System Performance Metrics

- Order lead time
- Order throughput
- Order cycle time
- Theoretical cycle time
- Factory/system level work-in-process
- On-time delivery percentage
- Finished product inventory level

Basic Process View

- Process
  - Transforms product in some desirable manner
- Elements
  - Resources
    - Machine, operator, tools, fixtures, etc.
  - Material
    - Input, output, setup
  - Information
    - Issues
    - Maintenance, setup, operation, coordination

Job/Process Performance Metrics

- Job throughput
- Job cycle time
- Job buffer inventories
- Job processing time
- Equipment utilization/availability
- Operator utilization/availability

Example Process Level Issues

- Economic Order Quantity (EOQ)
  - Average annual cost as a function of Q
  - Setup cost, purchase cost, and holding cost
    \[ g(Q) = \frac{K}{Q} + \lambda \cdot \frac{Q}{2} \] where \( \lambda = \frac{Q}{P} \)
  - Find value of Q to minimize total cost, g(Q)
    - Take derivative of g(Q) with respect to Q and set to zero
      \[ g'(Q) = \frac{K}{Q^2} - \frac{\lambda}{2} = 0 \]
      \[ Q^* = \sqrt{\frac{2PK}{\lambda}} \]
  - Economic Order Quantity (EOQ)
    - Determine the “optimum” batch size for the operation
    - Under some restrictive assumptions, the inventory profile takes a standard “saw tooth” form