146	5.361
4	0.400	104.329	0.879	3.078	7.692
5	0.400	111.877	0.834	4.011	10.023
6	0.400	124.425	0.759	4.944	12.354
7	0.400	136.969	0.683	5.877	14.685
8	0.400	150.509	0.602	6.810	17.016

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.606	88.159	0.955	0.280	0.462
2	0.606	90.004	0.944	1.213	2.000
3	0.606	91.464	0.935	2.146	3.538
4	0.606	93.343	0.924	3.078	5.077
5	0.606	96.891	0.904	4.011	6.615
6	0.606	103.192	0.867	4.944	8.154
7	0.606	111.775	0.816	5.877	9.692
8	0.606	124.145	0.744	6.810	11.231

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.799	84.575	0.963	0.280	0.350
2	0.799	85.919	0.955	1.213	1.518
3	0.799	86.888	0.950	2.146	2.686
4	0.799	88.201	0.942	3.078	3.854
5	0.799	91.002	0.926	4.011	5.022
6	0.799	95.982	0.897	4.944	6.190
7	0.799	103.495	0.854	5.877	7.358
8	0.799	113.552	0.795	6.810	8.527

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.997	81.996	0.967	0.280	0.281
2	0.997	83.096	0.961	1.213	1.217
3	0.997	83.621	0.956	2.146	2.153
4	0.997	84.892	0.950	3.078	3.089
5	0.997	87.097	0.938	4.011	4.024
6	0.997	90.919	0.916	4.944	4.960
7	0.997	96.915	0.881	5.877	5.896
8	0.997	106.056	0.829	6.810	6.832

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	1.215	80.315	0.971	0.280	0.230
2	1.215	81.181	0.966	1.213	0.998
3	1.215	81.753	0.963	2.146	1.766
4	1.215	82.770	0.957	3.078	2.534
5	1.215	84.828	0.945	4.011	3.301
6	1.215	88.107	0.927	4.944	4.069
7	1.215	92.772	0.900	5.877	4.837
8	1.215	101.218	0.852	6.810	5.605

FILM EFFECTIVENESS TEST
ANGLED INJECTION WITH ACCELERATING FLOW

INJECTION ANGLE = 0.5 DEG NUMBER OF SLOTS = 9 SLOT WIDTH = 1.25 (IN.)
SLOT HEIGHT = 0.259 (L/E.) LIP THICKNESS = 0.256 (IN.)
HOT SIDE AREA= 26.6790 (SQ.IN) COLD SIDE AREA= 3.61 (SQ.IN.)

T/C LOCATIONS

T/C#	X/E	4R	5M	5R	6L	6M	LAND
1	0.302	X	X	X	X	X	X
2	3.174	X	X	X	X	X	X
3	5.846	X	X	X	X	X	X
4	8.518	X	X	X	X	X	X
5	7.181	X	X	X	X	X	X
6	8.683	X	X	X	X	X	X
7	10.535	X	X	X	X	X	X
8	12.207	X	X	X	X	X	X

Note: D(X1,X2) = 100*(X2-X1)/X1
Note: EF = (Tgas - Taw)/(Tgas - Talet)

FILM EFFECTIVENESS DATA

***** Column 4R *****

ROW#	T/C#	M	Taw	Tgas	Talet	EF	s/Me
439	1	0.159	121.383	249.400	72.800	0.735	3.149
439	2	0.159	140.078	249.400	72.800	0.502	13.647
439	3	0.159	166.121	249.400	72.800	0.347	34.144
439	4	0.159	200.690	249.400	72.800	0.277	54.642
439	5	0.159	206.890	249.400	72.800	0.261	45.139
439	6	0.159	209.641	249.400	72.800	0.254	55.638
439	7	0.159	208.965	249.400	72.800	0.256	66.136
439	8	0.159	210.003	249.300	73.000	0.253	76.631
440	1	0.208	108.357	249.200	70.600	0.788	3.607
440	2	0.208	140.991	249.200	70.600	0.605	10.631
440	3	0.208	175.348	249.200	70.600	0.431	18.656
440	4	0.208	189.838	249.200	70.600	0.393	26.680
440	5	0.208	197.744	249.200	70.600	0.388	34.704
440	6	0.208	201.238	249.200	70.600	0.288	42.728
440	7	0.208	201.388	249.200	70.600	0.267	50.752
440	8	0.208	203.258	249.200	70.600	0.257	58.777
441	1	0.404	76.708	248.900	61.700	0.920	1.261
441	2	0.404	86.830	249.900	61.700	0.866	5.376
441	3	0.404	106.833	249.900	61.700	0.760	9.511
441	4	0.404	138.327	248.900	61.700	0.593	13.646
441	5	0.404	157.739	249.800	61.700	0.490	17.781
441	6	0.404	167.076	248.900	61.700	0.440	21.916
441	7	0.404	170.058	249.900	61.700	0.424	26.051
441	8	0.404	175.481	249.900	61.700	0.396	30.186
442	1	0.602	67.454	249.600	58.600	0.933	0.833
442	2	0.602	75.547	249.600	58.600	0.823	3.808
442	3	0.602	80.632	249.600	58.600	0.884	6.783
442	4	0.602	97.176	249.600	58.600	0.785	9.161
442	5	0.602	119.023	249.600	58.600	0.684	11.857
442	6	0.602	133.349	249.600	58.600	0.608	14.713
442	7	0.602	140.893	249.600	58.600	0.572	17.688
442	8	0.602	149.311	249.600	58.600	0.525	20.265
443	1	0.820	65.188	249.600	58.600	0.984	0.612
443	2	0.820	67.878	249.600	58.600	0.950	3.653
443	3	0.820	73.067	248.600	58.600	0.829	6.693
443	4	0.820	81.498	248.600	58.600	0.678	9.738
443	5	0.820	95.818	249.600	58.600	0.804	9.771
443	6	0.820	108.765	249.600	58.600	0.733	10.812
443	7	0.820	119.156	249.600	58.600	0.683	11.852
443	8	0.820	130.293	249.600	58.600	0.624	14.892
444	1	1.005	65.818	249.700	60.500	0.973	0.498
444	2	1.005	67.475	249.700	60.500	0.963	2.163
444	3	1.005	68.860	249.700	60.500	0.950	3.827
444	4	1.005	76.819	249.700	60.500	0.915	5.491
444	5	1.005	87.027	249.700	60.500	0.860	7.156
444	6	1.005	97.953	249.700	60.500	0.803	8.820
444	7	1.005	107.109	249.700	60.500	0.756	10.484
444	8	1.005	116.156	249.700	60.500	0.690	12.149
445	1	1.816	66.893	249.000	62.400	0.976	0.613
445	2	1.816	68.132	249.000	62.400	0.969	1.768
445	3	1.816	69.804	249.000	62.400	0.960	3.163
445	4	1.816	75.276	249.300	62.400	0.931	4.539
445	5	1.816	83.973	249.000	62.400	0.884	5.914
445	6	1.816	91.308	249.000	62.400	0.834	7.290
445	7	1.816	101.338	249.900	62.400	0.780	8.665
445	8	1.816	113.160	249.000	62.400	0.727	10.041
446	1	1.423	68.730	248.800	64.600	0.978	0.553
446	2	1.423	69.761	248.800	64.600	0.972	1.538
446	3	1.423	71.106	248.800	64.600	0.965	2.703
446	4	1.423	76.171	248.800	64.600	0.937	3.870
446	5	1.423	84.088	248.800	64.600	0.892	5.036
446	6	1.423	89.636	248.800	64.600	0.860	6.203
446	7	1.423	98.965	248.800	64.600	0.808	7.404
446	8	1.423	110.846	248.800	64.600	0.748	8.570
447	1	1.219	70.747	248.300	66.600	0.974	0.418
447	2	1.219	71.957	248.300	66.600	0.970	1.783
447	3	1.219	73.637	248.300	66.600	0.962	3.155
447	4	1.219	78.788	248.200	66.600	0.935	4.527
447	5	1.219	87.337	248.300	66.600	0.885	5.899
447	6	1.219	94.605	248.300	66.600	0.836	7.271
447	7	1.219	104.101	248.200	66.600	0.784	8.643
447	8	1.219	115.119	248.300	66.600	0.733	10.014
448	1	1.002	72.606	248.000	67.600	0.971	0.501
448	2	1.002	74.019	248.000	67.600	0.964	2.170
448	3	1.002	76.486	249.000	67.600	0.950	3.840
448	4	1.002	83.135	249.000	67.600	0.915	5.510
448	5	1.002	93.367	249.000	67.600	0.857	7.179
448	6	1.002	103.836	249.000	67.600	0.798	8.849
448	7	1.002	112.363	249.000	67.600	0.753	10.518
448	8	1.002	123.814	249.000	67.600	0.688	12.188
449	1	0.805	73.818	249.000	68.100	0.970	0.623
449	2	0.805	74.081	249.000	68.100	0.956	2.701
449	3	0.805	80.160	249.000	68.100	0.933	4.778
449	4	0.805	88.327	249.000	68.100	0.863	6.858
449	5	0.805	102.996	248.300	68.100	0.807	8.934
449	6	0.805	115.662	249.000	68.100	0.737	11.011
449	7	0.805	124.353	249.300	68.100	0.688	13.089
449	8	0.805	135.576	249.000	68.100	0.627	15.166
450	1	0.600	74.081	248.900	69.300	0.962	0.835
450	2	0.600	81.233	248.900	69.300	0.934	3.620
450	3	0.600	88.177	248.900	69.300	0.905	6.405
450	4	0.600	104.455	248.900	69.300	0.824	9.190
450	5	0.600	124.640	248.900	69.300	0.693	11.976
450	6	0.600	137.543	248.900	69.300	0.620	14.758
450	7	0.600	144.167	248.900	69.300	0.583	17.544
450	8	0.600	152.941	248.800	69.300	0.534	20.329
451	1	0.387	81.227	248.900	71.300	0.946	1.085
451	2	0.387	90.522	248.800	71.300	0.893	5.410
451	3	0.387	111.424	248.900	71.300	0.774	9.926
451	4	0.387	142.813	248.900	71.300	0.597	14.241
451	5	0.387	160.638	248.900	71.300	0.495	18.556
451	6	0.387	169.030	248.900	71.300	0.450	22.872
451	7	0.387	171.571	248.900	71.300	0.435	27.187
451	8	0.387	176.671	248.900	71.306	0.407	31.503
452	1	0.203	107.817	248.800	77.100	0.821	2.464
452	2	0.203	141.515	248.800	77.100	0.625	10.488
452	3	0.203	174.231	248.800	77.100	0.434	18.909
452	4	0.203	190.027	248.900	77.100	0.342	27.331
452	5	0.203	197.838	248.800	77.100	0.296	35.752
452	6	0.203	201.368	248.800	77.100	0.277	43.574
452	7	0.203	201.182	248.800	77.100	0.277	51.795
452	8	0.203	203.301	248.800	77.100	0.265	60.017

***** LAND *****

ROW#	T/C#	M	Taw	Tgas	Talet	EF	s/Me
439	1	0.159	176.653	249.400	72.800	0.613	3.149
439	2	0.159	185.042	249.400	72.800	0.508	13.647
439	3	0.159	212.556	249.400	72.800	0.209	24.144
439	4	0.159	218.305	249.400	72.800	0.176	34.642
439	5	0.159	218.566	248.400	72.800	0.175	45.139
439	6	0.159	218.997	249.400	72.800	0.173	55.636
439	7	0.159	248.188	249.400	72.800	1.787	66.134
439	8	0.159	999.000	249.400	72.800	4.243	76.631
440	1	0.208	171.138	249.200	70.600	0.637	2.607
440	2	0.208	188.697	249.200	70.600	0.338	10.631
440	3	0.208	206.771	249.200	70.600	0.248	18.656
440	4	0.208	210.565	249.200	70.600	0.216	26.680
440	5	0.208	211.127	249.200	70.600	0.213	34.704
440	6	0.208	231.662	249.200	70.600	0.209	42.728
440	7	0.208	-33.739	249.200	70.600	1.705	50.752
440	8	0.208	999.000	249.200	70.600	4.184	58.777
441	1	0.404	188.686	248.900	61.700	0.662	1.261
441	2	0.404	179.133	249.900	61.700	0.376	5.376
441	3	0.404	185.688	248.900	61.700	0.362	9.511
441	4	0.404	189.716	248.800	61.700	0.352	13.646
441	5	0.404	191.964	249.800	61.700	0.381	17.781
441	6	0.404	193.506	248.800	61.700	0.158	21.916
441	7	0.404	-18.617	249.900	61.700	1.427	26.051
441	8	0.404	999.000	249.900	61.700	3.980	30.186
442	1	0.602	167.883	248.600	58.600	0.427	0.833
442	2	0.602	177.708	248.600	58.600	0.376	3.808
442	3	0.602	178.524	248.600	58.600	0.367	6.783
442	4	0.602	171.398	248.600	58.600	0.408	9.161
442	5	0.602	186.093	249.600	58.600	0.448	11.857
442	6	0.602	181.888	248.600	58.600	0.459	14.713
442	7	0.602	9.360	248.600	58.600	1.262	17.688
442	8	0.602	999.000	249.600	58.600	1.824	20.265
443	1	0.820	171.193	248.600	58.600	0.410	0.612
443	2	0.820	176.671	248.600	58.600	0.383	3.653
443	3	0.820	175.381	248.600	58.600	0.388	6.693
443	4	0.820	184.438	249.600	58.600	0.445	9.738
443	5	0.820	156.411	249.600	58.600	0.497	9.771
443	6	0.820	150.727	248.600	58.600	0.517	10.812
443	7	0.820	21.858	249.600	58.600	1.193	11.852
443	8	0.820	999.000	249.600	58.600	1.835	14.892
444	1	1.005	175.301	248.700	60.500	0.396	0.498
444	2	1.005	174.108	248.700	60.500	0.389	2.163
444	3	1.005	171.810	248.700	60.500	0.412	3.827
444	4	1.005	174.535	248.700	60.500	0.478	5.491
444	5	1.005	148.835	248.700	60.500	0.533	7.156
444	6	1.005	145.550	248.700	60.500	0.550	8.820
444	7	1.005	28.727	248.700	60.500	1.148	10.484
444	8	1.005	999.000	248.700	60.500	1.880	12.149
445	1	1.816	178.054	249.000	62.600	0.380	0.613
445	2	1.816	175.801	249.000	62.600	0.392	1.768
445	3	1.816	169.610	249.000	62.600	0.427	3.163
445	4	1.816	174.227	249.000	62.600	0.403	4.539
445	5	1.816	165.530	249.000	62.600	0.556	5.914
445	6	1.816	142.520	249.000	62.600	0.671	7.290
445	7	1.816	31.619	249.000	62.600	1.163	8.665
445	8	1.816	999.000	249.000	62.600	4.019	10.041

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
446	1	1.423	180.345	248.800	64.600	0.372	0.353
446	2	1.423	175.331	248.800	64.600	0.398	1.528
446	3	1.423	167.724	248.800	64.600	0.440	2.703
446	4	1.423	154.871	248.800	64.600	0.511	3.878
446	5	1.423	144.038	248.800	64.600	0.569	5.054
446	6	1.423	141.168	248.800	64.600	0.584	6.229
446	7	1.423	32.484	248.800	64.600	1.174	7.404
446	8	1.423	999.000	248.800	64.600	-4.073	8.579

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
447	1	1.219	179.956	249.200	66.400	0.379	0.412
447	2	1.219	177.665	249.200	66.400	0.391	1.783
447	3	1.219	171.398	249.200	66.400	0.426	3.155
447	4	1.219	158.474	249.200	66.400	0.496	4.527
447	5	1.219	147.885	249.200	66.400	0.554	5.899
447	6	1.219	144.988	249.200	66.400	0.570	7.271
447	7	1.219	31.164	249.200	66.400	1.193	8.642
447	8	1.219	999.000	249.200	66.400	-4.102	10.014

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
448	1	1.002	177.579	249.000	67.400	0.393	0.501
448	2	1.002	178.486	249.000	67.400	0.388	2.170
448	3	1.002	174.251	249.000	67.400	0.412	3.840
448	4	1.002	162.321	249.000	67.400	0.477	5.510
448	5	1.002	152.250	249.000	67.400	0.533	7.179
448	6	1.002	149.248	249.000	67.400	0.549	8.849
448	7	1.002	28.402	249.000	67.400	1.215	10.518
448	8	1.002	999.000	249.000	67.400	-4.130	12.188

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
449	1	0.805	175.039	249.000	68.100	0.408	0.623
449	2	0.805	180.302	249.000	68.100	0.380	2.701
449	3	0.805	178.675	249.000	68.100	0.388	4.778
449	4	0.805	168.459	249.000	68.100	0.445	6.856
449	5	0.805	158.893	249.000	68.100	0.498	8.934
449	6	0.805	155.491	249.000	68.100	0.517	11.011
449	7	0.805	22.640	249.000	68.100	1.231	13.089
449	8	0.805	999.000	249.000	68.100	-4.146	15.166

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
450	1	0.600	172.321	248.900	69.300	0.423	0.835
450	2	0.600	181.598	248.900	69.300	0.375	3.620
450	3	0.600	182.938	248.900	69.300	0.367	6.405
450	4	0.600	174.842	248.900	69.300	0.412	9.190
450	5	0.600	167.810	248.900	69.300	0.452	11.974
450	6	0.600	163.433	248.900	69.300	0.475	14.759
450	7	0.600	12.021	248.900	69.300	1.318	17.544
450	8	0.600	999.000	248.900	69.300	-4.177	20.329

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
451	1	0.387	170.058	248.900	71.300	0.444	1.295
451	2	0.387	182.410	248.900	71.300	0.374	5.610
451	3	0.387	188.773	248.900	71.300	0.339	9.926
451	4	0.387	187.131	248.900	71.300	0.348	14.241
451	5	0.387	185.402	248.900	71.300	0.358	18.556
451	6	0.387	185.143	248.900	71.300	0.359	22.872
451	7	0.387	-10.183	248.900	71.300	1.459	27.187
451	8	0.387	999.000	248.900	71.300	-4.224	31.503

