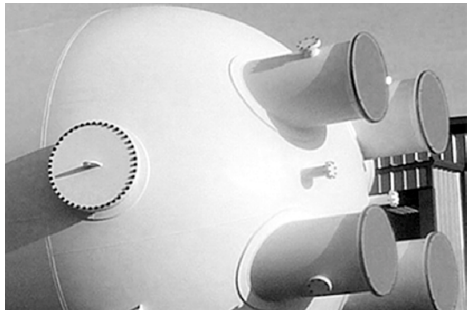
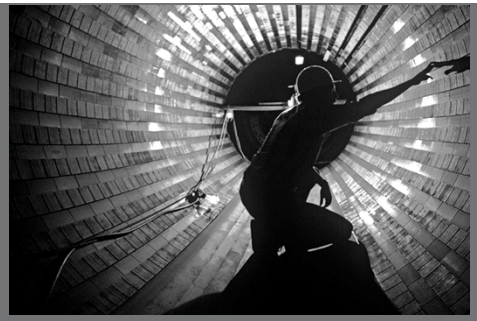
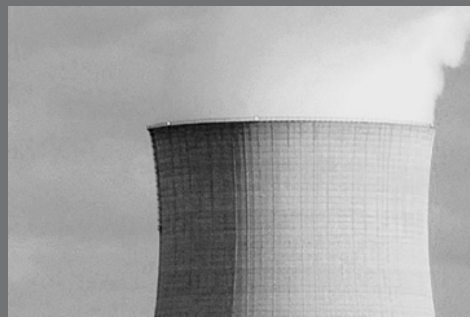
CURTISS-WRIGHT

Nuclear Division





Mechanical Reverse Engineering
Curtiss-Wright Nuclear Division - Nova



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Reverse Engineering

OVERVIEW

- Levels of Complexity
- Overview of Process
- Considerations

Reverse Engineering

WHAT IS REVERSE ENGINEERING?

"The process of developing technical information sufficient to duplicate an item accomplished by physically examining, measuring or testing existing items; reviewing technical data; or performing engineering analysis."

EPRI TR-107372 – Guideline for Reverse Engineering at Nuclear Power Plants

Reverse Engineering

LEVELS OF COMPLEXITY

Piece Parts (Simple)

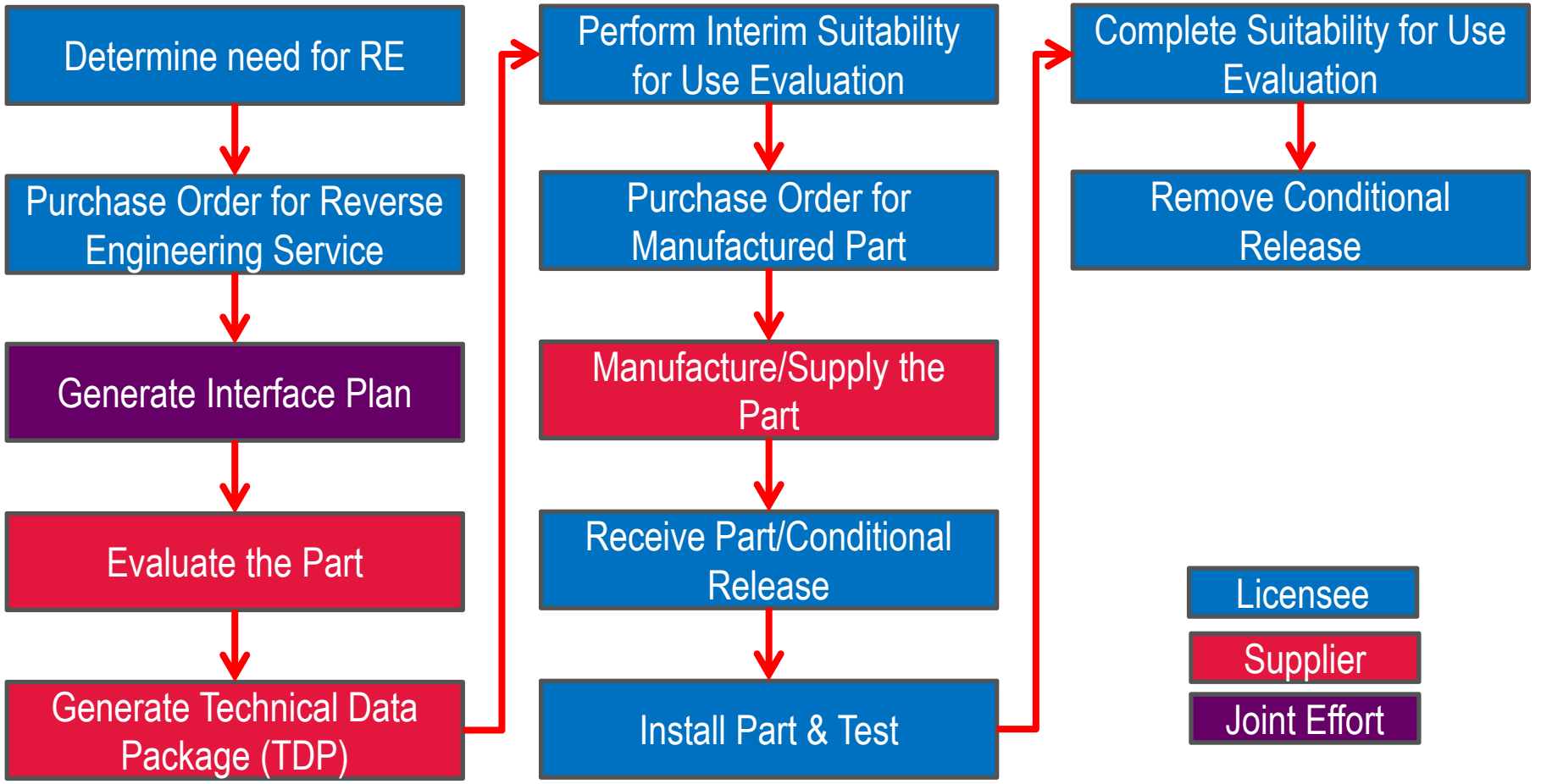
- Specialty Fasteners
  - Nut, Bolt, Screw, Stud, Washer…etc.
- Valve Applications
  - Stem, Bushing, Disc, Guide, Retainer, Spindle, Gland, Pin, Cage, Spacer, Follower….etc.
- Pump Applications
  - Shaft, Sleeve, Ring, Coupling…..etc.

