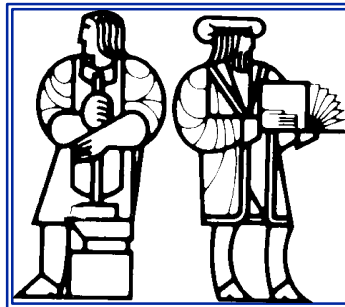


Lean Aircraft Initiative Plenary Workshop

Factory Operations Focus Team



March 5, 1997

**Presented by:
Tom Shields
MIT**

- **Phase I research**
- **Phase II research direction**
- **Research activities**
- **Next steps**

Phase I Research Report

-
- **Inventory survey and case studies**
 - Baseline for the industry
 - Front end loading of inventory
 - Two recommendations for improvement
 - **Benchmarking nonsponsor companies**
 - **Comparative case studies**
 - Flow optimization
 - Variability reduction
 - **Focused case studies**
 - **Lean implementation considerations**
 - **Member flow benchmarking**

Phase II Research Considerations

- **Identifiable and practical deliverables**
- **Meaningful to senior management**
- **LEM used as a guide for research**
- **Extendible to the enterprise level**
- **Balanced breadth and depth of research**
- **Linked to Implementation IPT**

Strategic Approach

- **Build on the LEM**
- **Conduct on-site field research**
- **Drill down to prioritized metrics/enabling practices (using “Order to point of use delivery cycle time” as initial metric)**
- **Use appropriate models to analyze interactions of key factors**
- **Use models as decision tools**

*LEAN AIRCRAFT
INITIATIVE*



Example Deliverables

- **Production system benchmarking**
- **Models for analysis and decision**

Phase II Factory Operations Research

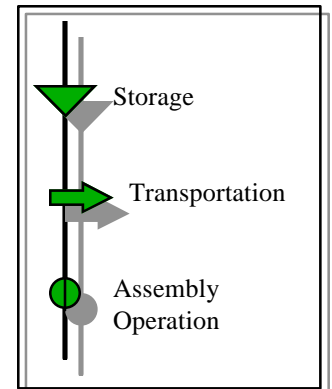
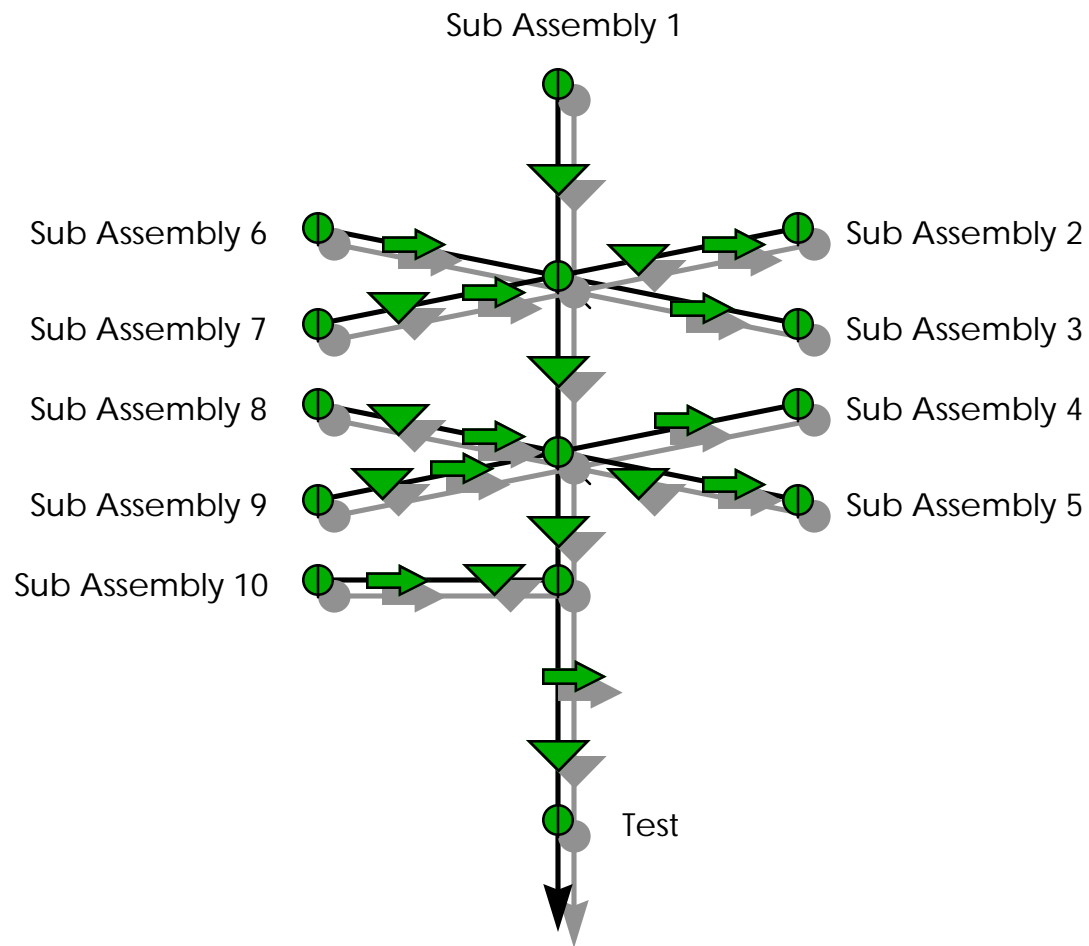
- **Better understanding of assembly stage**
- **Identification of appropriate metrics**
- **Identification of causes for deviation in assembly cycle time**
- **Recommendations for leaner systems**