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
452	1	0.203	173.629	248.800	77.100	0.438	2.466
452	2	0.203	190.805	248.800	77.100	0.338	10.688
452	3	0.203	206.567	248.800	77.100	0.246	18.909
452	4	0.203	212.308	248.800	77.100	0.213	27.131
452	5	0.203	212.684	248.800	77.100	0.210	35.352
452	6	0.203	212.986	248.800	77.100	0.209	43.574
452	7	0.203	-43.394	248.800	77.100	1.702	51.795
452	8	0.203	999.000	248.800	77.100	-4.349	60.017

***** Column 5A *****

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
439	1	0.159	125.794	249.400	72.800	0.700	3.169
439	2	0.159	165.087	249.400	72.800	0.477	13.667
439	3	0.159	180.845	249.400	72.800	0.391	24.164
439	4	0.159	200.820	249.400	72.800	0.276	34.662
439	5	0.159	207.031	249.400	72.800	0.240	45.159
439	6	0.159	208.100	249.400	72.800	0.234	55.656
439	7	0.159	208.100	249.400	72.800	0.234	66.154
439	8	0.159	202.390	249.400	72.800	0.263	76.651

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
440	1	0.208	105.782	249.200	70.400	0.802	2.407
440	2	0.208	140.535	249.200	70.400	0.608	10.431
440	3	0.208	135.441	249.200	70.400	0.636	18.456
440	4	0.208	188.341	249.200	70.400	0.340	26.480
440	5	0.208	194.870	249.200	70.400	0.304	34.504
440	6	0.208	199.084	249.200	70.400	0.280	42.528
440	7	0.208	200.058	249.200	70.400	0.275	50.552
440	8	0.208	196.596	249.200	70.400	0.294	58.577

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
441	1	0.404	74.440	248.900	61.700	0.933	1.241
441	2	0.404	80.787	248.900	61.700	0.898	5.376
441	3	0.404	86.808	248.900	61.700	0.867	9.511
441	4	0.404	118.339	248.900	61.700	0.700	13.646
441	5	0.404	141.476	248.900	61.700	0.571	17.781
441	6	0.404	155.488	248.900	61.700	0.498	21.916
441	7	0.404	163.767	248.900	61.700	0.455	26.051
441	8	0.404	168.470	248.900	61.700	0.430	30.186

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
442	1	0.602	67.834	249.600	58.600	0.952	0.833
442	2	0.602	69.895	249.600	58.600	0.941	3.609
442	3	0.602	76.385	249.600	58.600	0.907	6.385
442	4	0.602	80.330	249.600	58.600	0.887	9.161
442	5	0.602	99.219	249.600	58.600	0.787	11.937
442	6	0.602	115.880	249.600	58.600	0.700	14.713
442	7	0.602	130.281	249.600	58.600	0.625	17.489
442	8	0.602	137.383	249.600	58.600	0.588	20.265

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
443	1	0.820	65.836	248.600	58.400	0.961	0.612
443	2	0.820	66.536	248.600	58.400	0.957	2.652
443	3	0.820	74.044	248.600	58.400	0.916	4.692
443	4	0.820	73.033	248.600	58.400	0.923	6.732
443	5	0.820	83.318	248.600	58.400	0.870	8.772
443	6	0.820	96.051	248.600	58.400	0.802	10.812
443	7	0.820	107.418	248.600	58.400	0.742	12.852
443	8	0.820	118.195	248.600	58.400	0.687	14.892

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
444	1	1.005	65.772	249.700	60.500	0.972	0.489
444	2	1.005	66.578	249.700	60.500	0.968	2.153
444	3	1.005	75.005	249.700	60.500	0.923	3.827
444	4	1.005	78.084	249.700	60.500	0.902	5.491
444	5	1.005	81.716	249.700	60.500	0.835	7.156
444	6	1.005	104.101	249.700	60.500	0.770	8.820
444	7	1.005	113.478	249.700	60.500	0.720	10.484
444	8	1.005	121.514	249.700	60.500	0.678	12.148

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
445	1	1.214	66.758	249.000	62.400	0.977	0.413
445	2	1.214	67.385	249.000	62.400	0.973	1.788
445	3	1.214	74.840	249.000	62.400	0.933	3.163
445	4	1.214	78.302	249.000	62.400	0.914	4.538
445	5	1.214	92.645	249.000	62.400	0.838	5.914
445	6	1.214	107.330	249.000	62.400	0.758	7.289
445	7	1.214	118.151	249.000	62.400	0.701	8.665
445	8	1.214	126.449	249.000	62.400	0.657	10.041

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
446	1	1.423	68.551	248.800	64.600	0.979	0.353
446	2	1.423	68.899	248.800	64.600	0.976	1.528
446	3	1.423	75.433	248.800	64.600	0.941	2.703
446	4	1.423	73.123	248.800	64.600	0.954	3.878
446	5	1.423	81.410	248.800	64.600	0.909	5.054
446	6	1.423	91.804	248.800	64.600	0.852	6.229
446	7	1.423	101.880	248.800	64.600	0.798	7.404
446	8	1.423	111.950	248.800	64.600	0.743	8.579

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
447	1	1.219	70.368	249.200	66.400	0.977	0.412
447	2	1.219	71.108	249.200	66.400	0.974	1.783
447	3	1.219	78.143	249.200	66.400	0.936	3.155
447	4	1.219	80.408	249.200	66.400	0.922	4.527
447	5	1.219	94.016	249.200	66.400	0.848	5.899
447	6	1.219	108.258	249.200	66.400	0.771	7.271
447	7	1.219	119.048	249.200	66.400	0.712	8.642
447	8	1.219	127.410	249.200	66.400	0.666	10.014

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
448	1	1.002	72.228	249.000	67.400	0.973	0.501
448	2	1.002	72.888	249.000	67.400	0.969	2.170
448	3	1.002	79.757	249.000	67.400	0.932	3.840
448	4	1.002	84.948	249.000	67.400	0.903	5.510
448	5	1.002	97.048	249.000	67.400	0.837	7.179
448	6	1.002	109.036	249.000	67.400	0.771	8.849
448	7	1.002	117.933	249.000	67.400	0.722	10.518
448	8	1.002	125.357	249.000	67.400	0.681	12.188

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
449	1	0.805	73.481	249.000	68.100	0.970	0.623
449	2	0.805	74.512	249.000	68.100	0.965	2.701
449	3	0.805	80.115	249.000	68.100	0.934	4.778
449	4	0.805	80.408	249.000	68.100	0.931	6.856
449	5	0.805	90.078	249.000	68.100	0.878	8.934
449	6	0.805	102.244	249.000	68.100	0.811	11.011
449	7	0.805	113.085	249.000	68.100	0.751	13.089
449	8	0.805	123.911	249.000	68.100	0.697	15.166

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
450	1	0.600	75.732	248.900	69.300	0.964	0.835
450	2	0.600	77.336	248.900	69.300	0.955	3.620
450	3	0.600	81.940	248.900	69.300	0.930	6.405
450	4	0.600	88.718	248.900	69.300	0.903	9.190
450	5	0.600	103.173	248.900	69.300	0.811	11.974
450	6	0.600	119.723	248.900	69.300	0.719	14.759
450	7	0.600	131.288	248.900	69.300	0.655	17.544
450	8	0.600	139.601	248.900	69.300	0.608	20.329

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
451	1	0.387	78.751	248.900	71.300	0.954	1.295
451	2	0.387	82.813	248.900	71.300	0.935	5.610
451	3	0.387	88.885	248.900	71.300	0.901	9.926
451	4	0.387	120.771	248.900	71.300	0.721	14.241
451	5	0.387	143.346	248.900	71.300	0.594	18.556
451	6	0.387	156.356	248.900	71.300	0.521	22.872
451	7	0.387	162.883	248.900	71.300	0.484	27.187
451	8	0.387	165.404	248.900	71.300	0.469	31.503

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
452	1	0.203	107.419	248.800	77.100	0.823	2.466
452	2	0.203	141.644	248.800	77.100	0.624	10.688
452	3	0.203	129.880	248.800	77.100	0.694	18.909
452	4	0.203	187.434	248.800	77.100	0.357	27.131
452	5	0.203	193.389	248.800	77.100	0.323	35.352
452	6	0.203	197.377	248.800	77.100	0.298	43.574
452	7	0.203	198.301	248.800	77.100	0.293	51.795
452	8	0.203	195.432	248.800	77.100	0.311	60.017

***** Column 5B *****

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
439	1	0.159	123.523	249.400	72.800	0.711	3.169
439	2	0.159	139.238	249.400	72.800	0.618	13.667
439	3	0.159	186.950	249.400	72.800	0.354	24.164
439	4	0.159	197.783	249.400	72.800	0.292	34.662
439	5	0.159	203.820	249.400	72.800	0.258	45.159
439	6	0.159	205.469	249.400	72.800	0.249	55.656
439	7	0.159	204.512	249.400	72.800	0.254	66.154
439	8	0.159	201.615	249.400	72.800	0.271	76.651

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
440	1	0.208	107.330	249.200	70.400	0.793	2.407
440	2	0.208	137.333	249.200	70.400	0.626	10.431
440	3	0.208	171.527	249.200	70.400	0.434	18.456
440	4	0.208	188.186	249.200	70.400	0.341	26.480
440	5	0.208	193.872	249.200	70.400	0.310	34.504
440	6	0.208	196.598	249.200	70.400	0.294	42.528
440	7	0.208	196.360	249.200	70.400	0.296	50.552
440	8	0.208	194.394	249.200	70.400	0.307	58.577

RUN#	T/C#	M	Taw	Tgas	Tslot	EF	x/Ms
441	1	0.404	78.950	248.900	61.700	0.908	1.241
441	2	0.404	90.787	248.900	61.700	0.845	5.376
441	3	0.404	113.118	248.900	61.700	0.723	9.511
441	4	0.404	118.100	248.900	61.700	0.699	13.646

451	2	0.387	82.560	248.900	71.300	0.937	5.610
451	3	0.387	96.759	248.900	71.300	0.857	9.926
451	4	0.387	128.851	248.900	71.300	0.676	14.241
451	5	0.387	149.095	248.900	71.300	0.562	18.556
451	6	0.387	156.733	248.900	71.300	0.508	22.872
451	7	0.387	164.828	248.900	71.300	0.473	27.187
451	8	0.387	171.767	248.900	71.300	0.434	31.503

ROW#	Y/C#	M	Tsw	Tgas	Tslat	HF	s/Ma
452	1	0.203	102.421	248.800	77.100	0.853	2.466
452	2	0.203	130.860	248.800	77.100	0.687	10.688
452	3	0.203	148.026	248.800	77.100	0.470	18.909
452	4	0.203	183.587	248.800	77.100	0.368	27.131
452	5	0.203	191.238	248.800	77.100	0.335	35.352
452	6	0.203	195.129	248.800	77.100	0.313	43.574
452	7	0.203	197.766	248.800	77.100	0.287	51.795
452	8	0.203	200.191	248.800	77.100	0.284	60.017

***** Column 6N *****

ROW#	Y/C#	M	Tsw	Tgas	Tslat	HF	s/Ma
439	1	0.139	130.990	249.400	72.800	0.727	3.148
439	2	0.139	160.678	249.400	72.800	0.502	13.447
439	3	0.139	185.056	249.400	72.800	0.384	24.144
439	4	0.139	195.951	249.400	72.800	0.303	34.841
439	5	0.139	201.483	249.400	72.800	0.271	45.138
439	6	0.139	204.555	249.400	72.800	0.254	55.836
439	7	0.139	206.382	249.400	72.800	0.253	66.134
439	8	0.139	207.988	249.400	72.800	0.243	76.831

ROW#	Y/C#	M	Tsw	Tgas	Tslat	HF	s/Ma
440	1	0.208	102.509	249.200	70.400	0.820	2.467
440	2	0.208	135.270	249.200	70.400	0.637	10.631
440	3	0.208	148.189	249.200	70.400	0.453	18.656
440	4	0.208	184.538	249.200	70.400	0.362	26.680
440	5	0.208	193.375	249.200	70.400	0.318	34.504
440	6	0.208	196.513	249.100	70.400	0.295	42.728
440	7	0.208	197.334	249.200	70.400	0.290	50.753
440	8	0.208	196.858	249.200	70.400	0.293	58.977

ROW#	Y/C#	M	Tsw	Tgas	Tslat	HF	s/Ma
441	1	0.404	76.305	249.800	61.700	0.922	1.241
441	2	0.404	80.877	249.900	61.700	0.898	5.376
441	3	0.404	95.034	249.900	61.700	0.823	9.511
441	4	0.404	124.571	249.900	61.700	0.686	13.646
441	5	0.404	148.717	249.900	61.700	0.548	17.781
441	6	0.404	159.122	249.900	61.700	0.482	21.916
441	7	0.404	165.001	249.900	61.700	0.451	26.051
441	8	0.404	169.798	249.900	61.700	0.428	30.186

ROW#	Y/C#	M	Tsw	Tgas	Tslat	HF	s/Ma
442	1	0.602	68.058	249.600	58.600	0.850	0.833
442	2	0.602	70.208	249.600	58.600	0.839	5.009
442	3	0.602	76.867	249.600	59.800	0.816	9.305
442	4	0.602	87.891	249.600	58.800	0.848	9.181
442	5	0.602	107.817	249.600	58.600	0.762	11.957
442	6	0.602	124.285	249.600	58.600	0.656	14.713
442	7	0.602	134.834	249.600	58.600	0.601	17.489
442	8	0.602	144.558	249.600	58.600	0.550	20.265

ROW#	Y/C#	M	Tsw	Tgas	Tslat	HF	s/Ma
443	1	0.820	65.727	249.600	58.600	0.962	0.618
443	2	0.820	67.027	249.600	58.600	0.955	3.693
443	3	0.820	71.618	249.600	58.600	0.932	6.688
443	4	0.820	81.387	249.600	58.600	0.879	9.736
443	5	0.820	95.653	249.600	58.600	0.805	8.773
443	6	0.820	109.277	249.600	58.600	0.734	10.818
443	7	0.820	119.593	249.600	58.600	0.680	12.853
443	8	0.820	130.336	249.600	58.600	0.625	14.898

ROW#	Y/C#	M	Tsw	Tgas	Tslat	HF	s/Ma
444	1	1.005	66.910	249.700	60.500	0.869	0.699
444	2	1.005	67.340	249.700	60.500	0.866	3.165
444	3	1.005	73.840	249.700	60.500	0.828	5.627
444	4	1.005	90.300	249.700	60.500	0.662	5.691
444	5	1.005	107.619	249.700	60.500	0.752	7.156
444	6	1.005	120.204	249.700	60.500	0.684	8.820
444	7	1.005	128.153	249.700	60.500	0.642	10.486
444	8	1.005	136.937	249.700	60.500	0.596	12.140

ROW#	Y/C#	M	Tsw	Tgas	Tslat	HF	s/Ma
445	1	1.216	67.365	249.000	62.600	0.873	0.613
445	2	1.216	68.103	249.000	62.600	0.869	1.786
445	3	1.216	71.778	249.000	62.600	0.850	3.169
445	4	1.216	84.717	249.000	62.600	0.788	4.539
445	5	1.216	101.182	249.000	62.600	0.708	5.916
445	6	1.216	113.575	249.000	62.600	0.713	7.290
445	7	1.216	123.183	249.000	62.600	0.666	8.665
445	8	1.216	135.287	249.000	62.600	0.610	10.041

ROW#	Y/C#	M	Tsw	Tgas	Tslat	HF	s/Ma
446	1	1.423	68.088	248.800	64.600	0.876	0.553
446	2	1.423	68.537	248.900	64.600	0.873	1.528
446	3	1.423	71.106	248.900	64.600	0.865	2.703
446	4	1.423	75.738	248.900	64.600	0.840	3.878
446	5	1.423	83.081	248.900	64.600	0.809	5.054
446	6	1.423	95.510	248.800	64.800	0.832	6.229
446	7	1.423	108.886	248.800	64.800	0.778	7.404
446	8	1.423	117.652	248.800	64.600	0.719	8.579

ROW#	Y/C#	M	Tsw	Tgas	Tslat	HF	s/Ma
447	1	1.819	71.130	249.300	66.400	0.874	0.413
447	2	1.819	71.778	249.300	66.400	0.871	1.783
447	3	1.819	75.050	249.300	66.400	0.853	3.153
447	4	1.819	86.366	249.300	66.400	0.801	4.187
447	5	1.819	101.978	249.300	66.400	0.805	5.859
447	6	1.819	116.055	249.300	66.400	0.728	7.271
447	7	1.819	125.575	249.300	66.400	0.678	8.642
447	8	1.819	135.707	249.300	66.400	0.621	10.014

ROW#	Y/C#	M	Tsw	Tgas	Tslat	HF	s/Ma
448	1	1.008	72.909	249.000	67.400	0.930	0.503
448	2	1.008	73.709	249.000	67.400	0.965	2.170
448	3	1.008	78.981	249.000	67.400	0.911	3.840
448	4	1.008	93.982	249.000	67.400	0.849	5.510
448	5	1.008	112.883	249.000	67.400	0.751	7.178
448	6	1.008	125.270	249.000	67.400	0.681	8.848
448	7	1.008	132.781	249.000	67.800	0.640	10.518
448	8	1.008	140.447	249.000	67.400	0.598	12.188

ROW#	Y/C#	M	Tsw	Tgas	Tslat	HF	s/Ma
449	1	0.805	74.044	249.000	68.100	0.987	0.623
449	2	0.805	75.185	249.000	68.100	0.981	2.701
449	3	0.805	79.308	249.000	68.100	0.938	4.778
449	4	0.805	89.016	249.000	68.100	0.884	6.856
449	5	0.805	102.421	249.000	68.100	0.810	8.934
449	6	0.805	115.313	249.000	68.100	0.739	11.011
449	7	0.805	124.788	249.000	68.100	0.687	13.089
449	8	0.805	134.790	249.000	68.100	0.631	15.166

ROW#	Y/C#	M	Tsw	Tgas	Tslat	HF	s/Ma
450	1	0.600	76.350	248.900	69.300	0.961	0.835
450	2	0.600	77.918	248.900	69.300	0.952	3.820
450	3	0.600	81.763	248.900	69.300	0.931	6.825
450	4	0.600	93.574	248.900	69.300	0.865	9.190
450	5	0.600	112.037	248.900	69.300	0.762	11.974
450	6	0.600	127.561	248.900	69.300	0.676	14.759
450	7	0.600	137.454	248.900	69.300	0.621	17.528
450	8	0.600	146.890	248.800	69.300	0.568	20.328

ROW#	Y/C#	M	Tsw	Tgas	Tslat	HF	s/Ma
451	1	0.387	80.429	248.900	71.300	0.949	1.295
451	2	0.387	83.788	248.900	71.300	0.930	5.610
451	3	0.387	97.289	248.900	71.300	0.854	9.928
451	4	0.387	126.449	248.900	71.300	0.698	14.241
451	5	0.387	147.409	248.900	71.300	0.571	18.556
451	6	0.387	158.904	248.900	71.300	0.507	22.872
451	7	0.387	164.007	248.900	71.300	0.478	27.187
451	8	0.387	169.712	248.900	71.300	0.446	31.503

ROW#	Y/C#	M	Tsw	Tgas	Tslat	HF	s/Ma
452	1	0.203	104.367	248.800	77.100	0.841	2.466
452	2	0.203	137.196	248.800	77.100	0.650	10.688
452	3	0.203	148.588	248.800	77.100	0.467	18.909
452	4	0.203	183.716	248.800	77.100	0.378	27.131
452	5	0.203	191.131	248.800	77.100	0.336	35.352
452	6	0.203	195.345	248.800	77.100	0.311	43.574
452	7	0.203	198.123	248.800	77.100	0.307	51.795
452	8	0.203	196.484	248.800	77.100	0.304	60.017

FILM EFFECTIVENESS TEST
ANGLED INJECTION WITH ACCELERATING FLOW

INJECTION ANGLE = 8.5 DEG NUMBER OF SLOTS = 9 SLOT WIDTH = 1.25 (IN.)
SLOT HEIGHT = 0.299 (IN.) LIP THICKNESS = 0.299 (IN.)
HOT SIDE AREA= 26.6790 (SQ.IN) COLD SIDE AREA= 2.8820 (SQ.IN.)

