SIEMENS

Electrical Systems Architecture, a critical asset in Aerospace and Defence systems development workflows

siemens-fcas.com

What might combat aircraft, defence and aerospace companies expect from an increased focus on electrical systems architecture?

- Creates future proofed electrical and electronic systems and sub-system
- Utilize tools for assessing and validating architectures early in design process
- Supports informed changes leading to deterministic outcomes
- Creates outputs such as prototype schematics automatically
- Facilitates earlier, less risky and costly design changes

Why is a focus on electrical systems architecture important?

Today's electrical systems have morphed from ones which a few bright engineers could design, manage, assess and review, into hugely complex integrated systems and systems of systems.

These involve many hundreds of thousands of electrical and electronic connections designed and delivered by multiple design teams.

Such immense complexity and interdependency of systems creates cross-domain dependencies that require an ability to trace the potential impacts of decisions downstream through to manufacturing.

Companies are challenged to find new ways to mitigate the risks involved in late stage changes to development programs; risks that can prove critical to program success, timescales and profitability.

Furthermore, initial design decisions may, at the outset, meet all mission requirements but, given the long lifecycles of programs, particularly in defence and commercial aerospace industries, future-proofing the electrical/electronic (EE) architectures has become an essential prerequisite.

Without this, later introduction of new systems may be compromised, resulting in costly delays and difficulties in implementing necessary changes.

Who would benefit from further investment in electrical systems architecture?

Combat aircraft and defence systems companies, automobile manufacturers and other complex machinery businesses face somewhat similar challenges designing and integrating complex multi-disciplinary systems which operate sophisticated EE systems.

The verification and optimisation of EE systems counters many of the siloed decision-making paradigms of the past, delivering significant benefits in particular for engineering domains downstream in design programs, all of which are consumers of the EE architecture proposal.

EE engineers can use required metrics to drive Key Performance Indicator (KPI) demands, these parameters enable design automation within downstream teams, integrated within their development, delivering invaluable collaboration for multi-disciplinary teams to succeed in their tasks.

How does increased emphasis on electrical systems architecture help?

For companies looking to address EE challenges, the methods, solutions and characteristics of Model Based Systems Engineering (MBSE) centred on electrical systems architecture provides the tools and methodologies required for assessing and delivering robust EE architectures early in the design process.

Electrical design decisions need to be made holistically, with a balance of consideration of all of the required attributes, physical and electrical. Architectural and design decisions can now be made with full understanding of the benefits and trade-offs whilst always focusing on right-first time delivery and future proof architecture.

With earlier informed choices and the inevitability of changes in design cycles, organisations can now design, manage and deliver to timescale and profit through the entire engineering lifecycle.

Capitalising on real-time feedback, using simulations and metrics, delivers earlier review and validation of systems. Digitalising the EE process, within the MBSE digital thread, enhances effective decision making and delivers more automated deterministic outcomes as all domains contribute to and access the data it holds, promoting and facilitating collaboration and integration of complex systems.

This also helps to optimise and automate outputs based on what is right for the whole platform, not just across one engineering domain by enabling informed choices across change cycles.

What benefits might companies see through improved focus on electrical systems architecture?

- Minimises the likelihood of failure of the project
- Delivers significant reduction in change orders during manufacture
- Reduces significantly late change costs
- Improves and future proofs design
- Improves sustainability targets through less weight and CO2 emissions
- Delivers shorter development cycles and faster delivery of product
- Delivers much less onerous EE certification
- Delivers significant ROI through fewer errors and faster manufacture