StandardAero

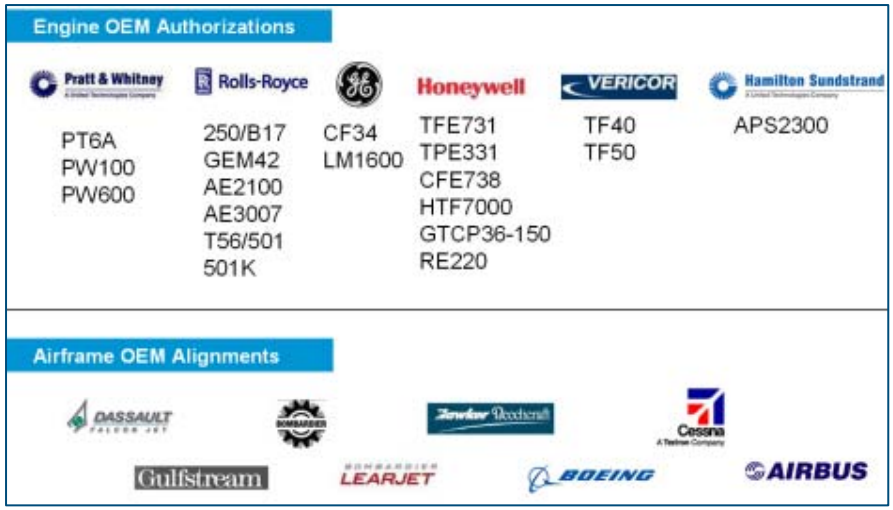
Taking back control of engine flow

- **How establishing flow in StandardAero's PT6 business unit made it easy to do things right, and to do the right things.**

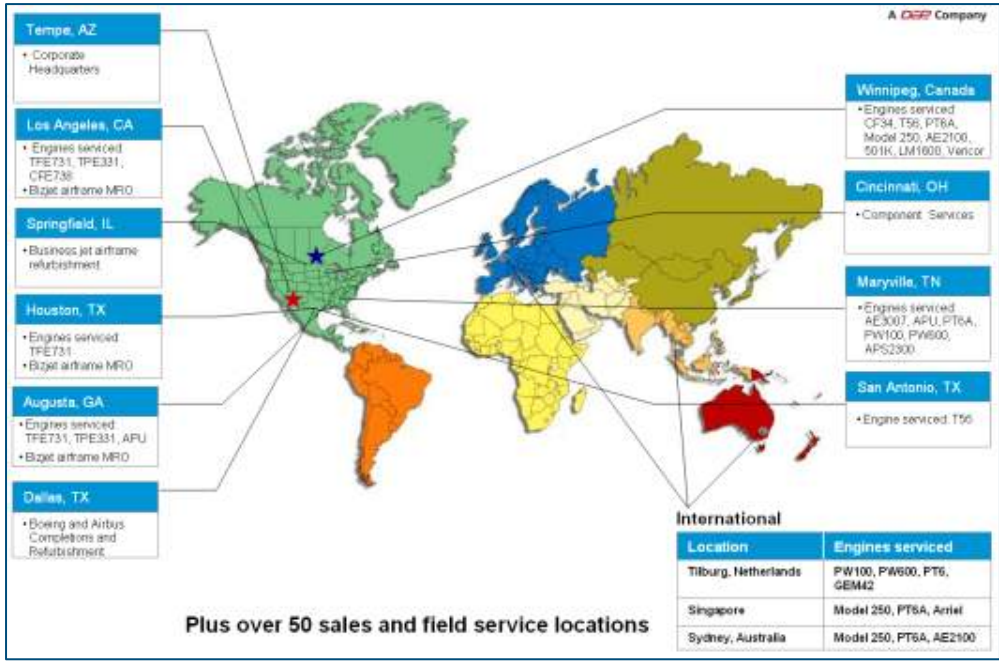
Rick Porayko, Senior Consultant, Strategic Projects

