“Capability creates the unexpected”

Gen Jon M. Davis, USMC, AHS Forum 73 keynote
Never wait for a spare part again
Customize capability in the field
Embracing Complexity, Enabling the Unexpected:
(Next Generation Agile Manufacturing to Enable “Point of Use” Customization for Complex Vehicles)

Bill Harris
with Jonathan Hartman

This presentation has been publicly released

Art of the Possible Concepts

Move to “add on” instead of “built in”
Move to “point of use” instead of “fixed factory”
Move to qualification during manufacture
“Add on” instead of “build in”

Capability with limits

Easily added flexibility

This presentation has been publicly released

Move the factory to “point of use”

Driven by economics and technical expertise

Driven by functionality and customer need

Coast Guard Air Station Kodiak

Qualification as part of manufacture

Process data = physical characteristics = performance

When in doubt, add a gauge, within reason

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Additive manufacturing
A Comprehensive “Digital Twin”
Remote presence, real time cooperation
Additive Manufacturing

Complexity and variety are advantages
Little or no assembly required
Near zero lead time
Unlimited design space
Less waste
Customizable replication

But,

Limited build volumes and material selection
Limited material property knowledge
Limited in situ process monitoring/ability to replicate
A Comprehensive “Digital Twin”

Assess, anticipate, and adapt the aircraft and its parts with low risk using real time and historical data

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Remote presence, real time cooperation

Secure, interactive, collaborative data exchange between humans and automated quality processes

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Rapidly maturing enablers

Statistically capable processes

High pedigree material and its performance data

Secure, high powered computational resources

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But We’re Not There Yet

• Machines and Materials
• Fluid configuration management of vehicle and manufacturing capability
• Warranty, liability and business model
• Data security
• Ability to deal with uncertainty and noise
• Moving Technical Experts to ‘On’ Instead of ‘In’ the Loop
• Certification and Quality Standards

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Evidence it can work

**Version 1**
September 1939

- 2 models
- 4 versions
- 6 modifications

**Version 4**
December 1941

Local design team
Onsite manufacturing
Full certification authority

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The Story of Sikorsky and Working Towards the Future

Use the greatest caution when combining the words Impossible and Aviation

This presentation has been publicly released
