MARPA 2011

Opportunities for Success and Safety

An Industry of Solutions

Jason Dickstein
MARPA President
Staying Relevant

Strategy without tactics is the slowest route to victory. Tactics without strategy is the noise before defeat

Sun Tzu
Reverse Engineering

• Some companies that compete with PMA manufacturers have been suggesting that there is something inherently “bad” about reverse engineering

• But reverse engineering is far more valuable than many people understand …
Three Letter Words

• Former FAA PMA Program Manager Bruce Kaplan
  “PMA is not a four letter word”

• So let’s start with a different four letter word ...
M-PMV

• Mason-Pfizer monkey virus (M-PMV)
  – A simian AIDS–causing monkey virus
  – Biologically similar to HIV

• Biochemists had been trying for 15 years to “solve” the M-PMV by creating an accurate model
  – Effectively reverse-engineering the retroviral protease
Viruses and Protein

• A virus like M-PMV is made up largely of proteins,
• Inside a cell, viruses like M-PMV creates other proteins to help themselves reproduce, like:
  – Protease
    • Cuts the "polyprotein" into the functional pieces it needs
  – Reverse transcriptase
    • Converts HIV's genes from RNA into DNA
• Both proteins are critical for the virus to replicate
• Both proteins would be potential targets of anti-viral drugs
Protein Geometry is Important

• Proteins are long chains of amino acids
• The structure affects the function of the protein
  – A protein that breaks down glucose so the cell can use the energy stored in the sugar will have a shape that recognizes the glucose and binds to it
  • The protein will be shaped so that chemically reactive amino acids will react with the key glucose activity points to break it down to release the energy
Geometry Leads to Cures

- Understanding the geometry of a protein helps scientists understand its reactive points to identify vulnerabilities
  - Scientists need to know more than just the constituent amino acids of a protein
  - They need to know its geometry
Protein Structure Prediction

• Knowing the structure of a protein is key to understanding how it works and to targeting it with drugs
• A small protein can consist of 100 amino acids
• Some human proteins can be huge (1000 amino acids)
• The number of different ways even a small protein can fold is astronomical
• Figuring out which of the many possible geometries is the correct model is one of the hardest problems in biology, today
Issue: How do You Reverse Engineer a Virus Protein?

*Reverse Engineering Ain’t So Bad*
Foldit

• A multiplayer online game that enlists players worldwide to solve difficult protein-structure prediction problems

• Foldit players leverage human three-dimensional problem-solving skills to interact with protein structures
  – Molecules assume the conformation of greatest thermodynamic stability (lowest energy)
  – Foldit players identify the lowest energy geometry

• Foldit algorithms can be used to predict a protein’s likely geometry
Foldit

Source: http://fold.it
M-PMV

• Mason-Pfizer monkey virus (M-PMV) retroviral protease
  – A simian AIDS–causing monkey virus

• Biochemists had been trying for 15 years to “solve” the M-PMV by creating an accurate model
  – Effectively reverse-engineering the retroviral protease

• The structure was resolved by “Foldit” players (in about 16 days) and confirmed by x-ray crystallography
M-PMV PR Monomer

Two Lessons

• Reverse engineering can help you better understand something
  – Permitting product improvements
• Sometimes the so-called experts can be outdone by a well-educated aftermarket
Three Letter Words

• PMA is not a four letter word

• Reverse Engineering is not a four letter word
  – If you understand the product then you can better improve it
  – This leads to safety innovations
  – This leads to reliability innovations
An Industry of Solutions

• MARPA’s Members are making positive contributions to safety
  – Parts availability
  – Keeping aviation affordable
  – Improving safety issues
  – Improving reliability

• Reverse engineering existing products provides a **specific opportunity** for safety / reliability improvement
Understanding the Article Leads to Improvements

• An Airbus 330 is suspected of encountering pitot probe icing
• Aero Instruments designs a replacement pitot probe with improved icing characteristics
  – Exceeds existing icing standards
Problem:
OEM Position (767-SL-29-039 Filter Bowl): Despite field failures, “Cost/Benefit analysis has determined that cost impact is insufficient to justify production changes.”

Service Letter 767-SL-29-039 suggests FPI of 271T0045-3 after an initial 21,000 cycles and every 3,000 cycles thereafter.

Solution:
HEICO produced an improved product which included a material change that resulted in:

Predicted LCF Life: Threads
p/n 271T0045-3: 160,000 cycles
p/n JA271T0045-3T > 4,000,000 cycles

HEICO obtained PMA for regulatory approval. Alternate ICA issued.