October 2009

StandardAero Corporate Overview



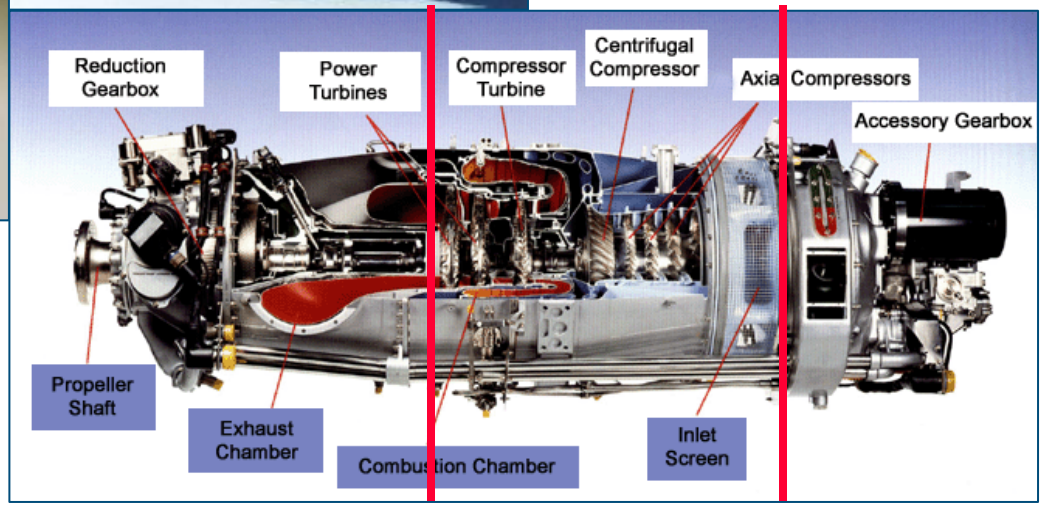
- $1.4B annual sales
- 4,000 employees total



The Winnipeg Operation:

- 1,500 employees
- 7 buildings adjacent to YWG airport
- Current expansion of the CF34 business

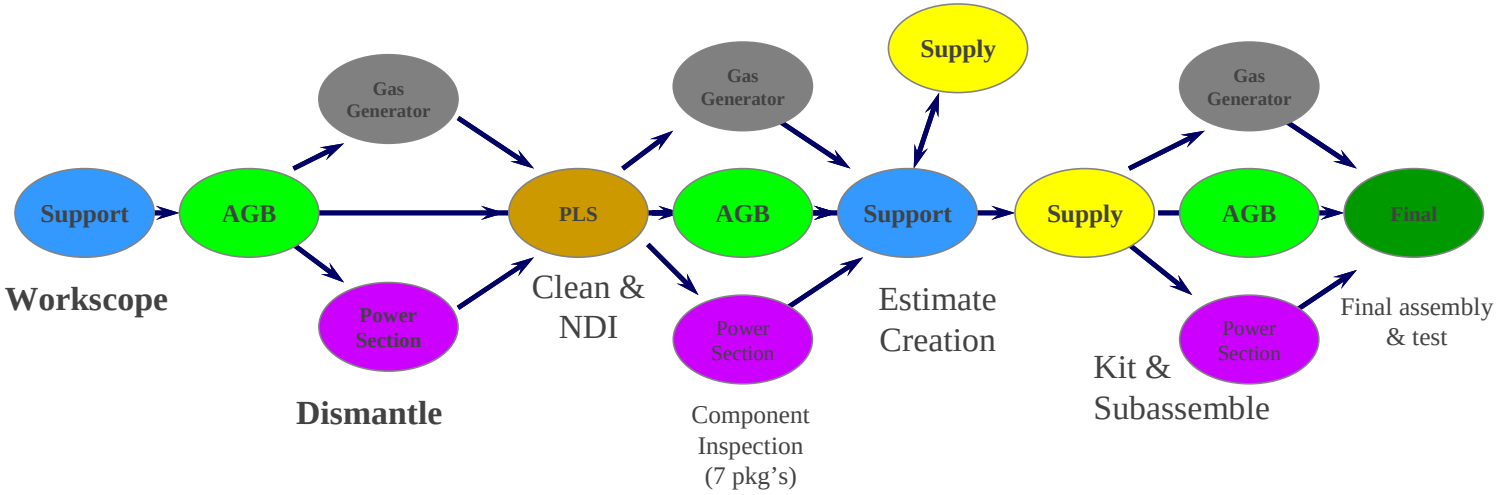
Overview of PT6 – The business unit, the engine, and the airplanes it powers