T/C LOCATIONS

T/C#	X/S	4R	5M	5R	6L	6M	LAND
1	0.502	X	X	X	X	X	X
2	2.174	X	X	X	X	X	X
3	3.846	X	X	X	X	X	X
4	5.518	X	X	X	X	X	X
5	7.191	X	X	X	X	X	X
6	8.863	X	X	X	X	X	X
7	10.535	X	X	X	X	X	X
8	12.207	X	X	X	X	X	X

Note: D(X1,X2) = 100*(X2-X1)/X1
Note: EF = (Tgas - Taw)/(Tgas - Tslot)

FILM EFFECTIVENESS DATA

SPANWISE AVERAGED FILM EFFECTIVENESS DATA

***** Columns 4R-5L, 5R, 5M-6L *****

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.159	122.205	0.720	0.502	3.149
2	0.159	159.524	0.509	2.174	13.647
3	0.159	186.318	0.357	3.846	24.144
4	0.159	198.087	0.291	5.518	34.642
5	0.159	203.928	0.257	7.191	45.139
6	0.159	206.396	0.244	8.863	55.636
7	0.159	206.323	0.244	10.535	66.134
8	0.159	204.925	0.252	12.207	76.631

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.206	105.663	0.818	0.502	2.436
2	0.206	136.922	0.640	2.174	10.558
3	0.206	170.292	0.449	3.846	18.680
4	0.206	186.192	0.359	5.518	26.801
5	0.206	193.774	0.315	7.191	34.923
6	0.206	197.181	0.296	8.863	43.045
7	0.206	197.836	0.292	10.535	51.166
8	0.206	197.697	0.293	12.207	59.288

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.396	79.301	0.930	0.502	1.267
2	0.396	86.488	0.891	2.174	5.490
3	0.396	103.477	0.798	3.846	9.714
4	0.396	132.008	0.642	5.518	13.937
5	0.396	150.965	0.538	7.191	18.160
6	0.396	160.395	0.487	8.863	22.384
7	0.396	164.525	0.464	10.535	26.607
8	0.396	168.799	0.441	12.207	30.831

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.601	72.611	0.953	0.502	0.834
2	0.601	76.100	0.935	2.174	3.614
3	0.601	84.587	0.889	3.846	6.395
4	0.601	97.873	0.817	5.518	9.175
5	0.601	115.525	0.722	7.191	11.955
6	0.601	128.846	0.650	8.863	14.736
7	0.601	136.523	0.609	10.535	17.516
8	0.601	144.570	0.565	12.207	20.297

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	0.812	70.174	0.963	0.502	0.618
2	0.812	71.782	0.954	2.174	2.676
3	0.812	78.012	0.921	3.846	4.735
4	0.812	87.242	0.871	5.518	6.794
5	0.812	99.944	0.803	7.191	8.852
6	0.812	111.541	0.740	8.863	10.911
7	0.812	119.902	0.695	10.535	12.969
8	0.812	129.423	0.644	12.207	15.028

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	1.003	69.780	0.969	0.502	0.500
2	1.003	70.721	0.963	2.174	2.167
3	1.003	76.087	0.935	3.846	3.834
4	1.003	86.565	0.878	5.518	5.501
5	1.003	99.731	0.807	7.191	7.167
6	1.003	110.780	0.747	8.863	8.834
7	1.003	118.437	0.706	10.535	10.501
8	1.003	127.145	0.659	12.207	12.168

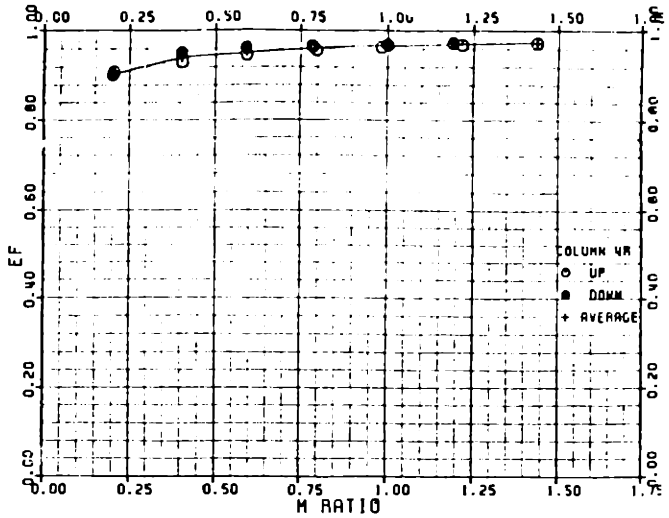
T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	1.217	69.411	0.973	0.502	0.412
2	1.217	70.044	0.969	2.174	1.786
3	1.217	73.532	0.951	3.846	3.159
4	1.217	81.669	0.907	5.518	4.533
5	1.217	93.943	0.840	7.191	5.907
6	1.217	105.485	0.778	8.863	7.280
7	1.217	114.001	0.731	10.535	8.654
8	1.217	123.461	0.680	12.207	10.027

T/C#	Mavg	Tavg	EFavg	X/S	X/MS
1	1.423	69.235	0.975	0.502	0.353
2	1.423	69.686	0.972	2.174	1.528
3	1.423	72.119	0.959	3.846	2.703
4	1.423	76.768	0.934	5.518	3.878
5	1.423	85.441	0.887	7.191	5.054
6	1.423	94.462	0.838	8.863	6.229
7	1.423	102.579	0.794	10.535	7.404
8	1.423	112.778	0.738	12.207	8.579

Appendix D: Sample Data Reduction

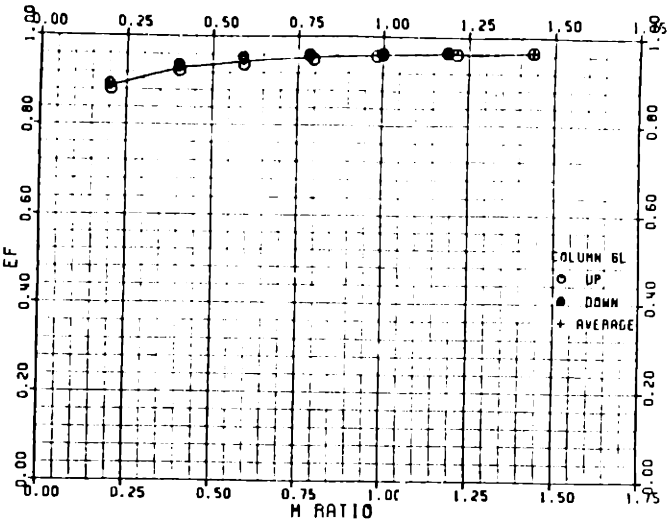
INJECTION ANGLE = 11.5 DEG.

X/S = 0.37



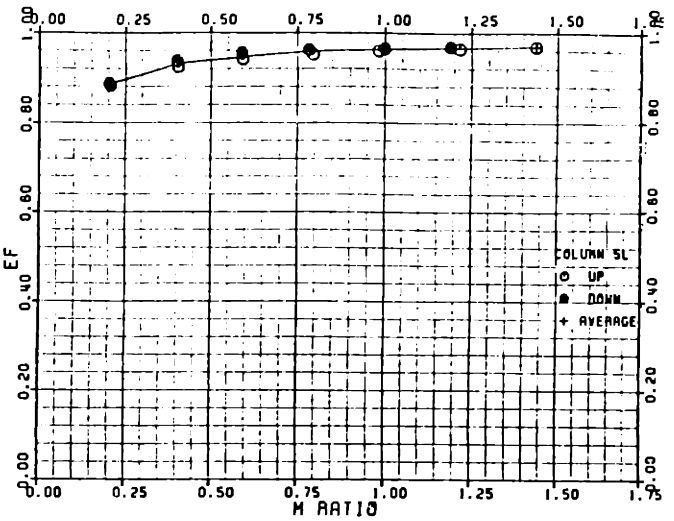
INJECTION ANGLE = 11.5 DEG.

X/S = 0.37



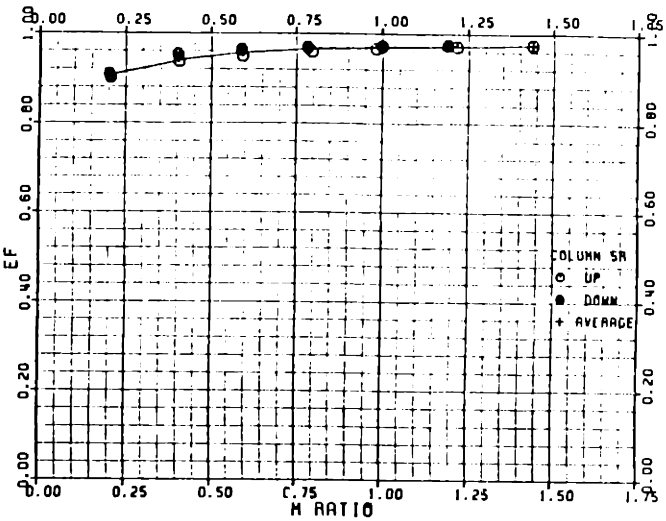
INJECTION ANGLE = 11.5 DEG.

X/S = 0.37



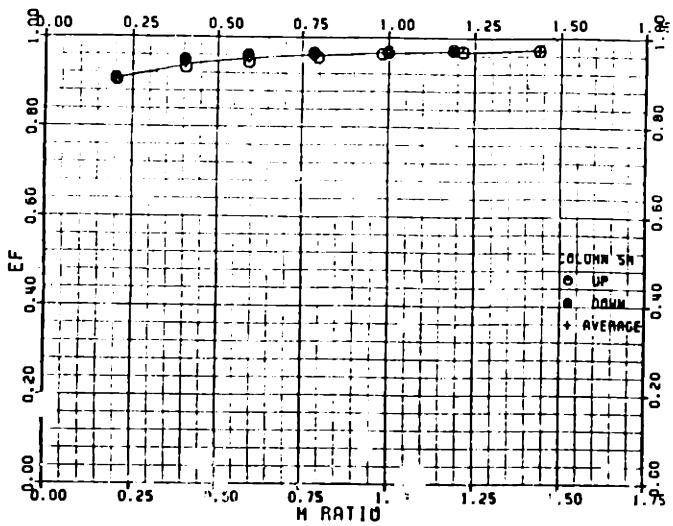
INJECTION ANGLE = 11.5 DEG.

X/S = 0.37



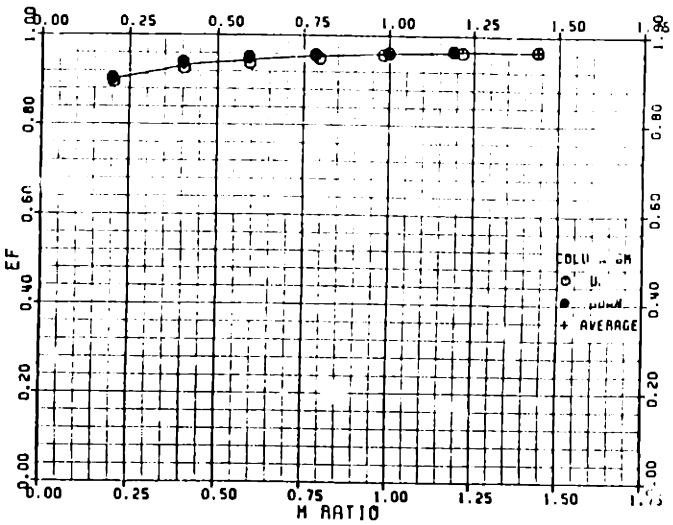
INJECTION ANGLE = 11.5 DEG.

X/S = 0.37



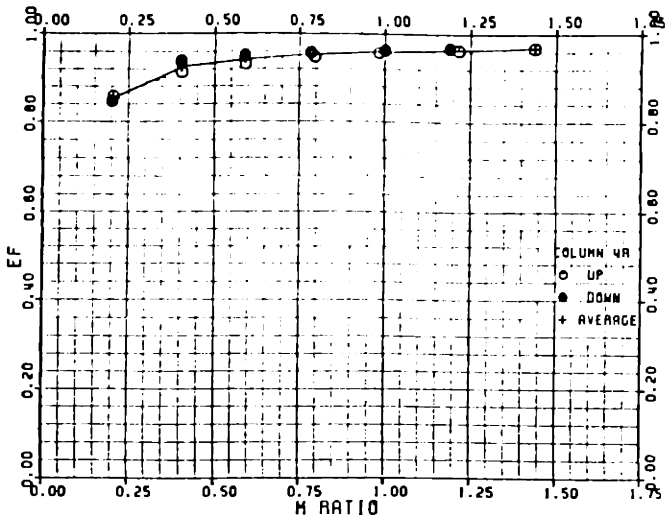
INJECTION ANGLE = 11.5 DEG.

X/S = 0.37



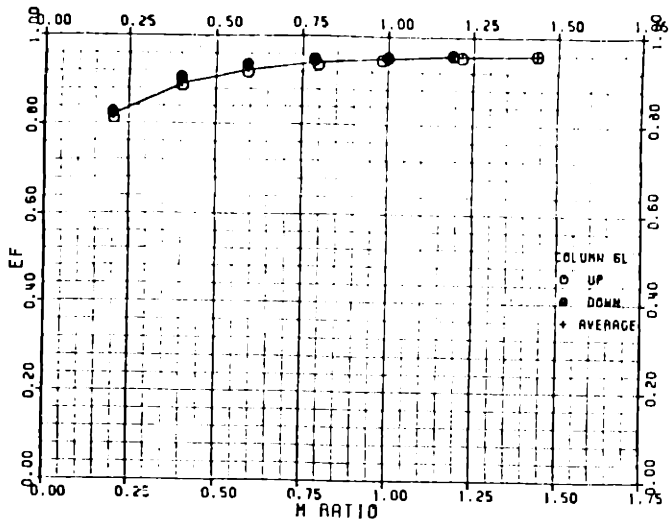
INJECTION ANGLE = 11.5 DEG.

X/S = 1.60



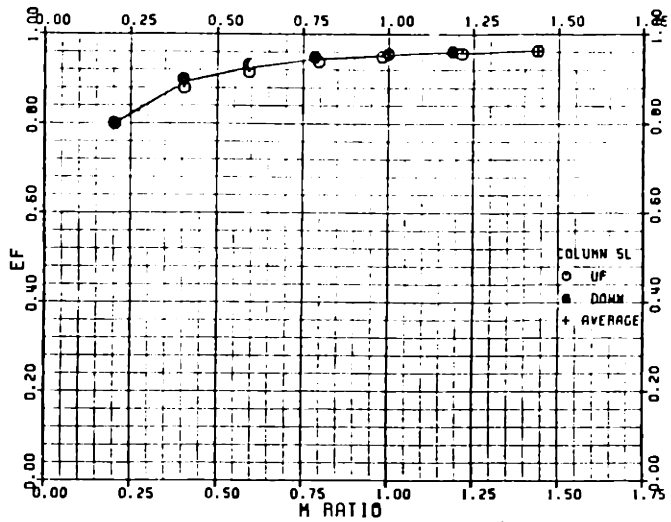
INJECTION ANGLE = 11.5 DEG.

X/S = 1.60



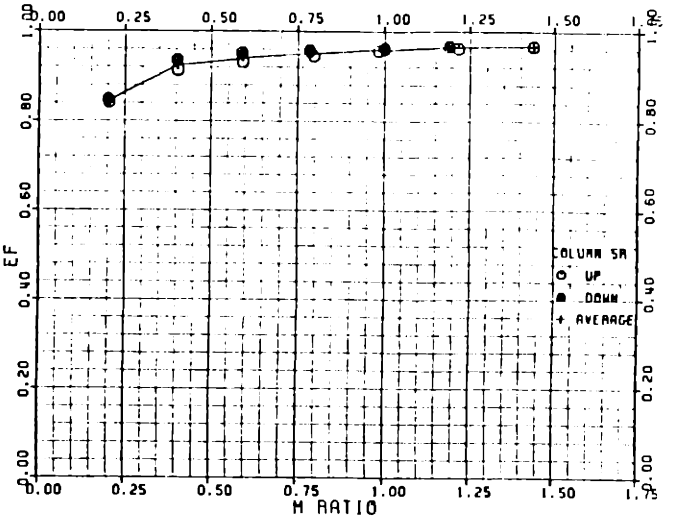
INJECTION ANGLE = 11.5 DEG.

