



The Cure for the Cargo Cult

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What is a Cargo Cult?

- **WWII S. Pacific:** Islanders prayed, food box came!
- Jumped into the programming lexicon
- Happens ever more in engineering
- PUT IT IN AND DON'T ASK WHY



The Background

- Scrubber System
- Trusted, established supplier
- Many small changes, including feed, layout
- The assumptions didn't work this time
- Weeks of redo and thousands of dollars
- Overall success

This Case

- Different type of customer, construction, and gas
- Impact
 - Dosing rates changed
 - Multiple recalibrations of pH/ORP + Alkalinity
 - Poor meter rangeability and replacement
 - Replacements could not arrive on time
 - Logic reviewed repeatedly
 - New and iterative managerial processes
 - New set of reassembly instructions

Normal Accidents

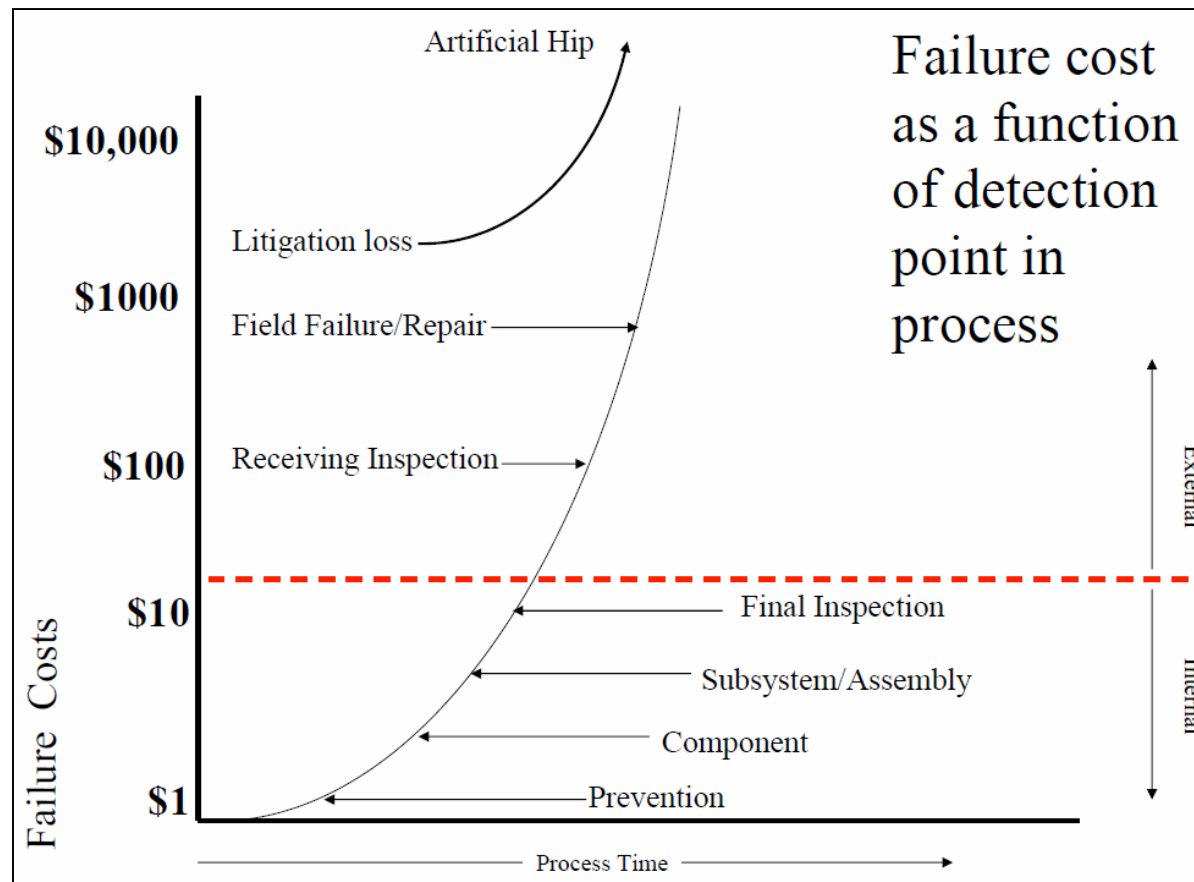
- Complex, tight coupling, catastrophic potential
- Accident in spite of all in spec
- This Scrubber was a mini example
- Large examples:
 - **Operations:** Three Mile Island, Fukushima
 - **Project level:** Rolls-Royce RB211, S-Class

Prevention: The Second Right Answer

- Charles “Chic” Thompson, What A Great Idea!
- Rule #3: always look for the 2nd answer
- Brave enough to fight: “It cannot be wrong!”
- Sakichi Toyoda’s “5 Whys”
 - Why did they choose that meter?
 - Were able to build a spool piece and rotameter with range reflected in programming
- Do not see micro and macro as contradictions

For Management, Remember the 10X Rule

- Begin with the End in Mind
 - I want the system to work



Source: <http://www.cqacademy.com/cqe-body-of-knowledge/quality-system/cost-of-quality/>

Prevention: Applications Mind

- Not taught, not encouraged, reductionist
 - Our education is not well integrated
- The good thing: I&C&E already knows this
 - With instrumentation, you cannot see problems in isolation
- Ownership drives the right attitude
 - Sign your name to the project
- Know your limitations first, then work them
 - Do not be afraid to ask questions and do not assume
- Have multiple disciplines at your disposal

Conclusion

- Not an optimum situation
- Will still require extra site work
- Prevented a lot of site work and trips
- Very thankful management on all sides
- **OVERALL SUCCESS**