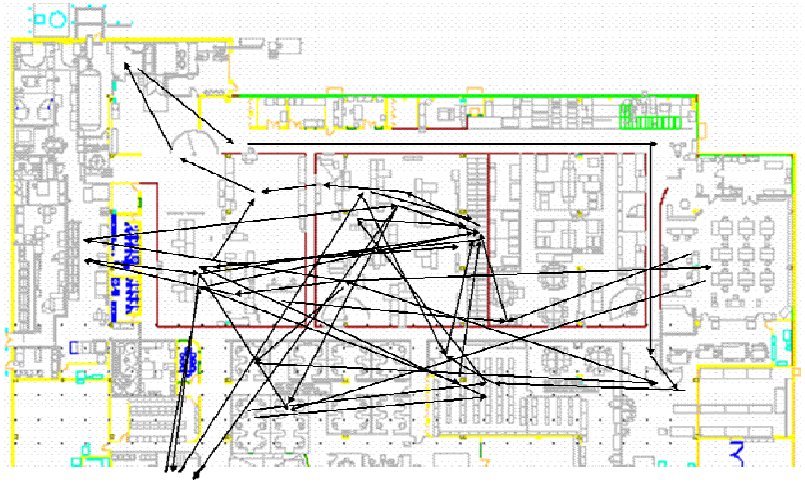
- Turboprop producing between 500 and 1,500 SHP depending on model
- StandardAero overhauls just over 200 per year, plus does several hundred lesser maintenance events
- Annual revenue: $100M
- Employees: 140

- The engine can be divided into 3 major modules
- The modules can be further divided into a total of 17 different subassemblies

Our traditional approach to cellular structure was to disaggregate engines into modules, and process the modules in series

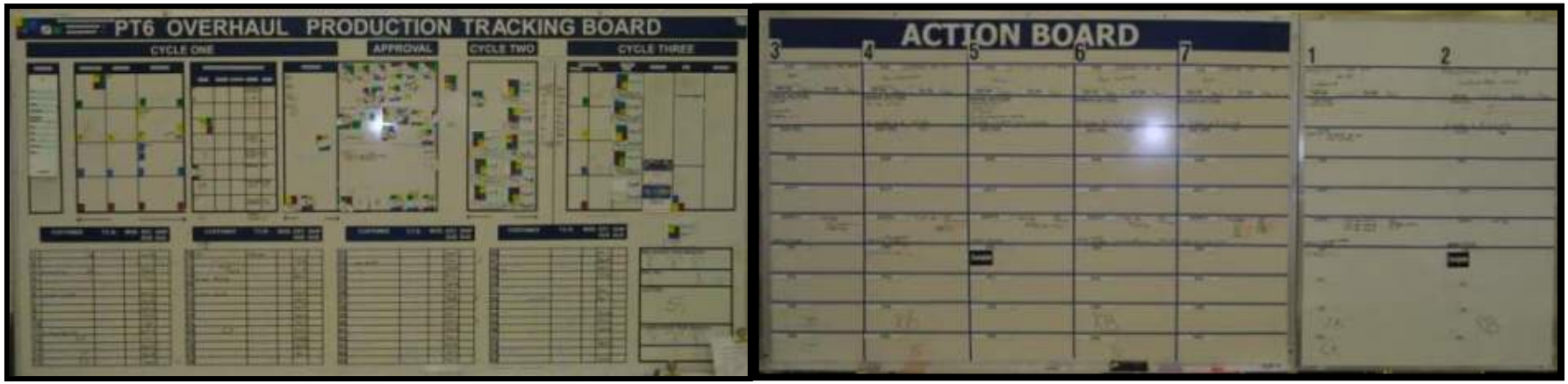


- Process flow was not ideal – everybody touched the same job at least 4 times!
- Finding things was nearly impossible – components from each engine were scattered throughout the facility



A twice-daily “production meeting” was required – everybody brought their clipboards and spreadsheets!