X/S = 1.60



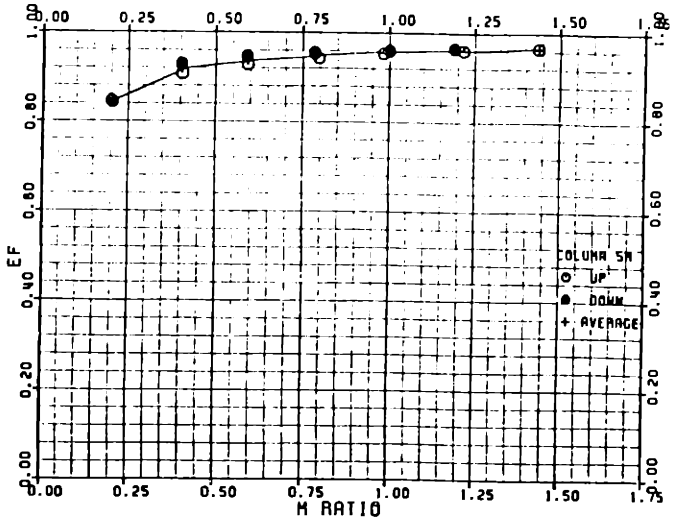
INJECTION ANGLE = 11.5 DEG.

X/S = 1.60



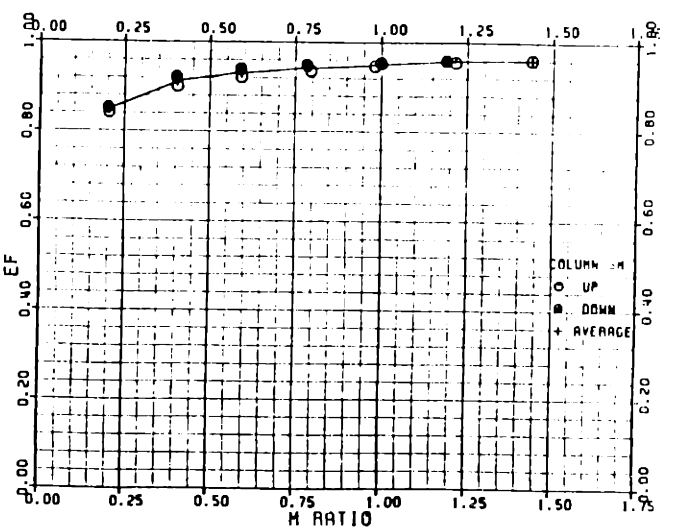
INJECTION ANGLE = 11.5 DEG.

X/S = 1.60



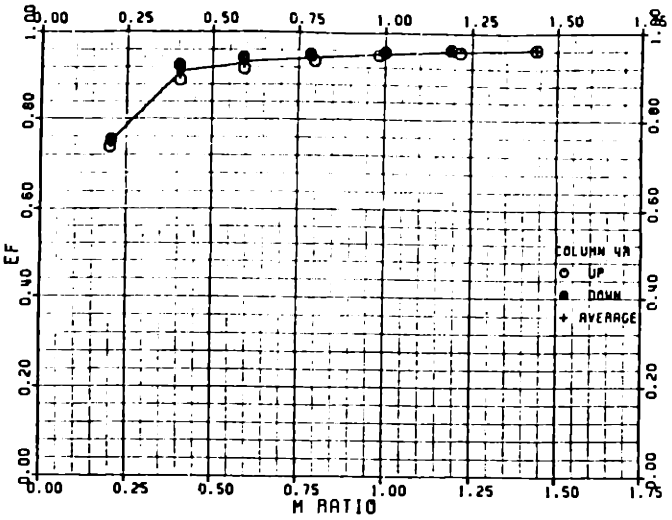
INJECTION ANGLE = 11.5 DEG.

X/S = 1.60



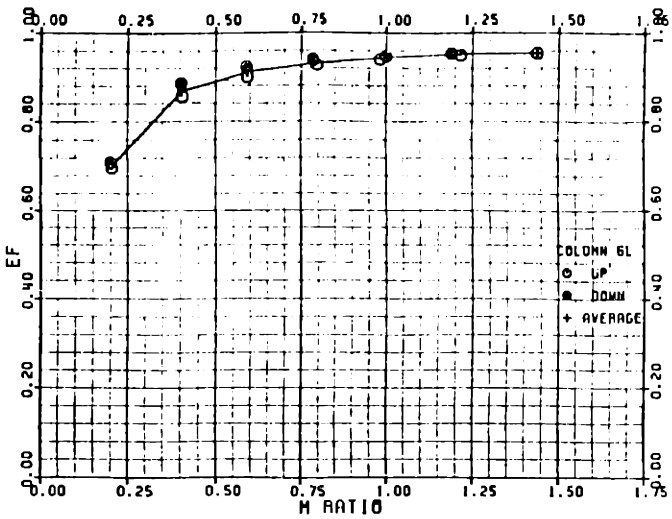
INJECTION ANGLE = 11.5 DEG.

X/S = 2.83



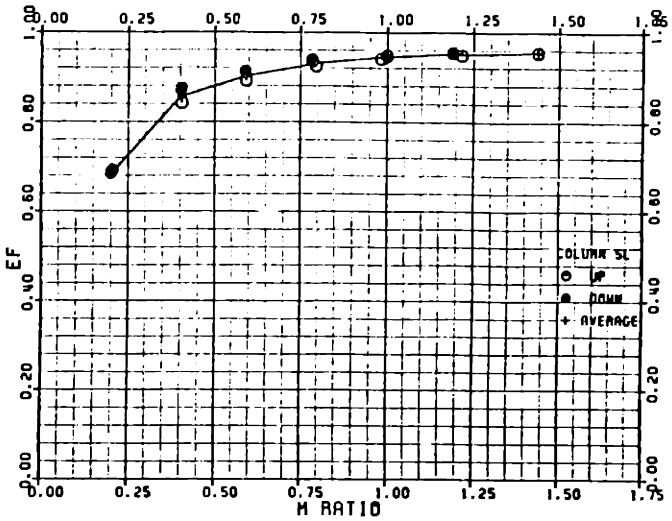
INJECTION ANGLE = 11.5 DEG.

X/S = 2.83



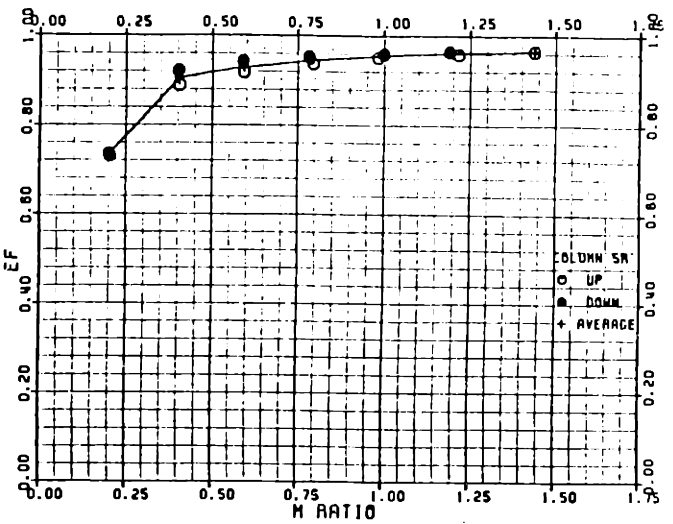
INJECTION ANGLE = 11.5 DEG.

X/S = 2.83



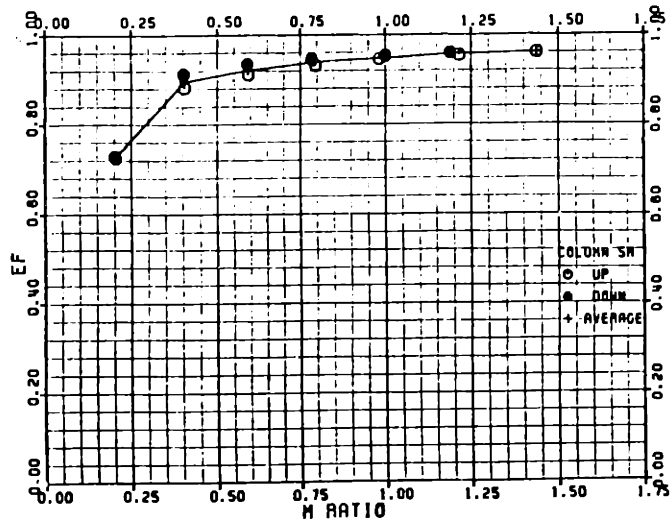
INJECTION ANGLE = 11.5 DEG.

X/S = 2.83



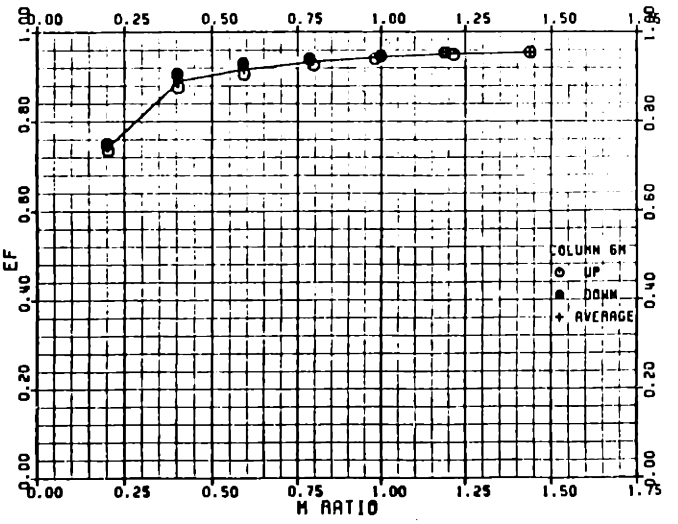
INJECTION ANGLE = 11.5 DEG.

X/S = 2.83



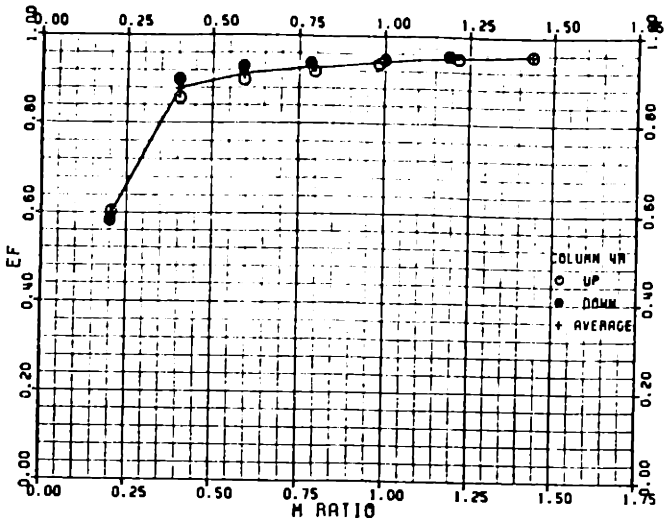
INJECTION ANGLE = 11.5 DEG.

X/S = 2.83



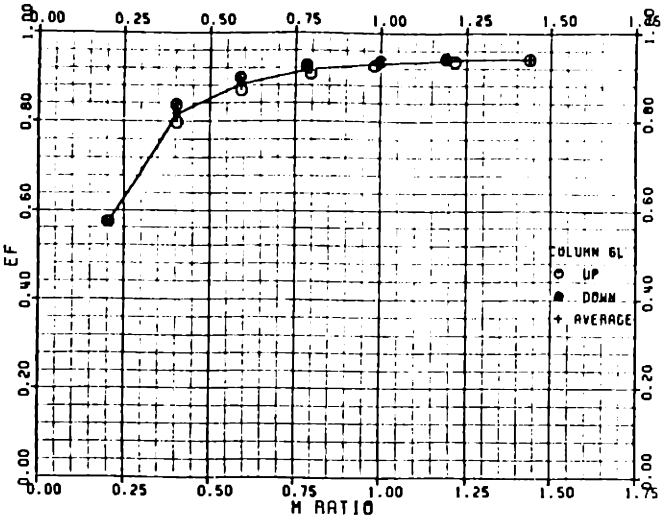
INJECTION ANGLE = 11.5 DEG.

X/S = 4.05



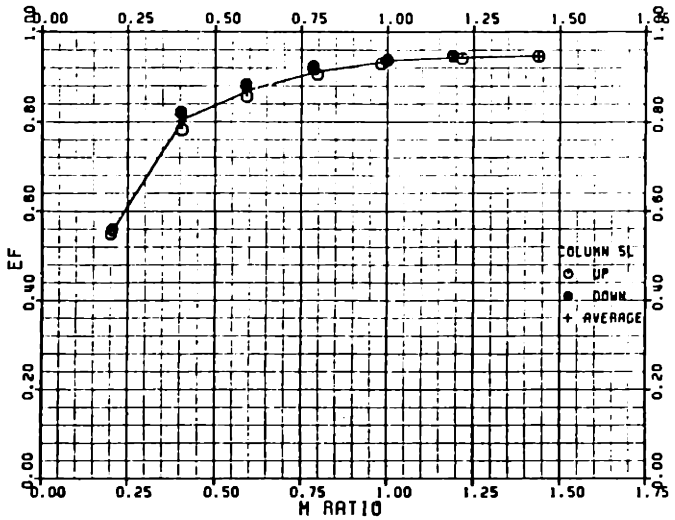
INJECTION ANGLE = 11.5 DEG.

X/S = 4.05



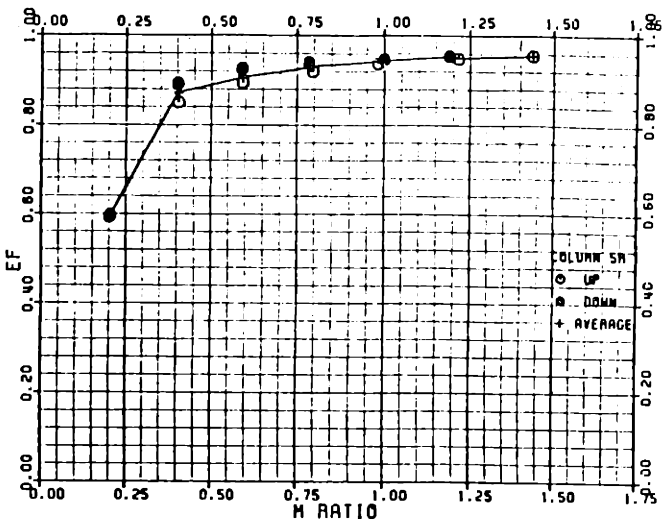
INJECTION ANGLE = 11.5 DEG.

X/S = 4.05



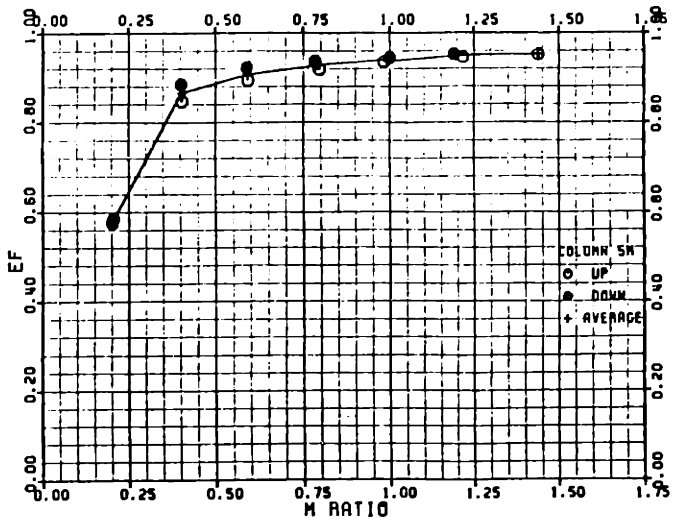
INJECTION ANGLE = 11.5 DEG.

X/S = 4.05



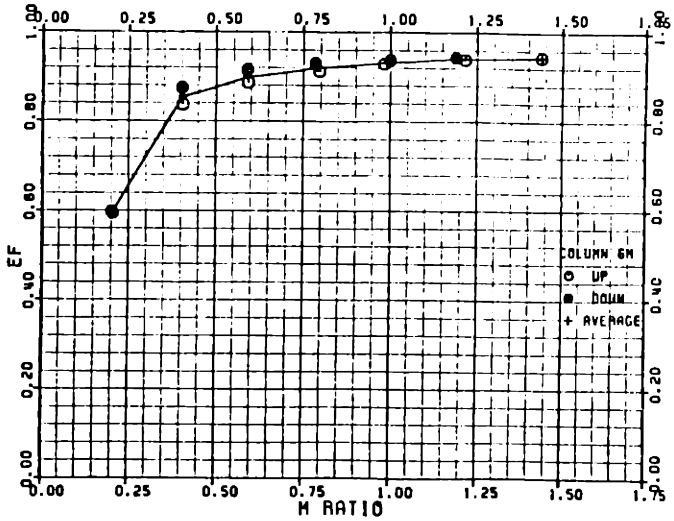
INJECTION ANGLE = 11.5 DEG.

X/S = 4.05



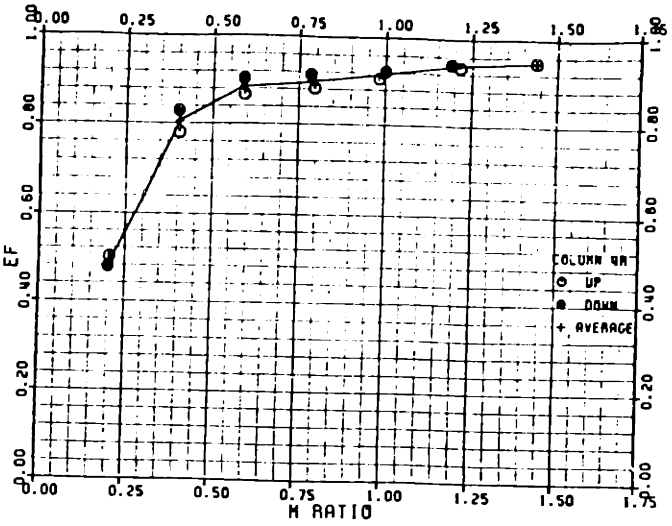
INJECTION ANGLE = 11.5 DEG.

