Electronic Systems

BAE SYSTEMS
INSPIRED WORK

MathWorks Expo – October 2015
Achieving Certification for Safety Critical Systems

John Russell – Head of Systems and Software Engineering – BAE Systems Electronics Systems (UK)

October 2015





BAE SYSTEMS
INSPIRED WORK

Electronic Systems (UK) Overview

BAE SYSTEMS
INSPIRED WORK

Agenda

- Introduction to BAE Systems Electronic Systems
- The challenge of achieving certification for safety critical systems
- Application of Model Based Design – why is it right?
- What is next?
- Conclusions

BAE SYSTEMS
INSPIRED WORK

Electronic Systems (UK) Overview

- Electronic Systems is part of BAE Systems and reports into the US arm of the business
- The ES UK business is located in Rochester, Kent, England

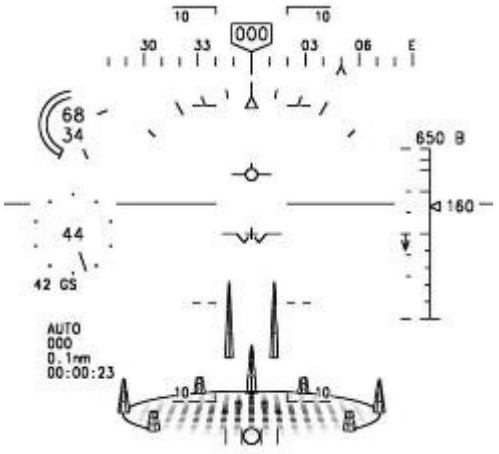
- The site has 1600 employees

- Civil customers
- Military customers

BAE SYSTEMS
INSPIRED WORK

Electronic Systems (UK) Overview

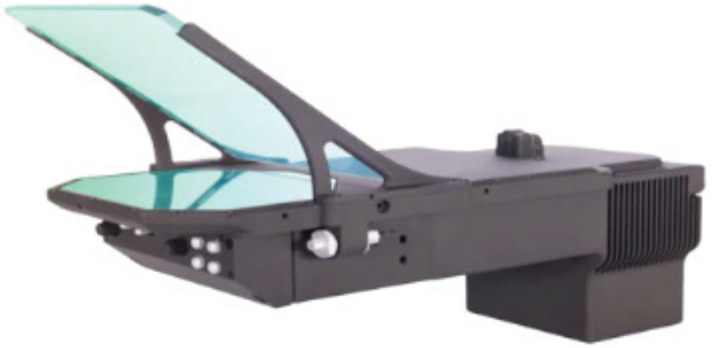
Helmet Mounted Displays

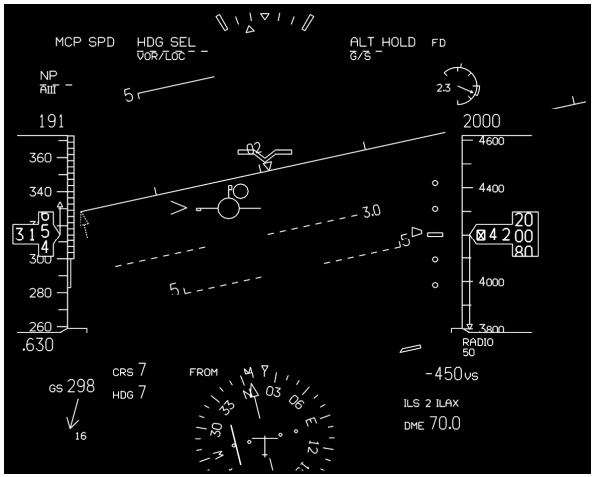


BAE SYSTEMS
INSPIRED WORK

Electronic Systems (UK) Overview

Head Up Displays





BAE SYSTEMS
INSPIRED WORK

Electronic Systems (UK) Overview

Flight Control Computers

BAE SYSTEMS
INSPIRED WORK

Electronic Systems (UK) Overview

Active Inceptors

BAE SYSTEMS
INSPIRED WORK

Electronic Systems (UK) Overview

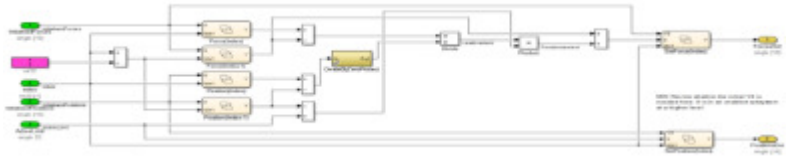
HybriDrive™ Systems

BAE SYSTEMS
INSPIRED WORK

What is Safety Critical Software?