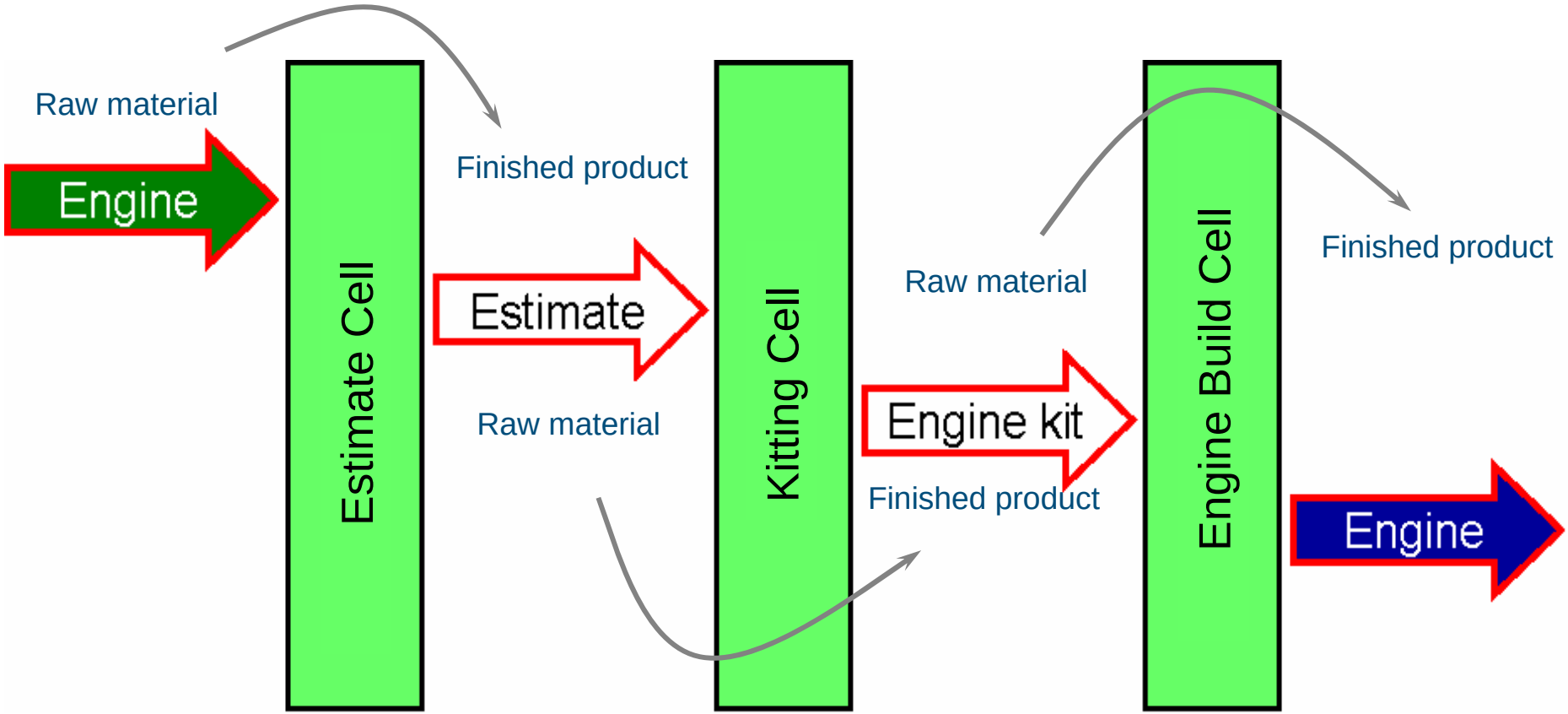
The control board was more than 15 feeet long!



Our new cellular design is based on our recently discovered *MRO Value Stream*

1	Open TCN (or similar)
2	Dismantle
3	Clean & NDI
4	Inspect
5	Determine the kit specification
6	Accumulate repaired parts
7	Issue new material
8	Issue the kit to the mechanic
9	Build subassemblies
10	Build modules
11	Assemble the engine
12	Test the engine
13	Final release
14	Ship the engine

Managing the operation is easy now because we've finally got the process right!

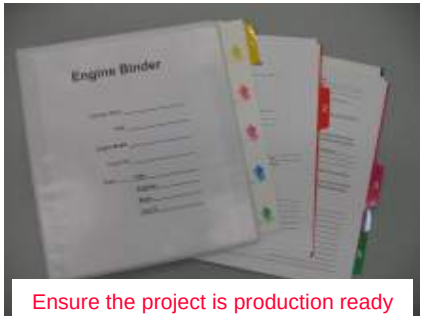


"Process:" a series of activities that transform raw material into finished product.