X/S = 4.05



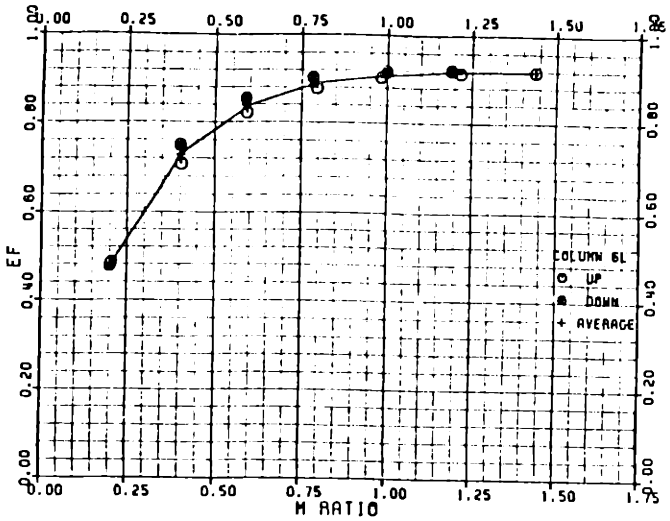
INJECTION ANGLE = 11.5 DEG.

X/S = 5.28



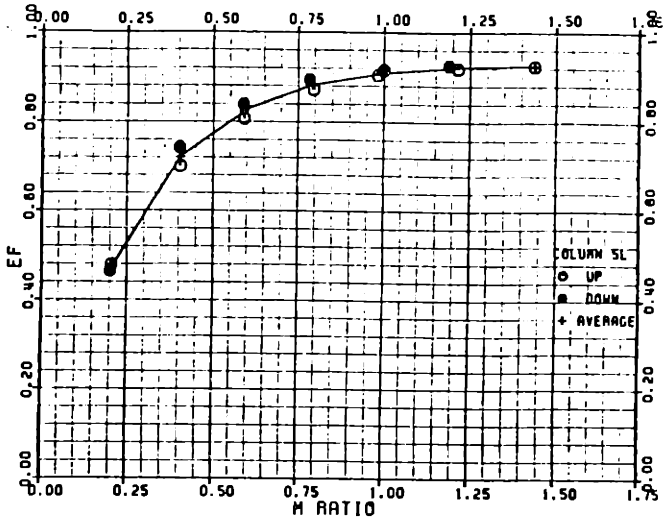
INJECTION ANGLE = 11.5 DEG.

X/S = 5.28



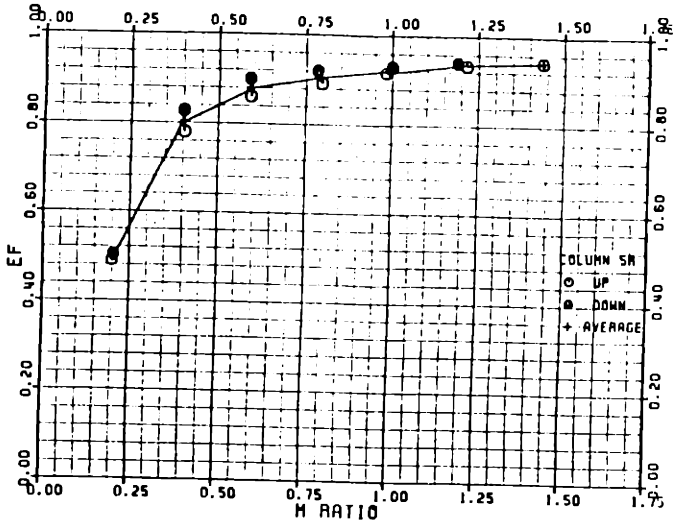
INJECTION ANGLE = 11.5 DEG.

X/S = 5.28



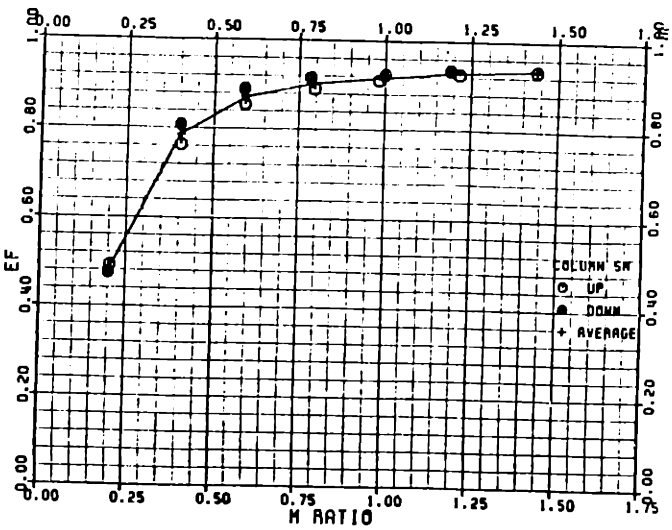
INJECTION ANGLE = 11.5 DEG.

X/S = 5.28



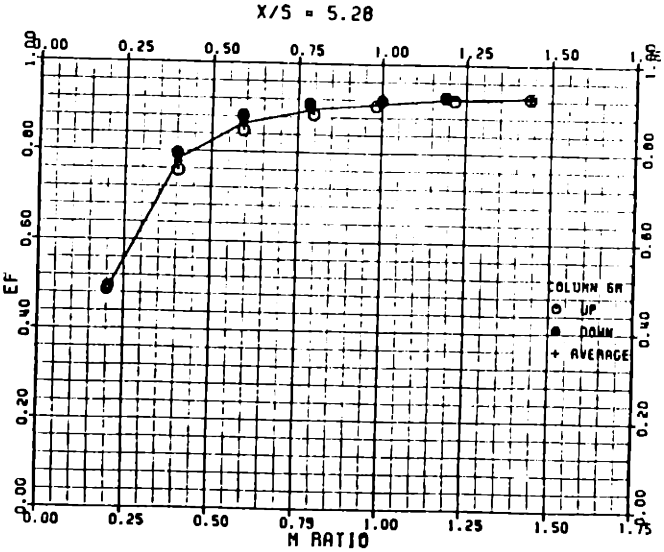
INJECTION ANGLE = 11.5 DEG.

X/S = 5.28



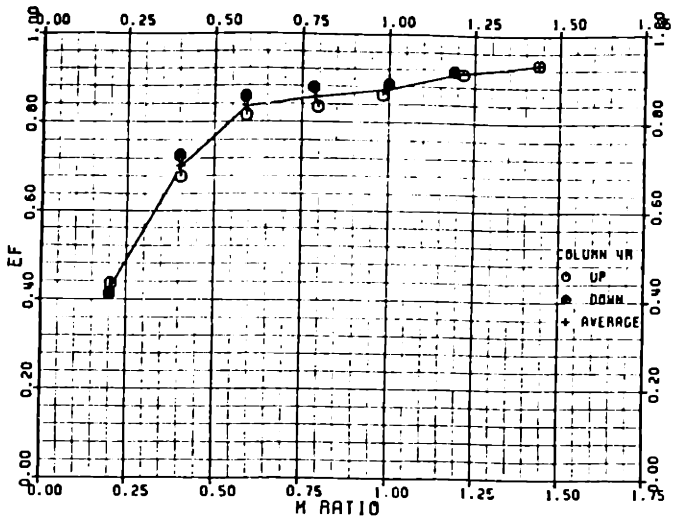
INJECTION ANGLE = 11.5 DEG.

X/S = 5.28



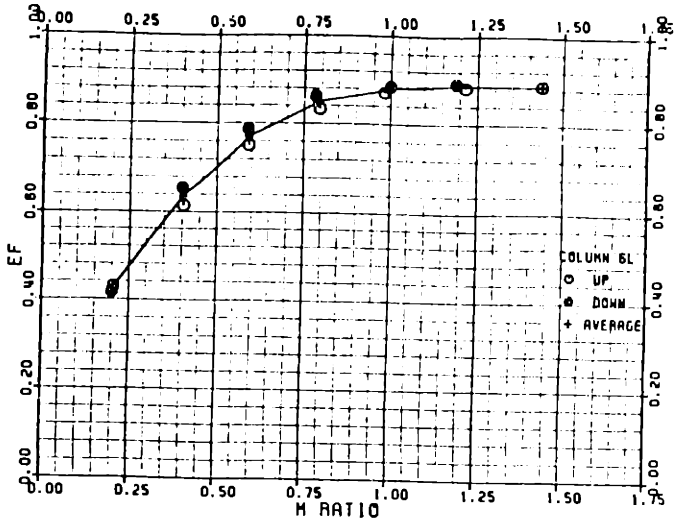
INJECTION ANGLE = 11.5 DEG.

X/S = 6.51



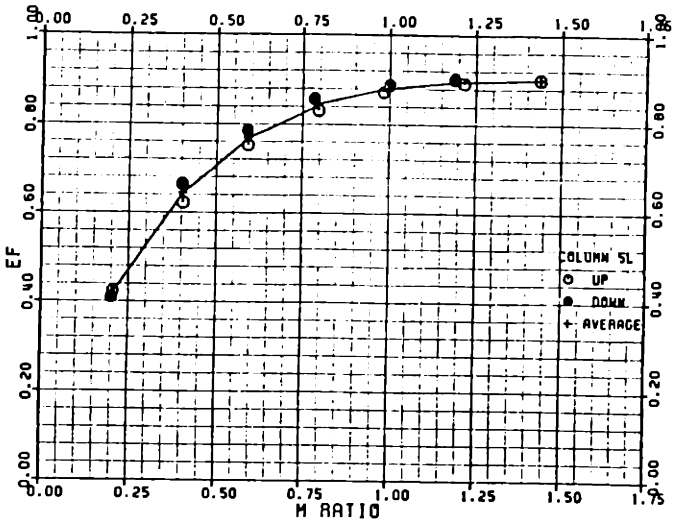
INJECTION ANGLE = 11.5 DEG.

X/S = 6.51



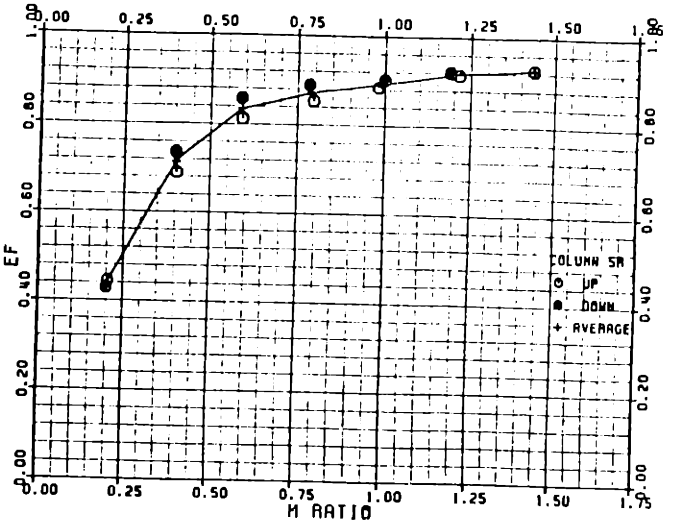
INJECTION ANGLE = 11.5 DEG.

X/S = 6.51



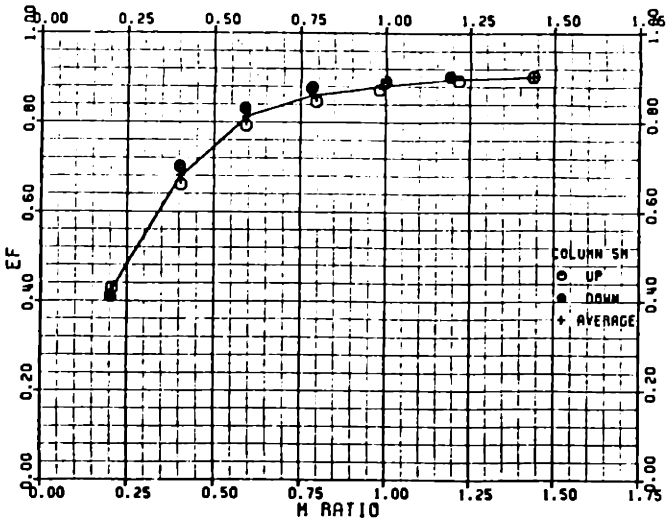
INJECTION ANGLE = 11.5 DEG.

X/S = 6.51



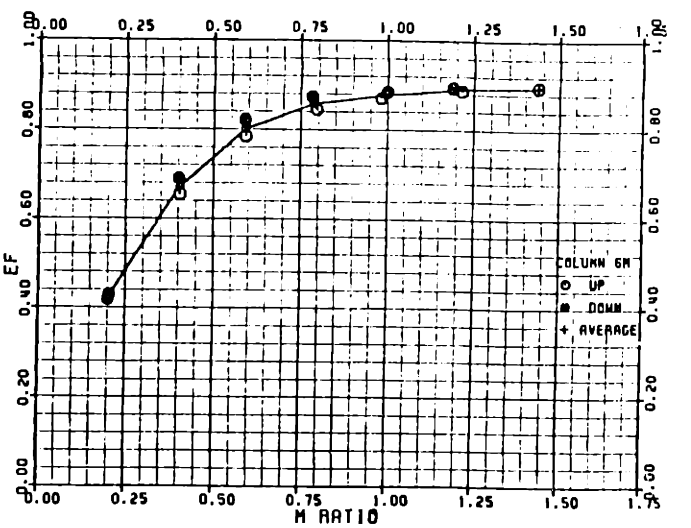
INJECTION ANGLE = 11.5 DEG.

X/S = 6.51



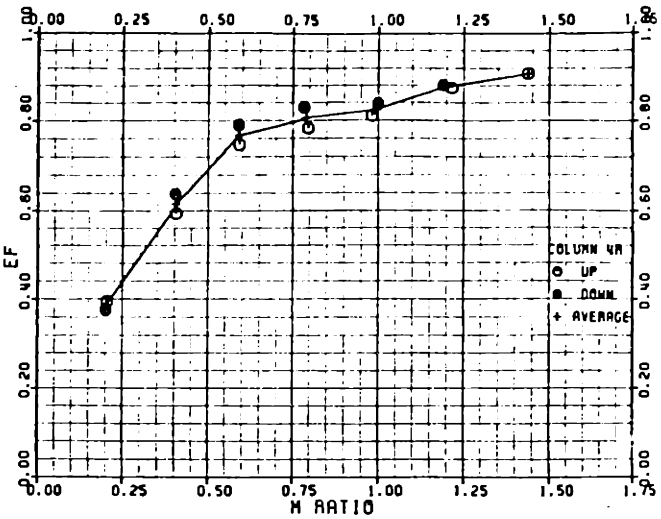
INJECTION ANGLE = 11.5 DEG.

X/S = 6.51



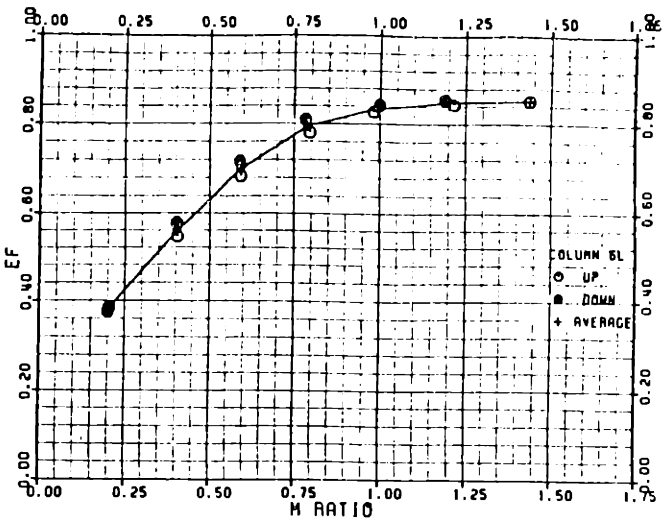
INJECTION ANGLE = 11.5 DEG.

X/S = 7.74



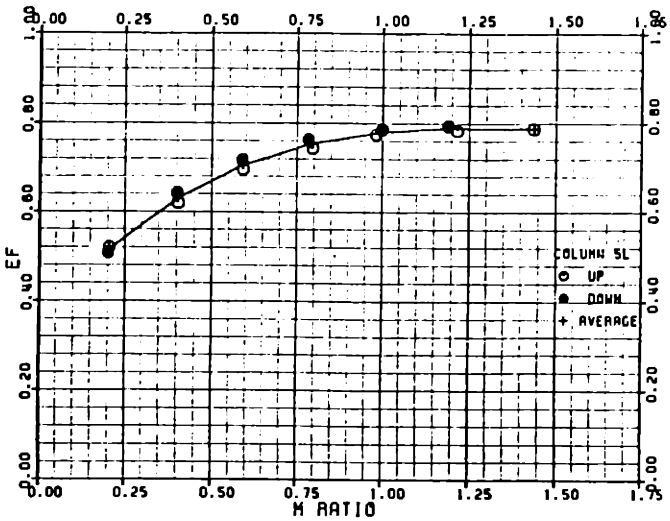
INJECTION ANGLE = 11.5 DEG.

X/S = 7.74



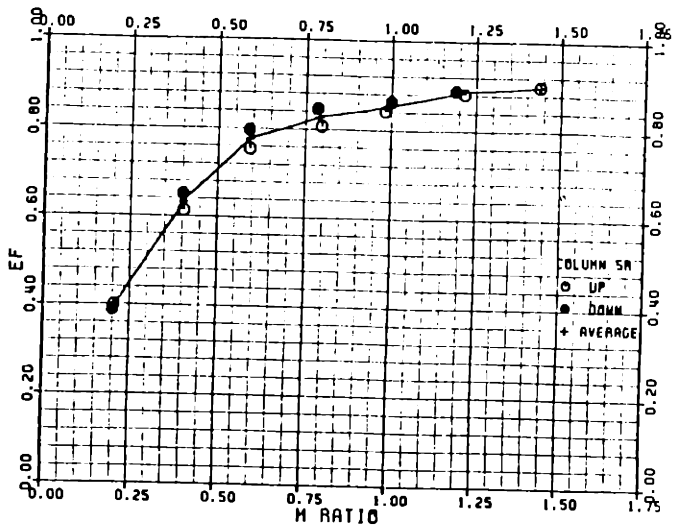
INJECTION ANGLE = 11.5 DEG.