- Safety Critical Software : Failure may have catastrophic consequences that causes injury or loss of life. E.g. Flight Control, Primary Flight Display

- Verification activities must demonstrate that the software meets its requirements under all foreseeable operating conditions



SAE-ARP-4754A
DO-178C / DO-331
DO-254

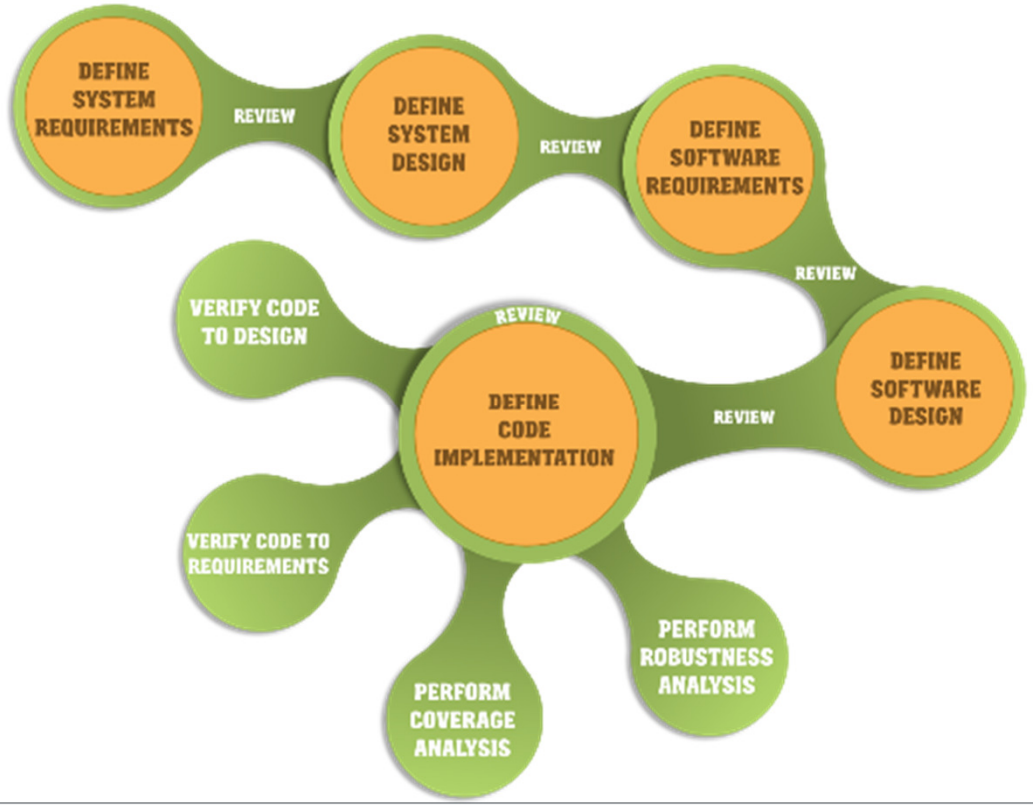
BAE SYSTEMS
INSPIRED WORK

The Challenge

- Increasing competition within the industry
- Increased focus on process adherence
- Evolving standards
- How can we meet these certification challenges and cost/schedule challenges
- The use of Model Based Design is one way
- Generation of a backup flight control system implemented purely in PLDs – no processor
- Developed to DO-254 DAL-A