Components (Complex)

- Pumps
- Valves/Actuators
- Snubbers/Accumulators/Hydraulic Cylinders

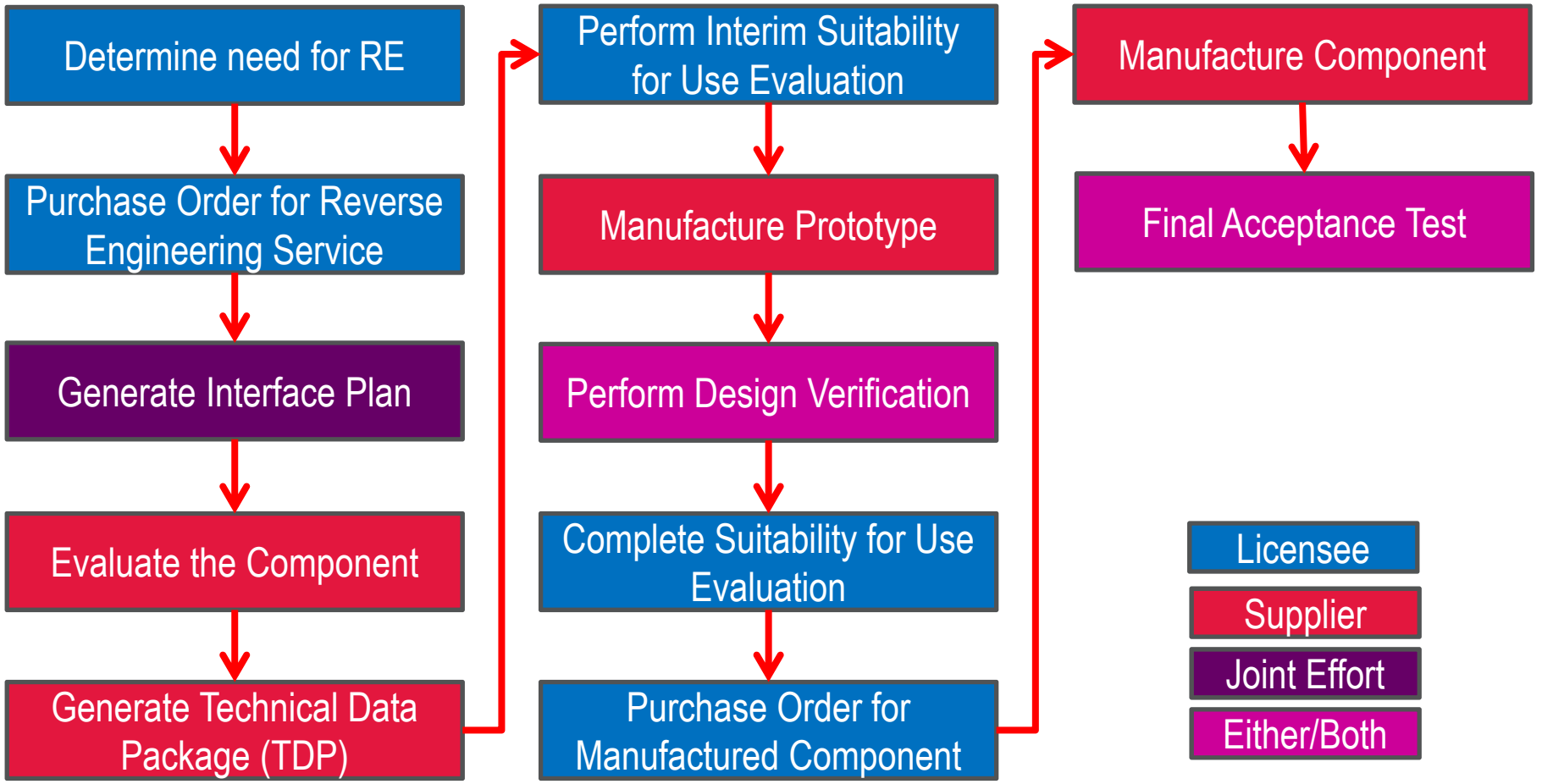
Reverse Engineering – Typical Process

GENERIC REVERSE ENGINEERING PROCESS – PIECE PARTS (SIMPLE)



Reverse Engineering – Typical Process

GENERIC REVERSE ENGINEERING PROCESS – COMPONENTS (COMPLEX)



Considerations

COLLABORATIVE PARTNERSHIP

- Multi-disciplined team
  - Procurement Engineering
  - Component Engineering
  - Design Engineering
  - Supply Chain
  - Quality Assurance
  - Systems Engineering
  - QC/Inspections
  - Supplier

Considerations

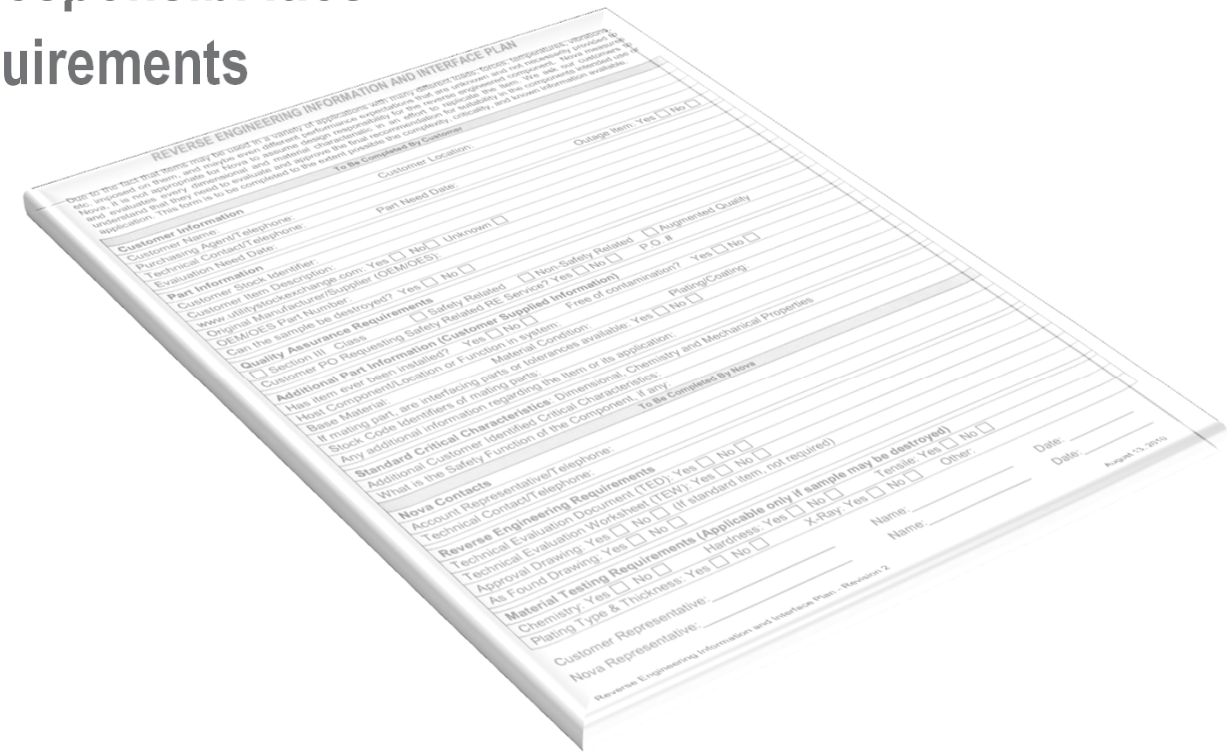
DESIGN CONTROL

- **Responsibility must be clearly defined**
  - Piece parts – typically lies with the Licensee
  - Components
    - Supplier Responsible – component supplied safety related
      - Supplier performs design verification through analysis, testing or qualification
    - Licensee Responsible – component supplied non-safety related
      - Licensee performs design verification

Considerations

INTERFACE PLAN

- Creates the roadmap for a successful project
- Defines roles and responsibilities
- Defines quality requirements



Reverse Engineering

SUMMARY

- Understand the complexity of the item being reverse engineered and how suitability of use will be determined.
- Licensee and Supplier must work in concert to ensure success.
- Evaluation of effectiveness may require review of the entire process including activities performed by both the Licensee and the Supplier.

Questions

Tad K. Gray
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