Shigeo Shingo

Estimating process highlights:

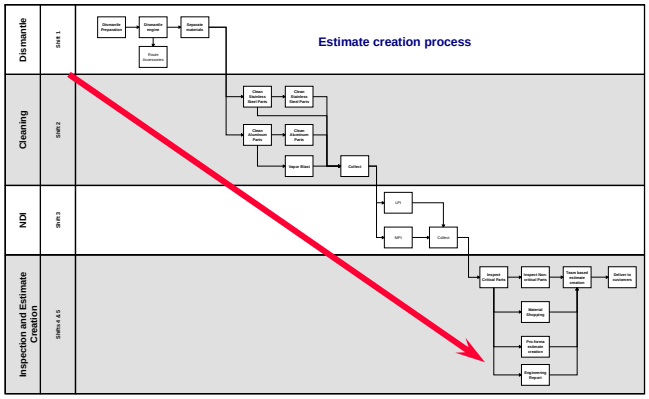
Process input



Ensure the project is production ready

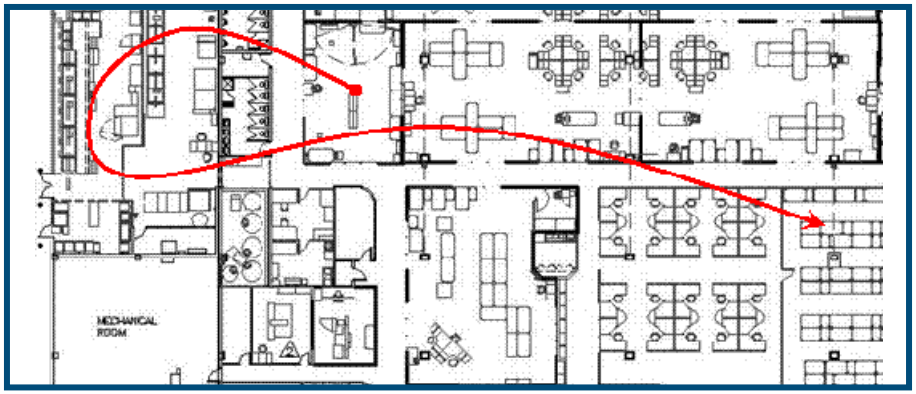
Provide a signal for work to begin

- Begin with standard work and mistake proofing
  - Follow single-piece flow through the process
    - Use teams when teams are appropriate



2	Dismantle
3	Clean & NDI
4	Inspect
5	Determine the kit specification

Each step = 1 shift

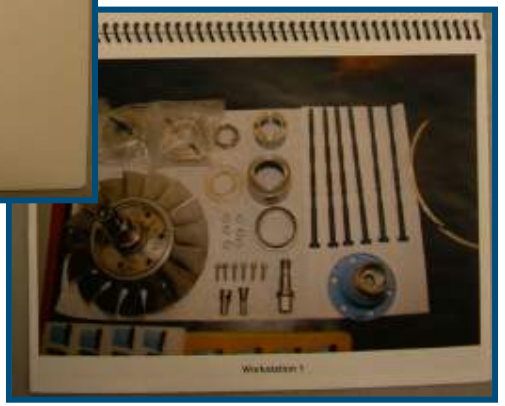


- Make the facility layout mirror the process

Process output

Kitting process highlights:

Simple visual control system to understand completion status and maintain schedule



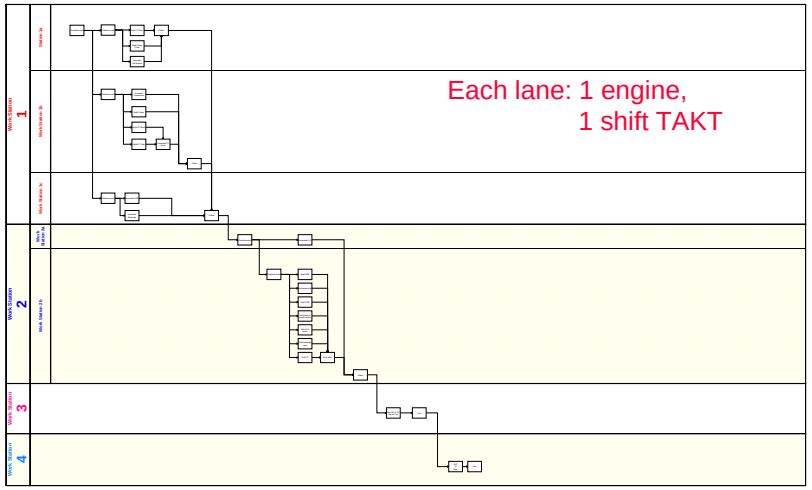
Assemble the product according to the (internal) customers requirements