X/S = 7.74



INJECTION ANGLE = 11.5 DEG.

X/S = 7.74



INJECTION ANGLE = 11.5 DEG.

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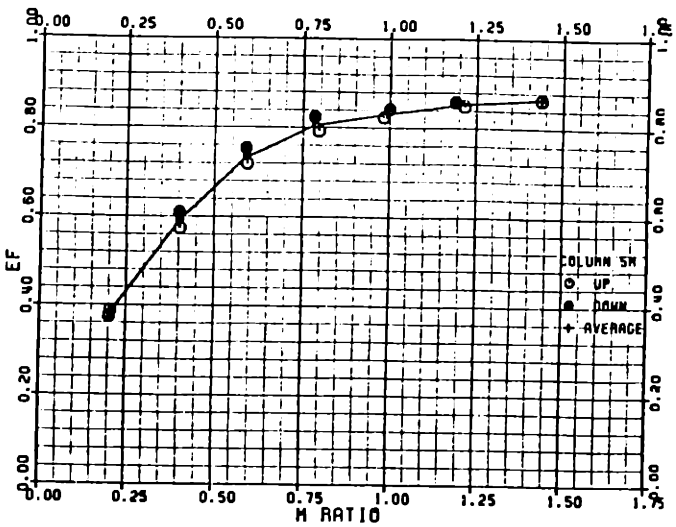

INJECTION ANGLE = 11.5 DEG.

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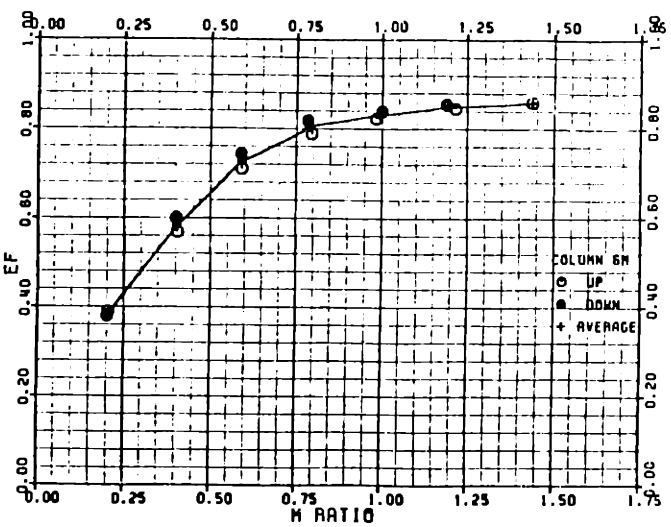

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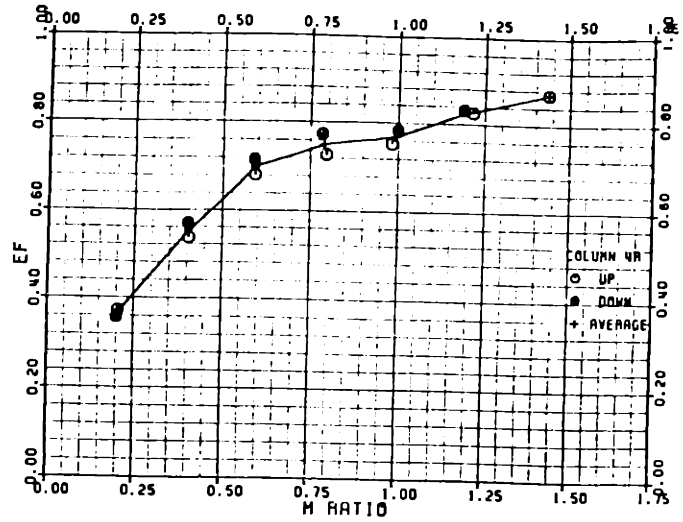

INJECTION ANGLE = 11.5 DEG.

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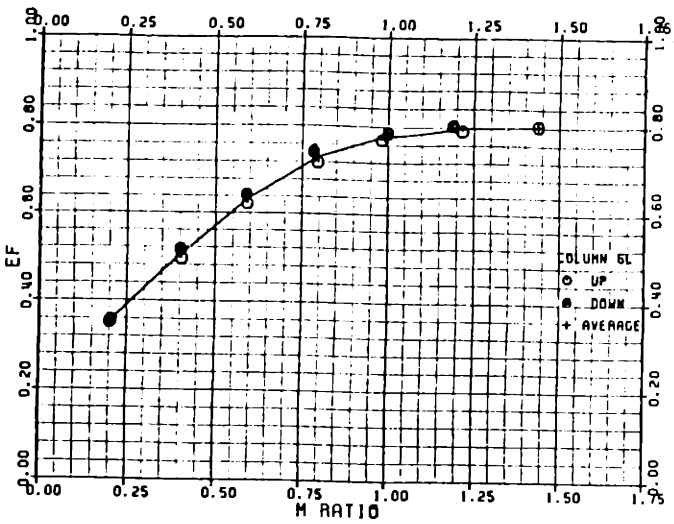

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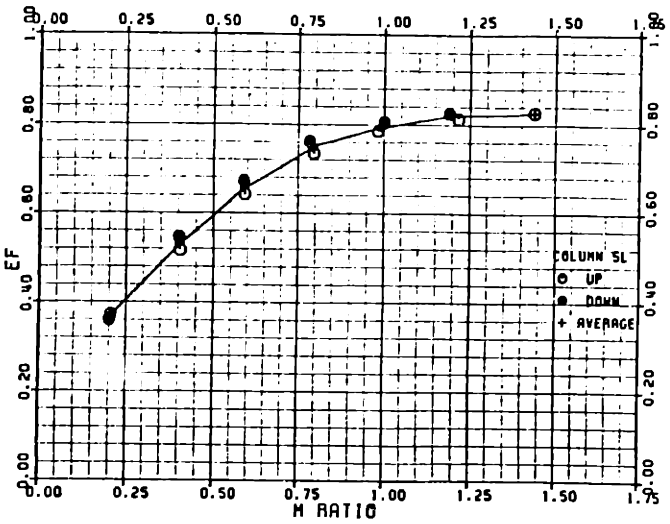

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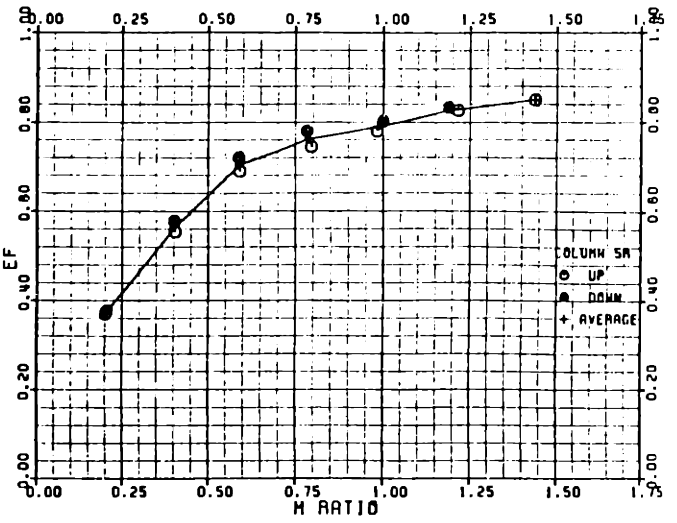

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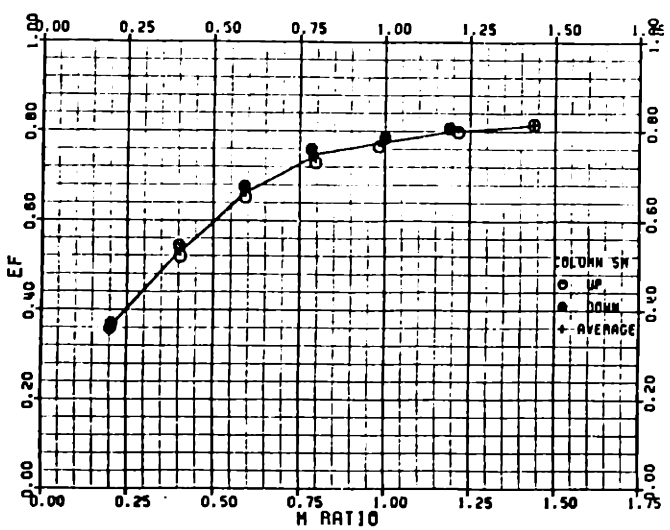

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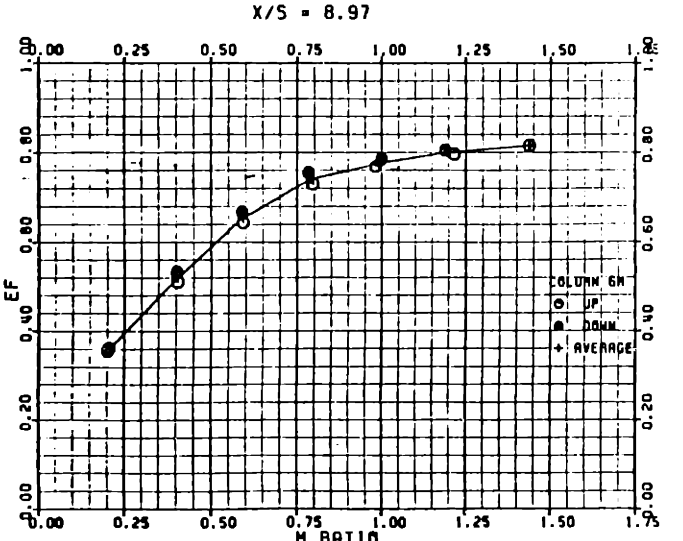

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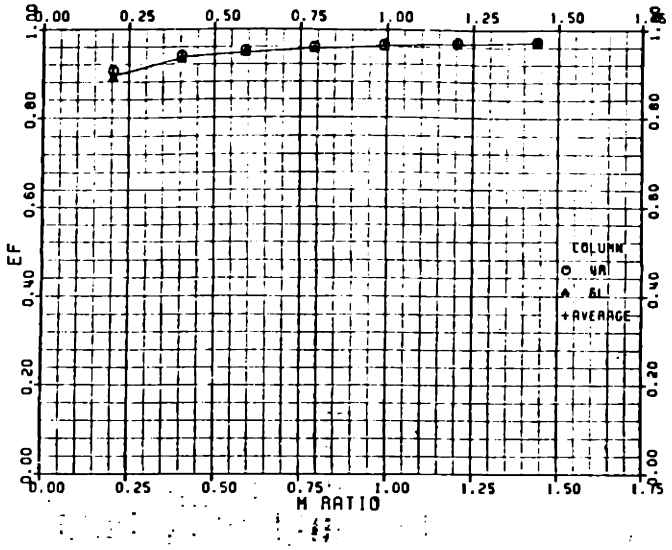

INJECTION ANGLE = 11.5 DEG.

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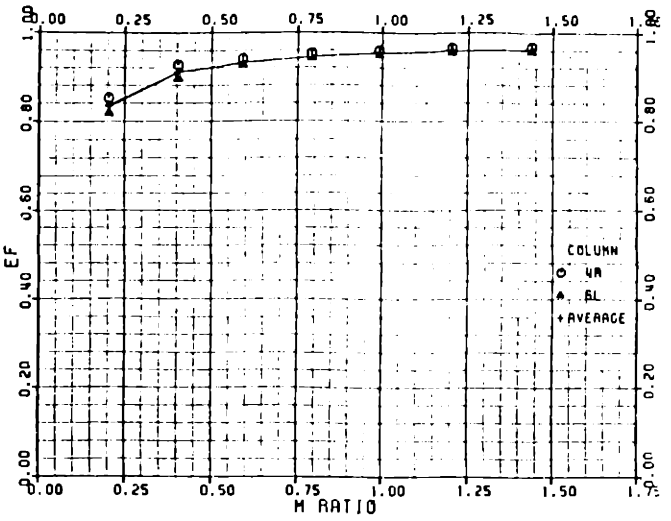

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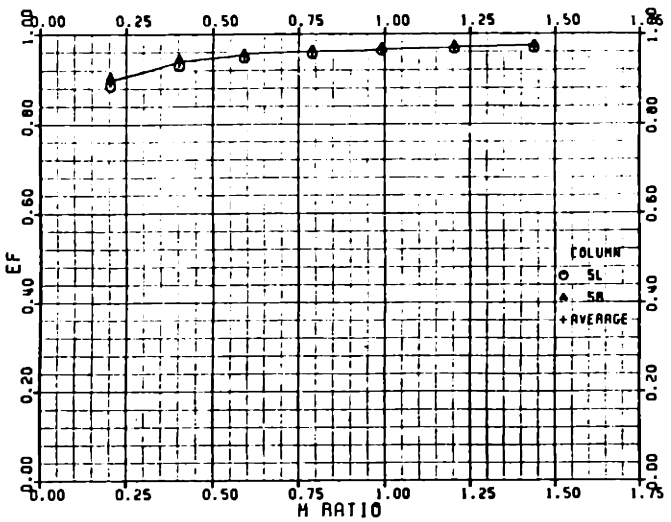

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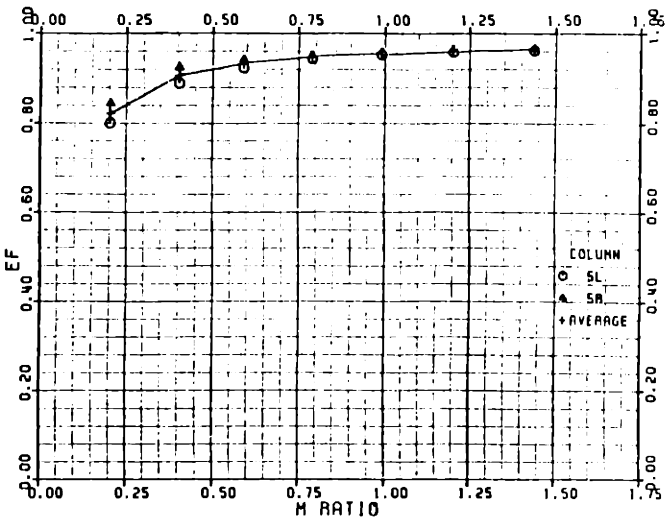

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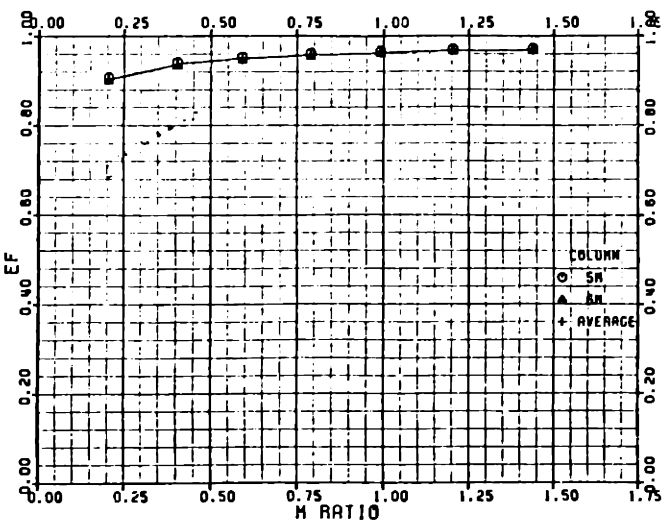

INJECTION ANGLE = 11.5 DEG.

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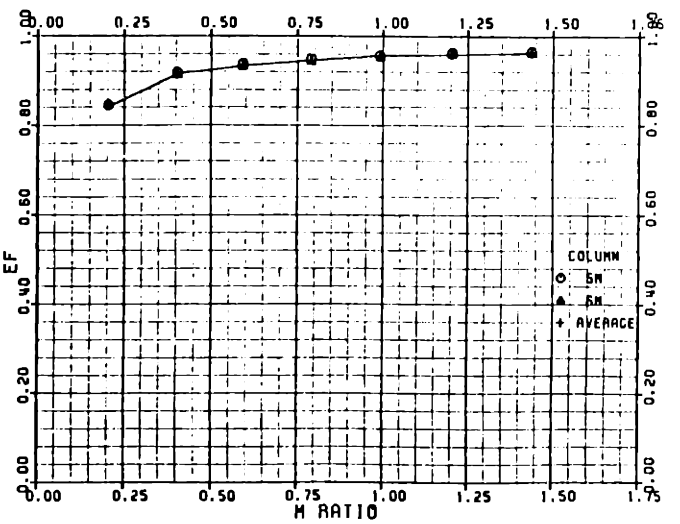
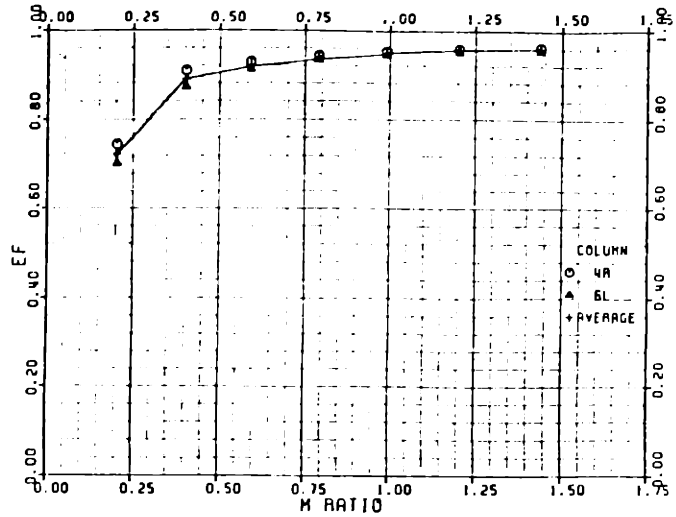


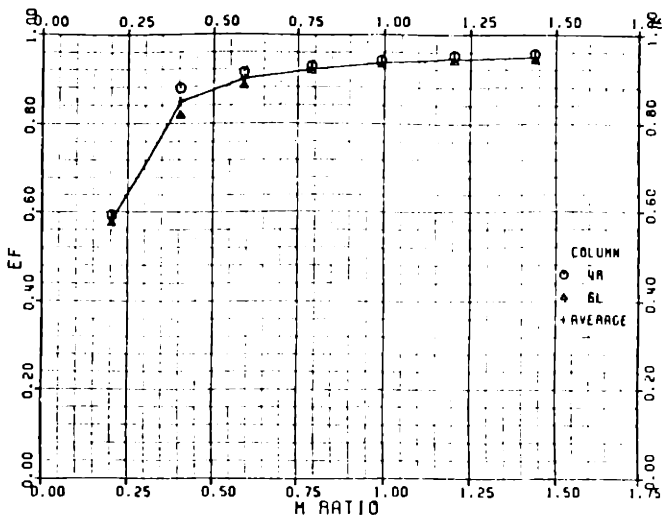
INJECTION ANGLE = 11.5 DEG.