Innovative Solutions to “age old” problems
Share Your Successes

• If you have made an important article improvement, please share it with MARPA
• We’d like to build a presentation of our members’ successes that would be available on the MARPA website for anyone to review
• This also permits MARPA to demonstrate to the public the important advances developed by our members
Three Letter Words

• PMA is not a four letter word

• Reverse Engineering is not a four letter word

• OEM is not a four letter word
Safety is Everybody’s Business

• Cooperation among competitors
• We can learn from the OEM successes
  – For example, Ed Bayne is at the Conference to talk about supplier control
• We can also learn from their failures
  – Unexpected reliability issues create opportunities
  – Long lead times create opportunities
• Never forget that every OEM is a potential business partner
MARPA Standard

Streamlined PMA Applications
Prior Planning for PMAs

A MARPA Standard

- MARPA standard for formatting certain PMA applications
- **Non-safety-significant parts**
  - Establish a MOU with local ACO
  - Have a history of success and quality (so the local office is comfortable with your packages)
  - Plan your PMA project
  - Submit all of the required information
  - Arrange your application in a standard format
  - Demonstrate to the FAA no adverse safety impact from failure
- Each draft has been distributed to the MARPA Technical Committee for comment and has also been placed on our website for public comment
- Copies are also available on your USB drives!
Streamlined Applications

• We expect FAA to issue draft guidance for comment
  – Recommending that for parts that met the MARPA Non-Safety-Significant protocol, FAA will aspire to turn-around the applications within 30 days
    • 30 days is a goal ... not a promise
  – Permits the FAA to quickly process these applications and thereby direct more engineering resources to more safety-sensitive projects
Supporting Safety

Removing Barriers to Effective Safety
Instructions for Continued Airworthiness

• PMA companies are strongly encouraged by FAA guidance to reference OEM manuals unless design differences make them inapplicable.

• PMA companies are required to demonstrate applicability of the manuals.

• Net result:
  – Installers rely on the same instructions no matter which version of the part they install.
  – Commonality of instructions supports human factors.
Restrictive Licenses for Manuals

May not sell, reverse engineer, or copy any of the [OEM] product or parts, or assist any third party in the reverse engineering or copying of any of the [OEM] product or parts, to make a competitive product or part.

This CMM is applicable only to original [part] manufactured by [OEM]. Please check type plate for correct vendor code and for correct part number without any prefix and/or suffix.

[OEM] manuals, component maintenance conditions, and overhauls requirements (including do not apply to assembles that contain replacement parts that are not authorized for use by [OEM].

Recipient agrees to procure SAI Parts only from SAI or authorized distributor. The use of PMA Parts is strictly prohibited.
The FAA does not find the following DAH practices acceptable under the provisions of 14 CFR §21.50(b) and related ICA airworthiness requirements:

1) Requiring the use (installation) of only DAH-produced or authorized replacement parts, articles, appliances, or materials.
2) Requiring that alterations or repairs must be provided or otherwise authorized by the DAH.
3) Requiring the use of only repair stations or other persons authorized by the DAH to implement the ICA.
4) Establishing, or attempting to establish, any restriction on the right of the owner/operator
Draft Policy Summary

• This draft FAA policy makes it clear that when the FAA approves a PMA and expects continued use of the OEM manual for maintenance of the PMA part, the OEM shall not interfere with this use.
Comment on the ICA Guidance

• Open for comment now
  – File comments on regulations.gov (Docket Number FAA-2011-1097)
  Or
  – Email comments to john.cerra@faa.gov

• Please send a copy of your comments to MARPA
FAA Sequencing Guidance

- FAA has developed a draft standard operating procedure for sequencing of 40+ hour projects
  - The draft seems to disadvantage small businesses
  - Some work still needs to be done
- This guidance still needs work but the FAA has been very open to working with industry to develop protocols that allow the FAA to prioritize projects without undermining the FAA’ safety goals
Supporting Customer Needs

Reaching Out to the Leasing Community
Leasing

• MARPA has been gathering data for a White Paper aimed at the leasing community

• The purposes will be:
  – To educate leasing companies about the value of PMA
  – To answer frequently asked questions about PMA,
    and
  – To dispel unfounded myths about PMA
MARPA Continues to Publish

- MARPA Supplement
- MARPA Blog
- MARPA Committee Email Alerts
- Monthly Column for Aviation Maintenance Magazine
- Airline Guide to PMAs (by David Doll)
- Comments filed with the FAA and with other government agencies
Why Have We Been Successful?

Collaborative Effort
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Leveraging Our Resources

• We do more with your help
  – Continued Operational Safety Committee
    • Annual Meeting with FAA to discuss safety issues
  – Technical Committee
    • Helps develop comments in response to FAA and other government proposals
  – Marketing Committee
    • New Branding
      – Logo, Website
    • Advertising (to educate about, and promote, PMA)
How Can You Get Involved?

• Join a Committee
  – Sign up at the registration desk
• Stay Informed
  – Sign-up for the MARPA Blog:  pmaparts.wordpress.com
• Implement a Formal COS Program
  – Guidance is available on MARPA’s website
• Write about PMA and about MARPA
  – Share your success stories or even write for the blog
• Share your thoughts
  – We need to know what is important to you!
Conference Attendance

- 272 pre-registrations as-of one week before the conference
  - This number will likely increase to at least 285 total registrations
- Compare to past years (final totals)

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2012 Conference Status

• Las Vegas Renaissance Hotel
• October 3-5, 2012
• $129 per night room rate
Thank You

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