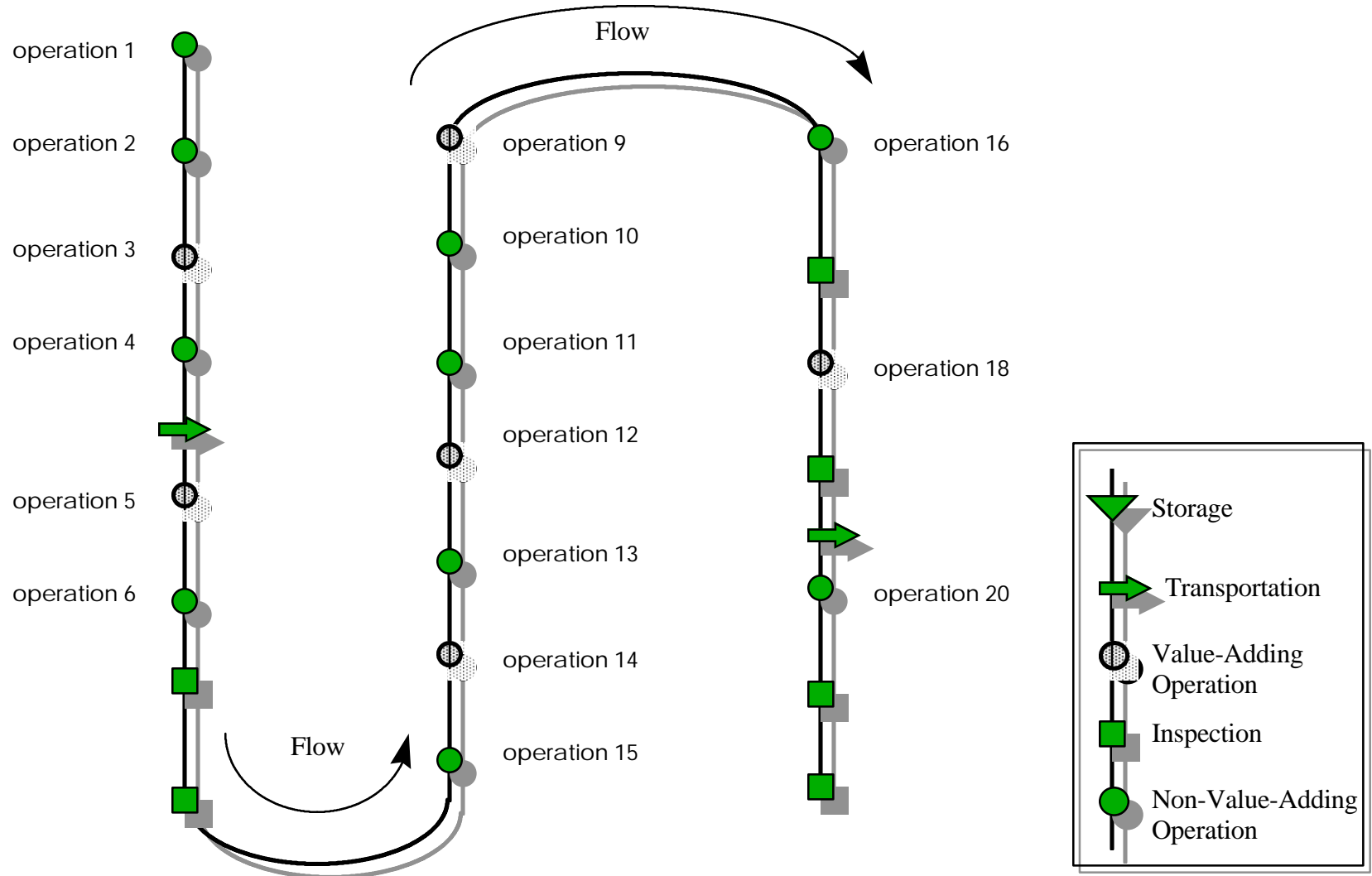
Research Activities Starting September 1996

- **Visits to member assembly facility**
 - Weekly visits (234 person hrs)
 - 2 week stay in January (28 person days)
- **Development of process maps**
- **Detailed tracking of specific serial numbers for product types during build**
- **Analysis of archival data of recent builds**

- **Collection of module build status documentation at assembly areas**
- **Identification of delay causes, if any, with Cell Leaders, Lead Persons, Operators, Schedulers, etc.**
- **Identification of waste**



Subassembly Process Maps





Reasons for Increment in Cycle Time

- **Part shortages (outside source)**
- **Part not found but ‘available’**
- **People not available**
- **Built awaiting inspection**
- **Quality problem**
 - part quality
 - work quality
- **Tooling availability**
- **Station availability**

Lean Changes Vs. Reality

Several lean changes are readily understood, but barriers exist ...

External Conditions

- **Contract conditions**
 - ❖ with customer
 - ❖ with supplier
- **Suppliers are limited**
 - ❖ business reasons
 - ❖ there aren't that many
 - ❖ capacity

Internal Conditions

- **Performance measurement system**
- **Need to work with upper management to meet requirements for lean transition**
- **Workforce issues**
 - ❖ much overtime
 - ❖ flexibility

- **Continue research at field sites**
 - Multiple sites in same sector
 - Multiple sectors
 - Engine sector in 1997
 - Airframe and Electronic sector in 1998
- **Propose experiments and monitor results**
- **Develop models or decision tools**
- **Product transition to production study starting in 1998**