X/S = 2.83



INJECTION ANGLE = 11.5 DEG.

X/S = 4.05



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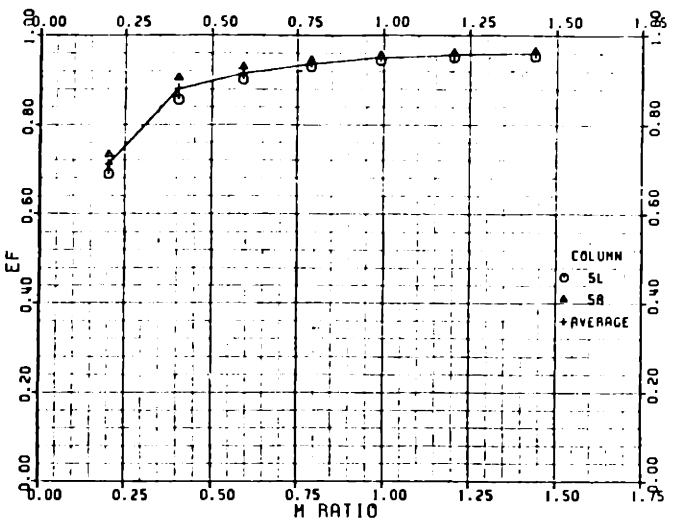

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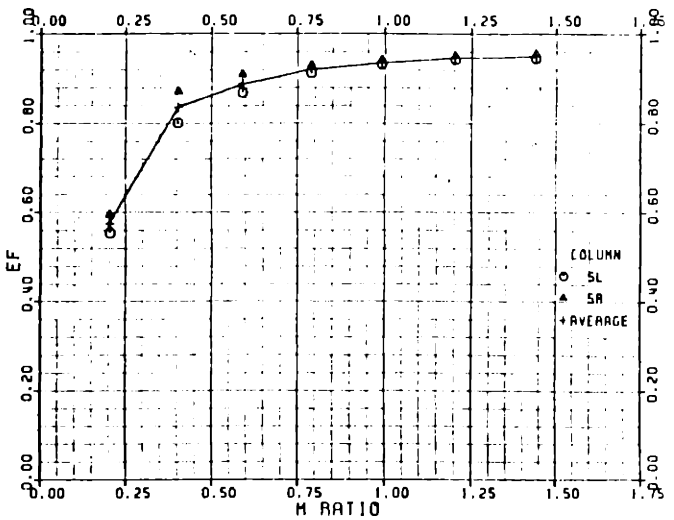

INJECTION ANGLE = 11.5 DEG.

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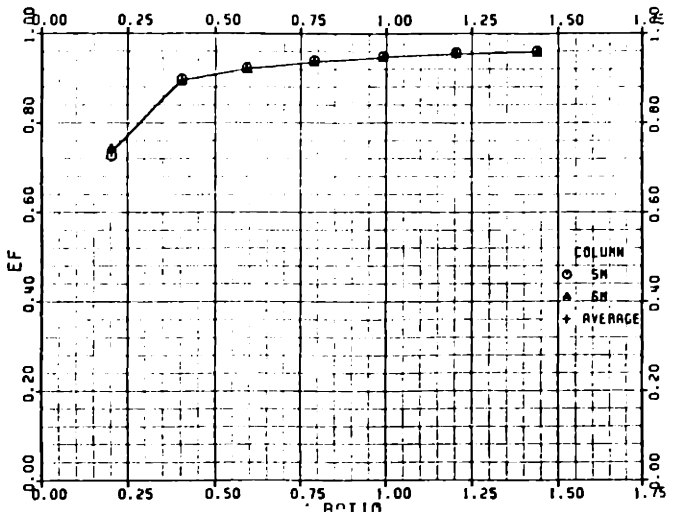

INJECTION ANGLE = 11.5 DEG.

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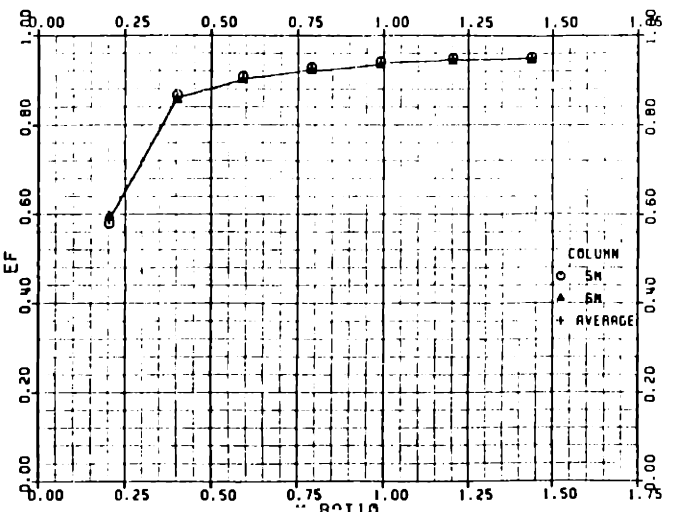
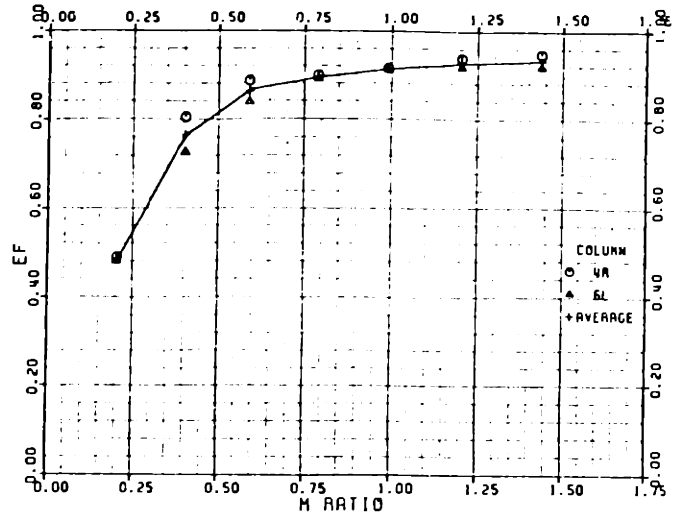


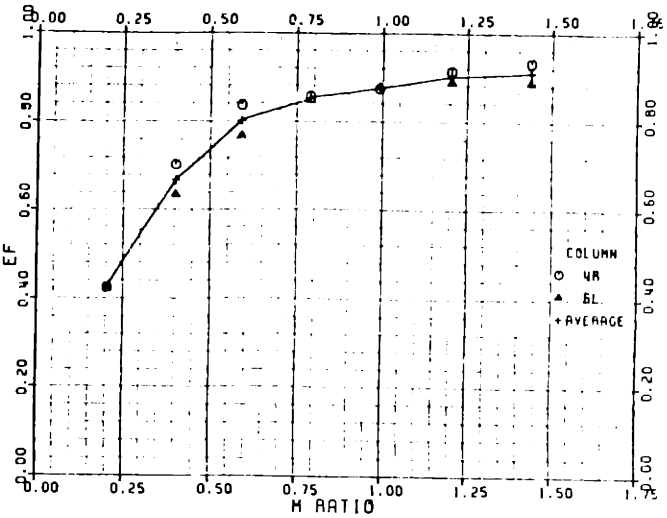
INJECTION ANGLE = 11.5 DEG.

X/S = 5.28



INJECTION ANGLE = 11.5 DEG.

X/S = 6.51



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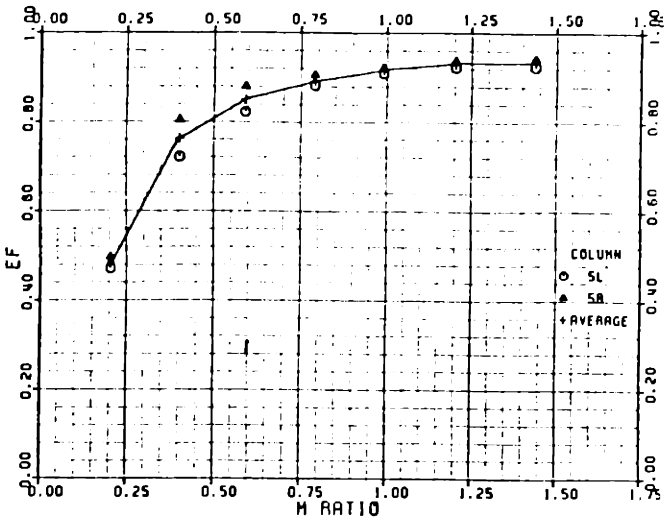

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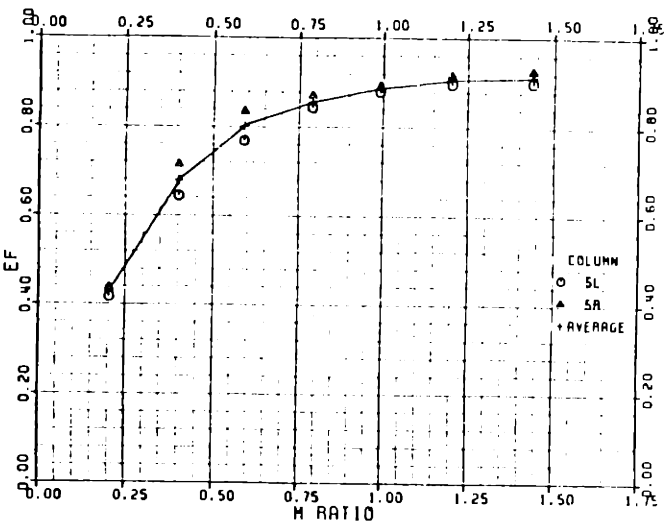

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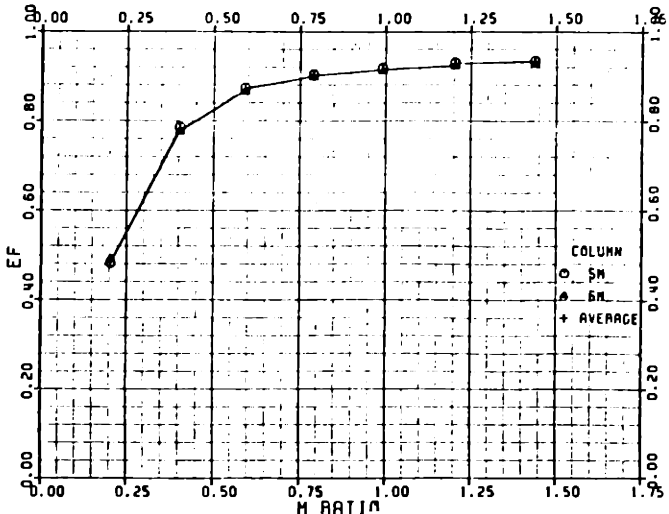

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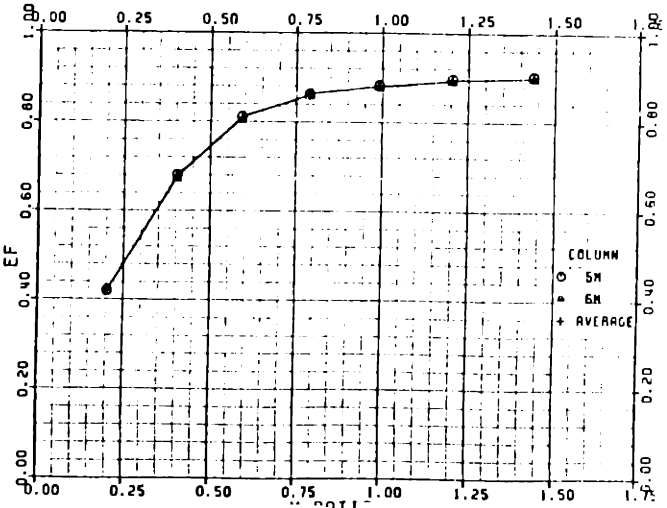
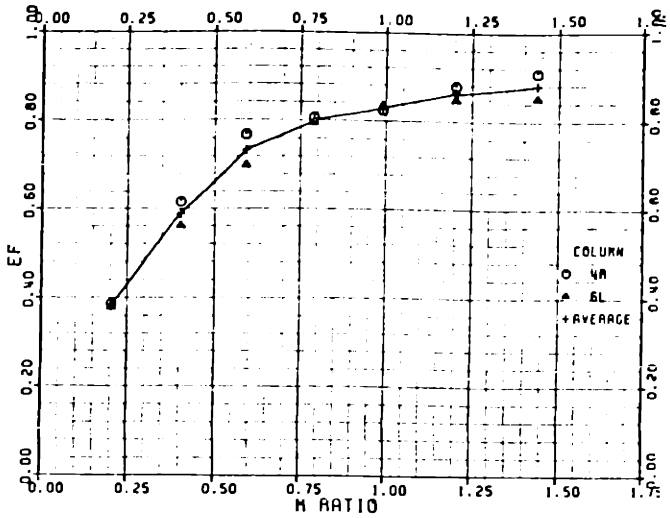


INJECTION ANGLE = 11.5 DEG.

X/S = 7.74



INJECTION ANGLE = 11.5 DEG.

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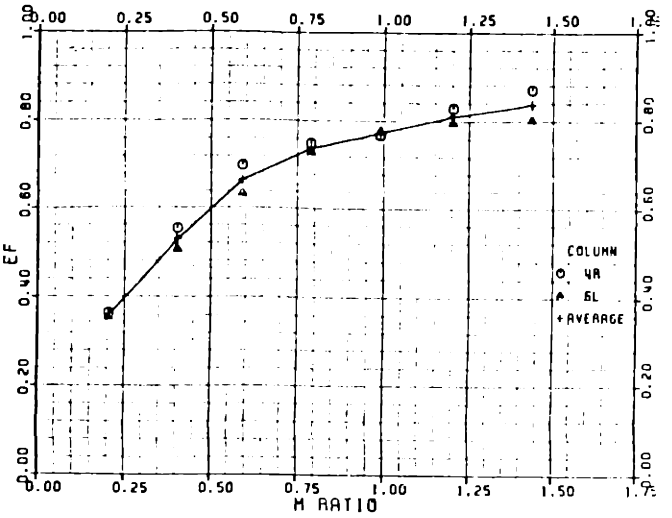

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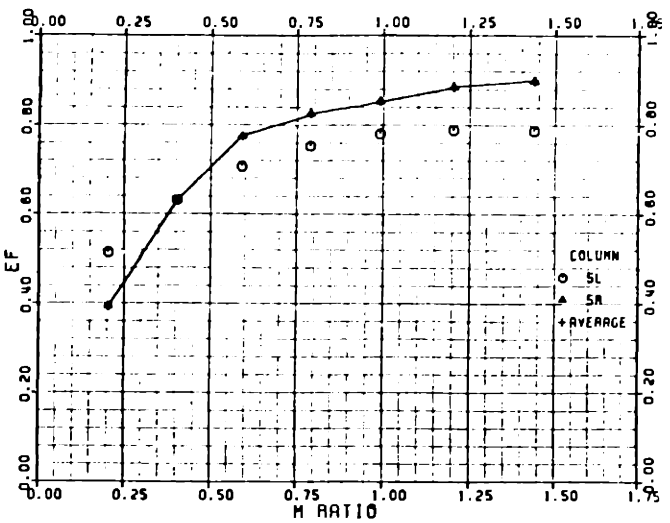

INJECTION ANGLE = 11.5 DEG.

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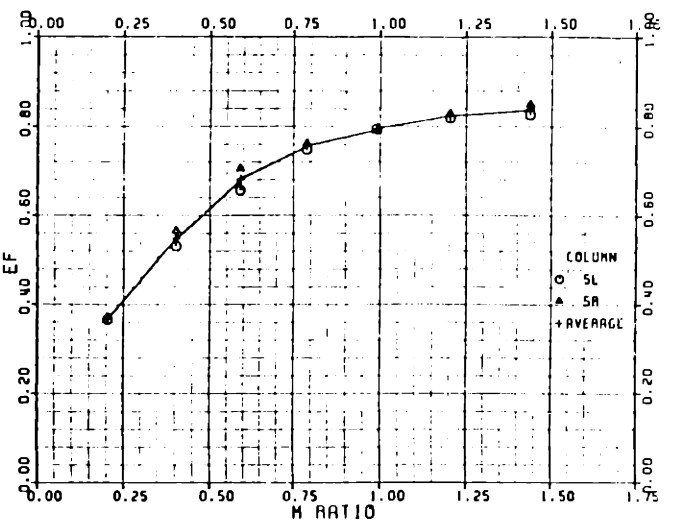
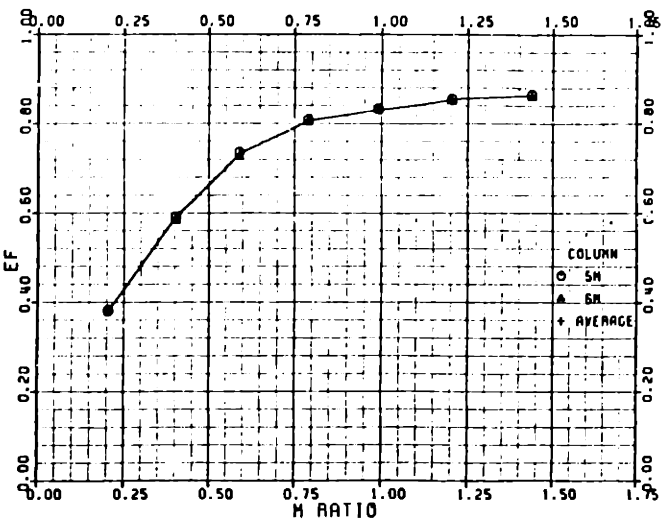


INJECTION ANGLE = 11.5 DEG.