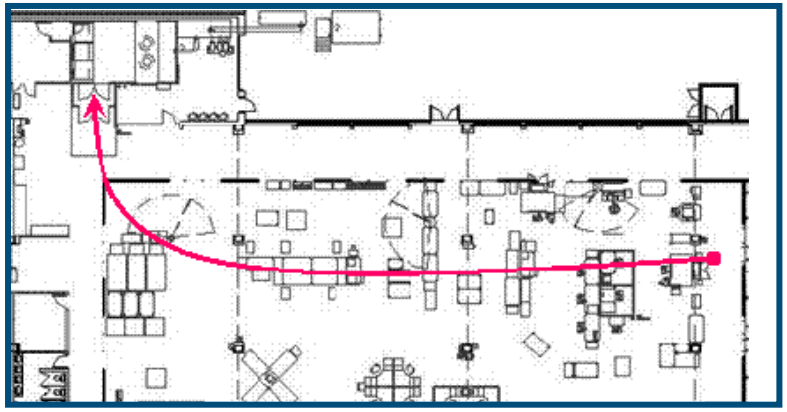
Provide part placement instructions to people placing part on the kit cart

MISTAKE PROOFING

Engine build process highlights:

- Follow single-piece flow through the process
  - Automate to tasks where appropriate





- Mirror the process in the facility layout

- Provide a means to resolve problems ***fast!***

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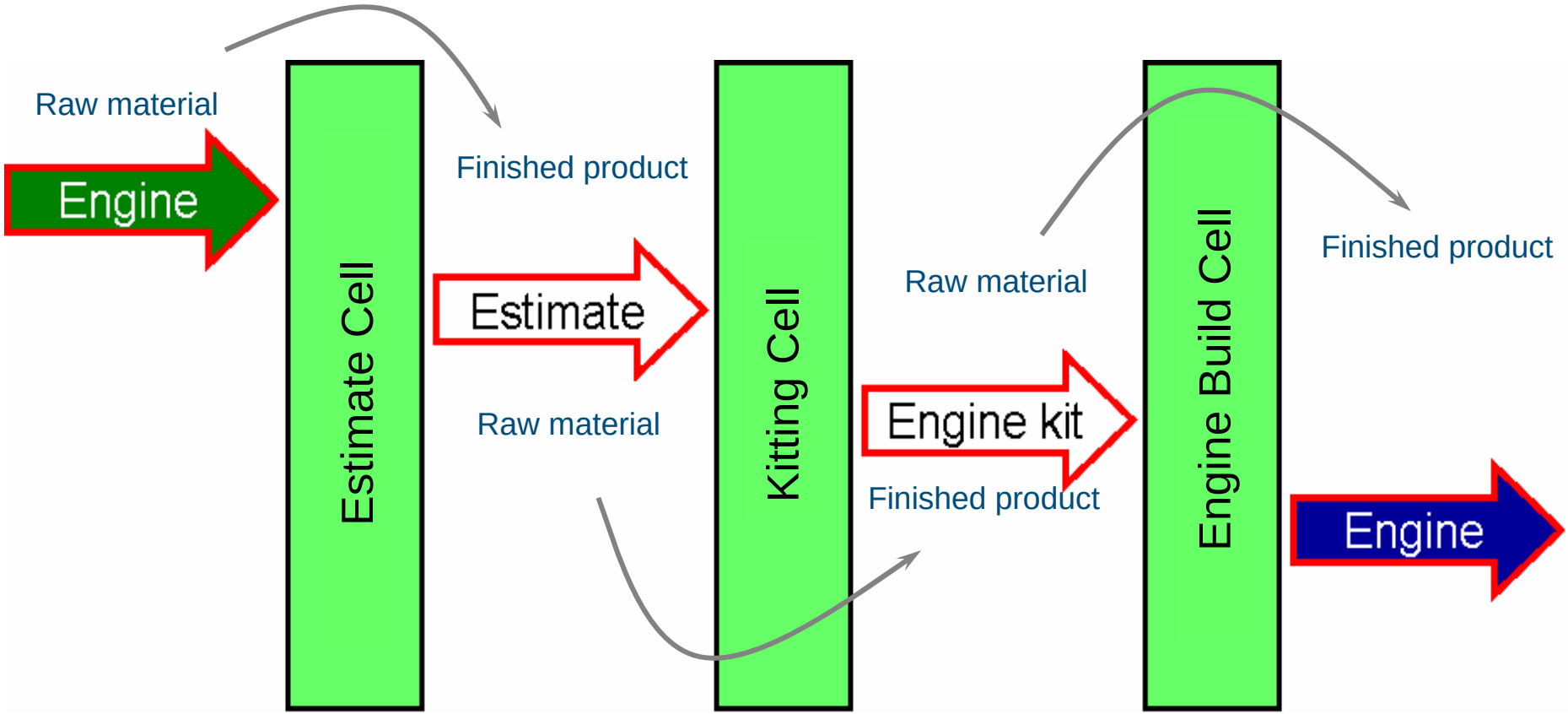
Managing the operation is easy now because we've finally got the process right!