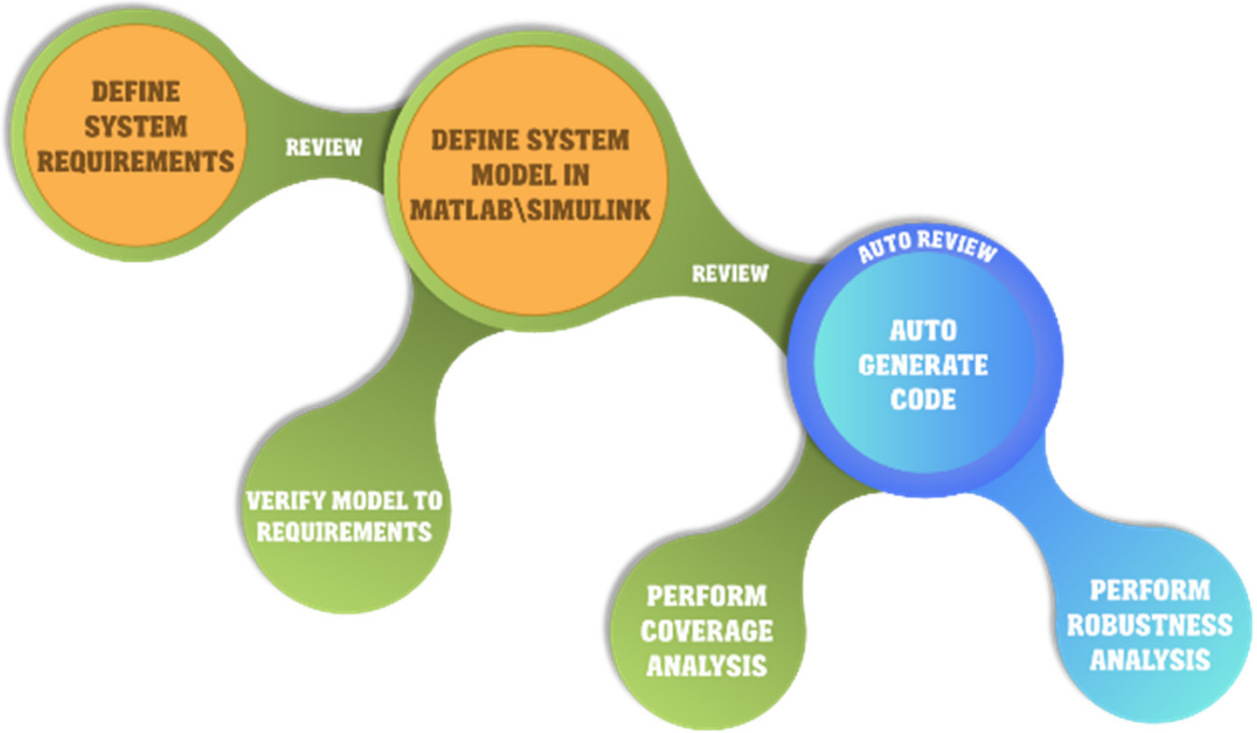
BAE SYSTEMS
INSPIRED WORK

Lifecycle Comparison – DAL A Software Development



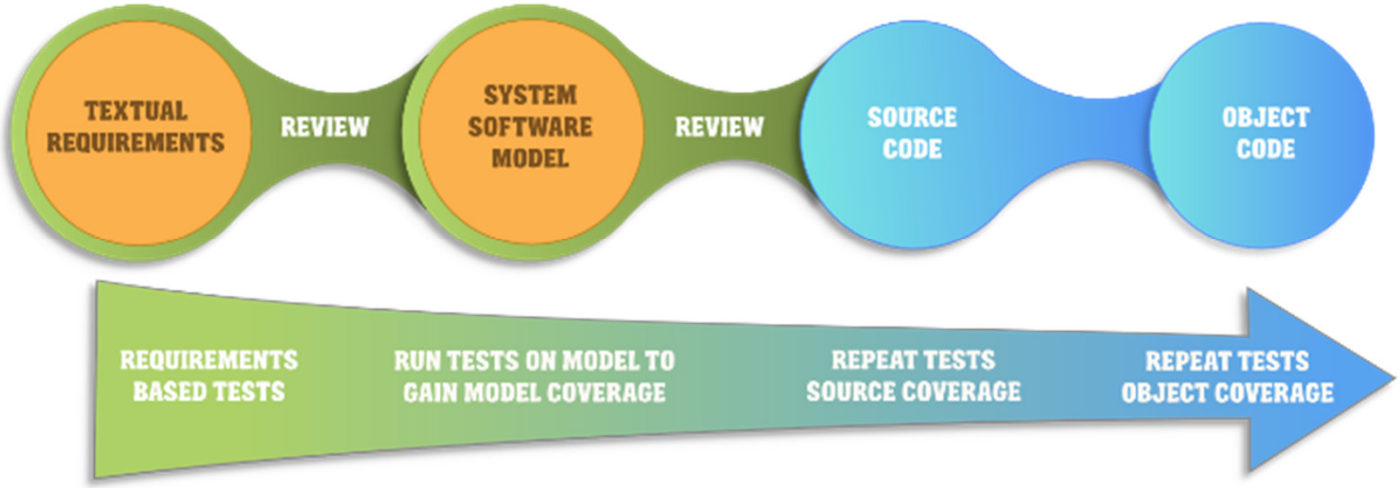
BAE SYSTEMS
INSPIRED WORK

Lifecycle Comparison – DAL A Software Development



BAE SYSTEMS
INSPIRED WORK

DO-178C MBD Workflow – Simple Approach



BAE SYSTEMS
INSPIRED WORK

What Is Next ?

- We have embraced model based design across the development lifecycle for high integrity software development. What can we further improve?

- Overall tool performance
- Utilisation of parallel computing resources
- Improved integration with other tools
- Level of subset support for the Simulink Code Inspector
- Reusable libraries
- Increased use of hardware in the loop systems

BAE SYSTEMS
INSPIRED WORK

Conclusions and Benefits

- Applicable to DO-178C and DO-254
- Cultural change
- Whole lifecycle view – an integrated workflow

- Cost
- Schedule
- Quality
- Customer satisfaction