1. Admin:
2. What are the principles of TPS?
3. Why are they so hard to copy & get right?
4. What is the nature of TMM-Georgetown’s seat problem.
5. What should they do?
JUST-IN-TIME PRODUCTION

OBJECTIVE:

-Constant Improvement of the Production/Delivery System, as measured by Quality, Cost, Lead Times, Service, Flexibility

METHOD:

-Simplify the Production System
-Rapid Feedback on Problems Thru Tightly Integrated Production
-Pull System for Inventory Control
-Exploratory Stress to Drive Improvement
-Effective Management of Capital Equipment
SIMPLIFY THE PRODUCTION SYSTEM

Fewer Suppliers
Reduced Parts Counts
Focused Factories
Scheduling by rate, not lots
Fewer storage containers
More Frequent Deliveries
Smaller Plants
Shorter Distances
Less Reporting
Fewer Inspectors
Less Buffer Stock
Fewer Job Classifications
RAPID FEEDBACK

"A DEFECT IS A TREASURE"

ACTION STEPS:

1. REMOVE FEEDBACK DELAYS
   --ESPECIALLY WIP INVENTORIES

2. LINE WORKERS STOP PRODUCTION
   WHEN PROBLEMS ARISE

BENEFITS:

INSTANT FEEDBACK TO PROBLEM SOURCE

JOB ENRICHMENT
   -UTILIZE MENTAL POWERS

INCENTIVES TO AVOID DEFECTS
   -CAUSE IS EASILY TRACEABLE
PULL SYSTEM FOR PRODUCTION AND INVENTORY CONTROL

PRODUCE EXACTLY
- WHAT IS NEEDED
- WHEN IT IS NEEDED

KANBAN OR CARD CONTROL REPLACES COSTLY COMPUTERIZED PLANNING AND TRACKING SYSTEM

PROBLEMS ARE QUICKLY FELT THROUGHOUT THE SYSTEM

ELIMINATES JUST-IN-CASE INVENTORIES

REQUIRES
- FLEXIBILITY
- FAST CHANGEOVERS
- SMALL LOT SIZES
EXPLORATORY STRESS TO DRIVE IMPROVEMENT
TO EXPOSE PROBLEMS

- REDUCE BUFFERS
- REDUCE CYCLE TIME TARGETS
- REDUCE LABOR ALLOCATIONS

PROBLEM EXPOSURE DRIVES EMPLOYEES TO WORK ON

- SETUP REDUCTION
- VARIABILITY REDUCTION
- CYCLE TIME REDUCTION
MANAGING CAPITAL EQUIPMENT

TOTAL PREVENTIVE MAINTENANCE

- ASSURES BETTER UPTIME RELIABILITY
- OFTEN PROVIDES MORE TOTAL UPTIME
- OPERATORS PERFORM REGULAR MAINT.

PRE-AUTOMATION

- PRODUCT DESIGN FOR ASSEMBLY
  - REDUCE PARTS COUNT
  - UTILIZE MODULARITY
  - SET SPECIFICATIONS EFFICIENTLY
    Know cust. needs and mfg capability

- PROCESS DESIGN FOR ASSEMBLY
  - REDUCE FLOW DISTANCES
  - UTILIZE FAIL-SAFE DEVICES
  - LOCATE TOOLS CONVENIENTLY
  - STREAMLINE BEFORE AUTOMATING

ADD CAPITAL INCREMENTALLY

- SEVERAL SMALL MACHINES MORE FLEXIBLE
  - MATCH SUPPLY WITH DEMAND
  - LESS CYCLE INVENTORY NEEDED

  - MOVABILITY PERMITS DEDICATED CELLS
JIT IMPLEMENTATION ISSUES

1. INVENTORY AS A SECURITY BLANKET
2. REDUCE INVENTORY CARRYING COSTS VS.
REDUCE SOURCES OF VARIABILITY
3. SUPPLIER MANAGEMENT
   - BULLYING VS. COOPERATION
   - HOW TO SHARE THE PAINS & GAINS
   - GET OWN HOUSE IN ORDER FIRST?
4. PHYSICAL DISTANCES
   - BETWEEN PLANTS
   - BETWEEN WORKSTATIONS
5. COOPERATIVE EFFORTS AMONG
   - MANUFACTURING
   - MARKETING
   - PURCHASING
   - ENGINEERING
6. PATIENCE
The Logic and Processes of JIT Improvement

Quality Problems

Setup Times & Setup Costs

System Variability

Inventories & Lead Times

Rapid Feedback

Problem Invisibility

Qual. Imp. Processes

EOQ = \sqrt{\frac{2RS}{CK}}

\[ L \approx \frac{\rho^2 \left[ \sigma_A^2 + \sigma_S^2 \right]}{(1-\rho^2) \left[ \mu_A^2 + \mu_S^2 \right]} \]

\[ P\{D \leq \mu + k\sigma\} = \frac{Cu}{(Co+Cu)} \]

\[ L = \lambda W \]
See Karmarkar: Getting Control of JIT, HBR, Sept-Oct 1989