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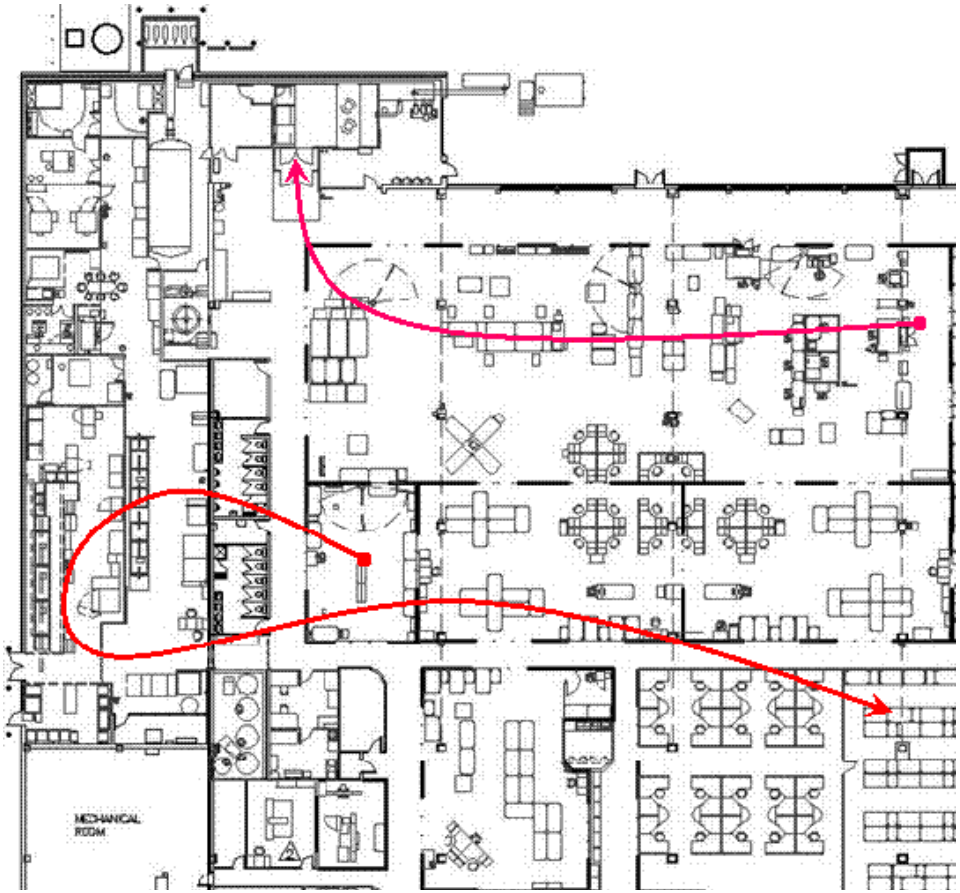
The process-based design and single-piece flow have resulted in many tangible benefits

- Cost of Poor Quality dropped from 5% of sales to 2% of sales (annual sales ~ $100M)
- The twice-daily production meeting was eliminated
- Direct labor content was reduced from 260 hours to 210
- Spare parts inventory was reduced by 40% ($7M)
- Customer delivery compliance increased dramatically
- The range of the cost at estimate vs. cost at invoice variance reduced from ~25% to <3%

Lessons Learned

- ***Waste is created*** when operational practices conflict with the value stream
- Ownership of a ***physical asset*** does not ensure control of a ***process***

Estimate Process



Engine Build Process

Kitting Process

End

Thank you for your interest in StandardAero's *leaner* operations