Information Products for Remanufacturing: 
Tracing the Repair of an Aircraft Fuel-Pump
(Research-in-Progress)

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Points to be Made

- Increasing importance of remanufacturing.
- Two types of supply chains
  - Initial manufacturing (planned and predictable)
  - Remanufacture (unpredictable)
- Just-in-Time inventory management is difficult or impossible.
- Good forecasting of parts need will allow inventory management to approach JIT.
- Forecasting relies upon data and experience
  - Information quality is critical for performance of the system.
- Additional research
Increasing Importance of Remanufacture

- Remanufacture is becoming increasingly important, particularly for products involving large initial investment.
  - Heavy construction equipment
  - Aircraft
    - Aircraft are flying far longer and logging far more flying hours than anticipated in original design.
      - 747-200, 727, B52, C135, C141
  - Trucks & Automobiles
- Environmental requirements will cause this need to spread to other products.
Two Supply Chains

- One of the distinguishing features of Remanufacture is the existence of two supply chains for parts and components.
  - Parts arrive on the ‘carcass’.
    - Condition usually unknown until disassembly.
  - Parts delivered through ‘normal’ supply chain.
    - Need usually unknown until disassembly.
‘Normal’ Supply Chain

- Uncertainty of need disallows the use of ‘Just-in-Time’ inventory management.
  - Need unknown until disassembly and testing of parts arriving via ‘carcass’.
  - Uncertainty can be reduced through use of forecasting.
    - Good forecasting allows us to approach Just-in-Time inventory control.
    - Forecasting based on historical record.
      - Quality of historical record dependent upon quality of information on which it is based.
Importance of Forecasting

- Inventory management totally dependent upon performance of forecasting model.
  - Effective forecasting reduces uncertainty in inventory need.
  - If forecasting were perfect, ‘JIT’ would be attainable.

- Goal is therefore to come as close to JIT as possible.
  - Attainment of this goal heavily dependent upon validity of input data.
Single part tracked through replacement and remanufacture process.

- Study uncovered complaints of ‘dirty data’ arriving at point of entry into historical record.
- Corrections entered based on judgment of experienced personnel.
- Study initiated to determine sources of ‘dirty data’.
The Submerged Fuel Pump

- Similar part used on many aircraft.
- Two major components.
  - Pump.
  - Stator.
Stator (Physical) Flow

Depot needs a stator to repair the pump
   Ask Depot IM for stator
      No
         IM for stator
            No
               Stator on hand in DLA?
                  No
                     Urgent?
                        Yes
                           DLA ESOC
                              Urgent & compelling purchase
                                 DLA Storage facility at Depot
                                 Stator vendor
                        No
                           Depot IM asks DLA IM for stator
                              No
                                 DLA Contract Manager
                                    Yes
                                       DLA Storage facility at Depot
                                 Fix the pump
                                     Get stator from DLA storage facility in Depot
Pump Constituents by Roles & Contacts

- **Product Management Specialist** (to be filled in)
  - Repair contracting for repair of end item

- **Contracting new buys**
  - **IM** (John Doe)
  - **ES** (Jane Doe)

- **Planner** (Joe Kennedy)
  - **Scheduler** (Karen Kim)

- **Mechanic Shop** (Vernon Jordan)

- **Engineer** (Chris Montalbano Thomas Jones)

- **PM** (Phyllis Smith)

- **Pump Vendor**

- Discuss problem about pump

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ADDITIONAL RESEARCH

1. Map physical flows, functional responsibilities, people, roles.
2. Map information flows, computer systems, people.
3. Determine information input/output, queuing/process time, dollar/performance costs, decisions made at each point.
4. Collect historical data on use of parts.
5. Test the sensitivity of the forecasting model to errors in the data.
Tracing the Fuel Booster Pump
STATOR POSITION IN THE FUEL BOOSTER PUMP, EXPLODED VIEW