X/S = 7.74



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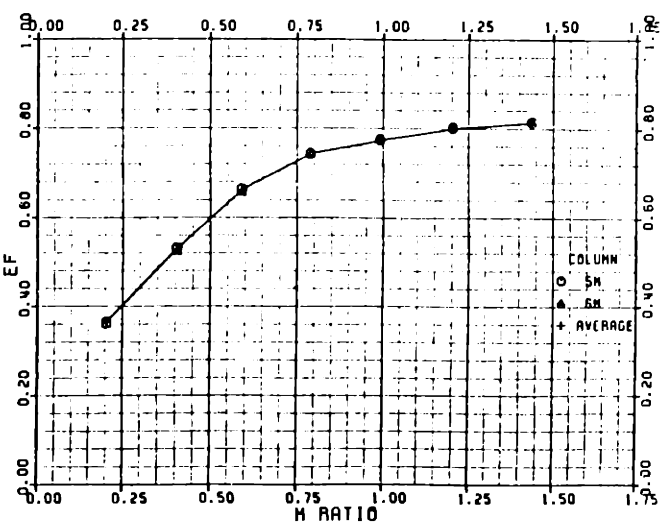

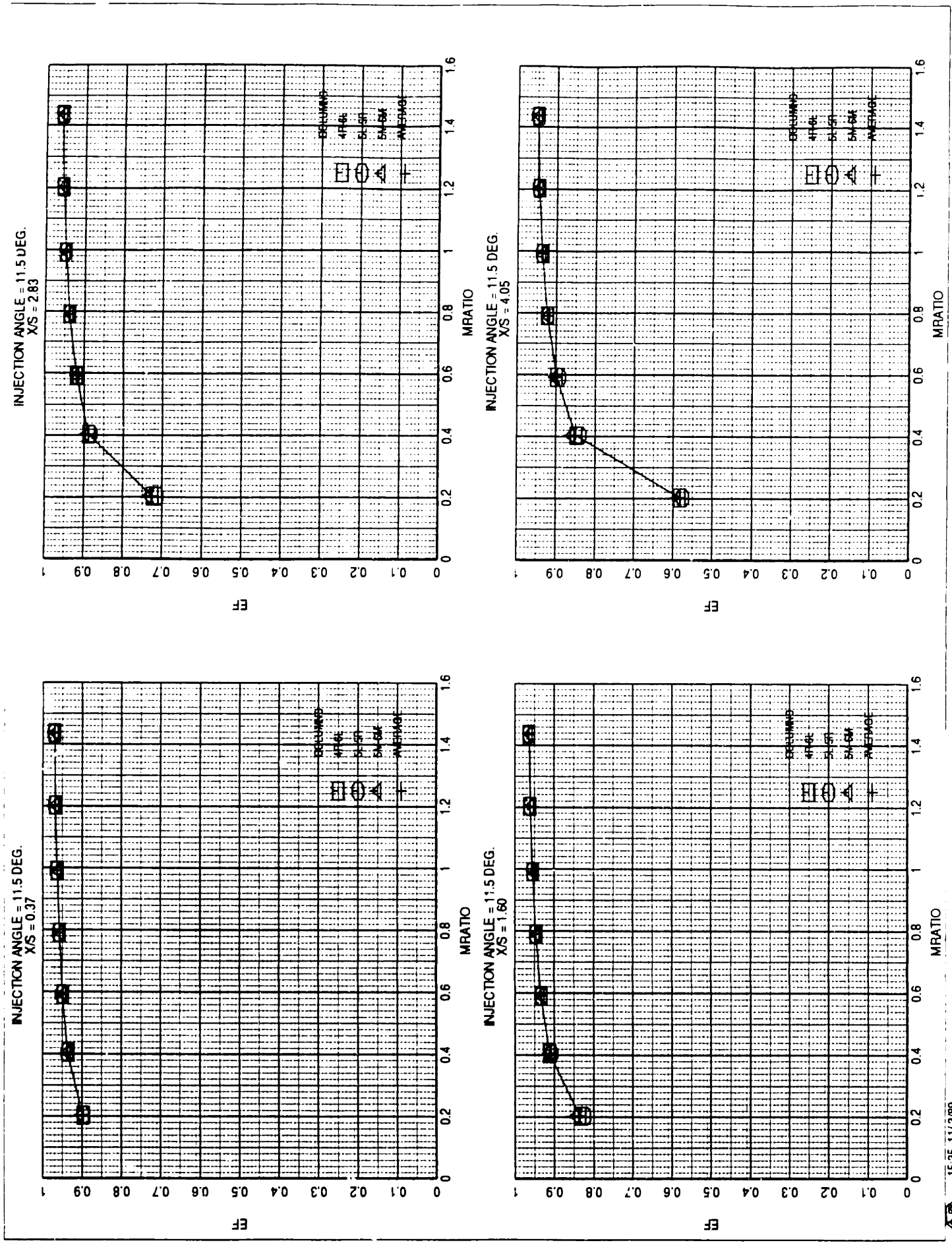
INJECTION ANGLE = 11.5 DEG.
X/S = 0.37
INJECTION ANGLE = 11.5 DEG.
X/S = 1.60
INJECTION ANGLE = 11.5 DEG.
X/S = 2.83
INJECTION ANGLE = 11.5 DEG.
X/S = 4.05
EF
MRATIO
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.2
1.4
1.6
BECKMAN
4T-6L
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METHOD
15:35 11/3/89
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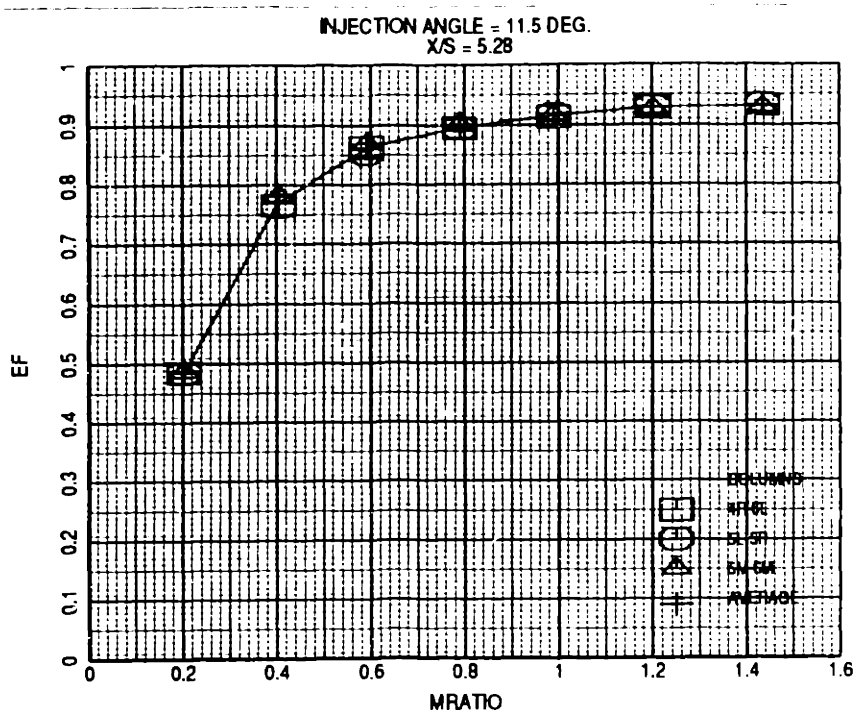
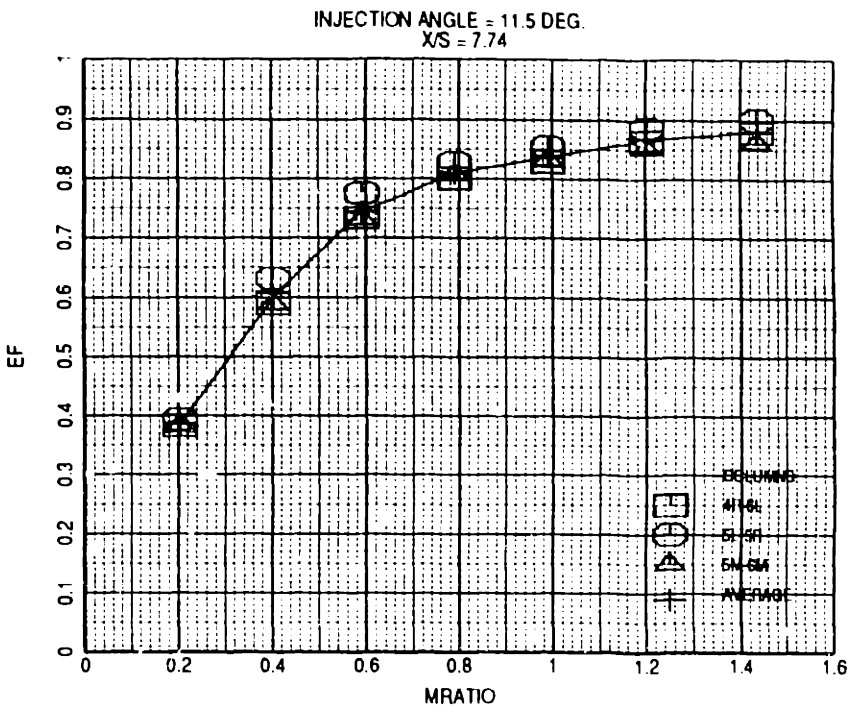
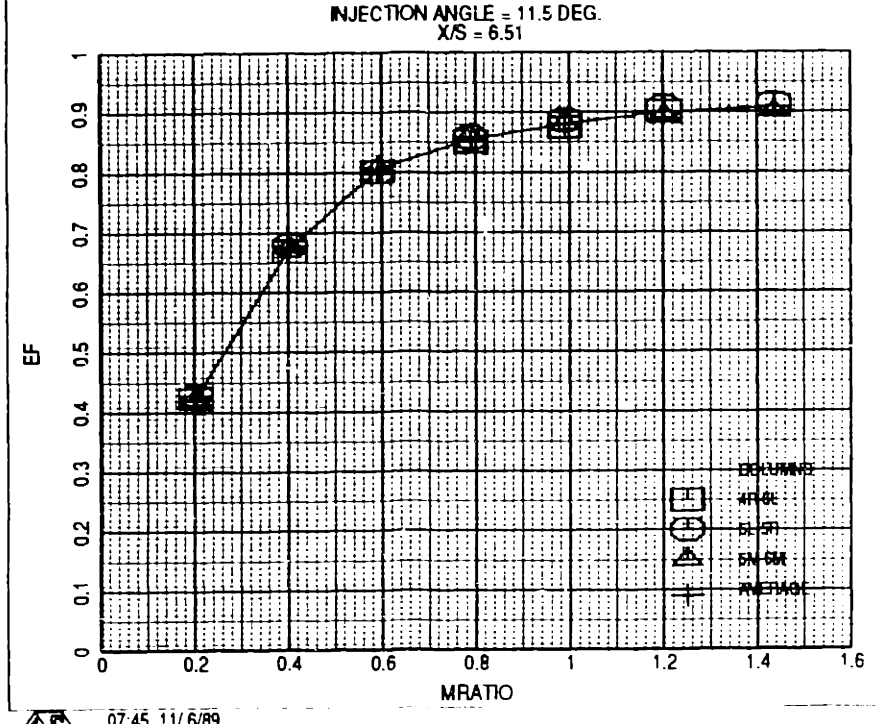
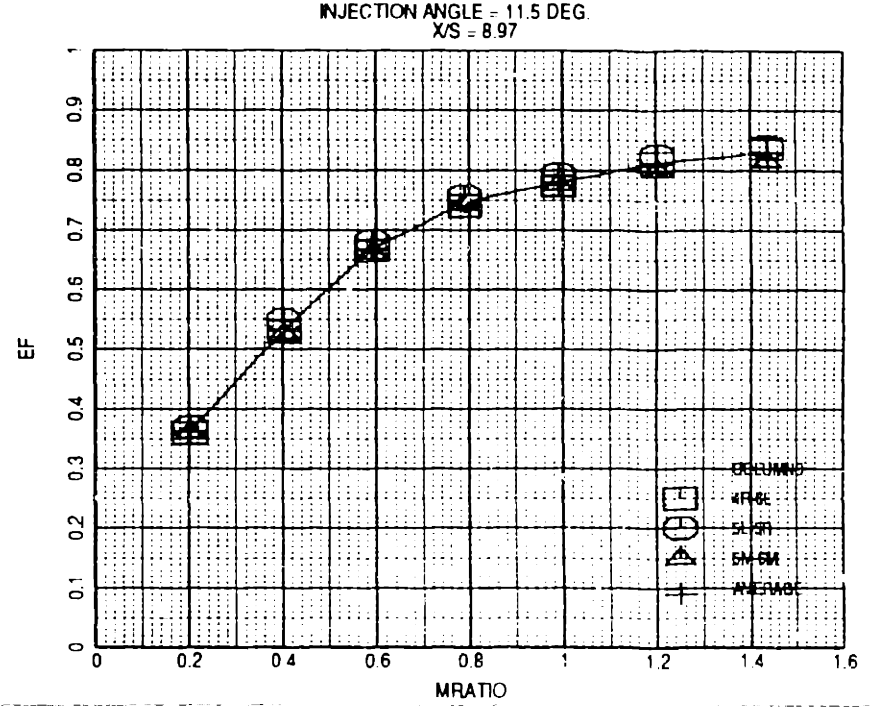
GENPLT12.3 6-JUL-1989









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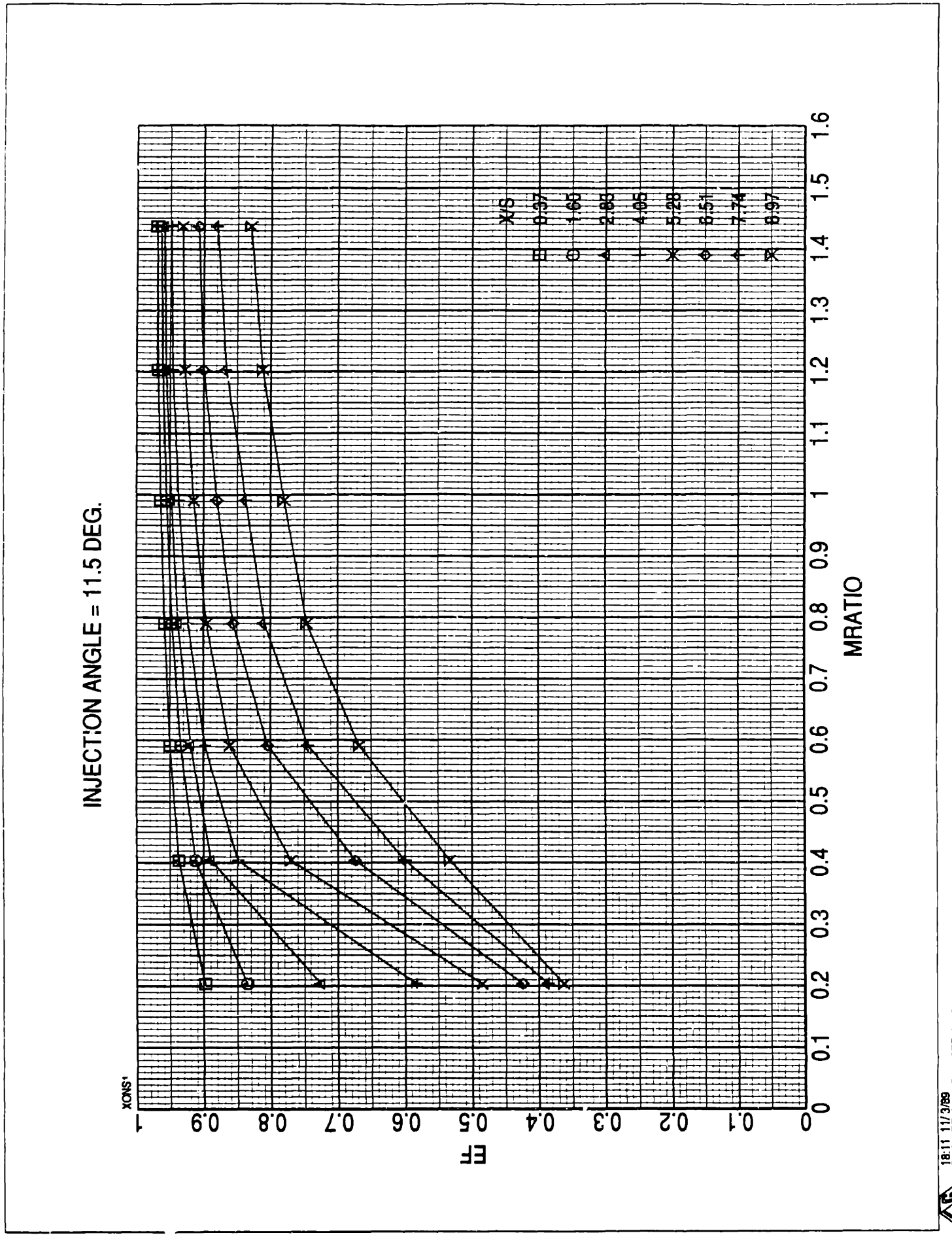
INJECTION ANGLE = 11.5 DEG.
EF
MRATIO
XONS'
XS
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1.65
2.83
4.95
5.28
6.51
7.74
8.97
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
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18:11 11/3/89
EGS VER 4.4.2 G 13-SEP-1989
GENPLT123 6-JUL-1989