2019 Innovation User Conference

22 May 2019, Coventry
ANSYS Technology Update

Mike Slack
Aligning to the next generation use cases

- Autonomous machines / Vehicles
- Additive Manufacturing
- Electrification
- Discovery
- Smart Connected Products

Platform

Materials Information

- Fluids
- Structures
- Electromagnetics
- Semiconductor Power
- Systems, FuSa Embedded Software
- Optical
Our Implementation strategy is pervasive
Digital Through Life Engineering Services (DoTES)

PAS 280:2018
Through-life engineering services – Adding business value through a common framework – Guide

New service opportunities

AVOID
physical degradation of the major asset

CONVERT
experience to incremental value

RECOVER
by physically improving the major asset

CONTAIN
by preparing and operating support assets
Additive Printing - Adapting to the data
Changing the way we Design, Manufacture, Repair and Retrofit.
Reliability in Engineering

Mechanical Fatigue/crack propagation

Electromagnetic compatibility – cause, impact or tolerance
Materials intelligence throughout product engineering

- **Concept**
  - Aesthetic / Rendering
  - Basic material properties

- **Engineering Design**
  - Detailed engineering properties
  - Compliance data

- **Simulation**
  - CAE models
  - Testing and analysis

- **Manufacture**
  - Supplier specs

- **Customer**
  - In-service data

- **Prototyping**
  - Testing and analysis
SHERLOCK SOFTWARE (DFR Solutions)

- Electronics-focused Reliability Physics Analysis (RPA) tool
- Predicts product failure early in design process, quickly and accurately
- Mitigates thermal, mechanical, and manufacturing risks
Systems – They’re Everywhere ...

- Actuators
- Software
- Energy Storage
- Power Generation
- Sensors
- Disturbances
- Uncertainty
- Variability
- Extremes
- Failures
ANSYS Model-Based Engineering Solutions

Model-Based Systems Engineering

Model-Based Software Engineering

Behavorial Simulation

3D Physical Simulation

Multi-Domain System Simulation

System Architecture & System Safety Validation

Model-Based Safety & Cybersecurity Analysis

ROMs
ANSYS - Functional Safety

A model-based safety approach that ensures unrivalled level of consistency, traceability, and efficiency.
Ansys Motion – a new paradigm in Multibody Dynamics
Capturing the behaviour of the physical system

Ansys Motions’ advanced contact logic and tightly integrated rigid and flexible solvers give a capability that is unique.
Electric Machines and Drives: Virtual Design

**Electromagnetic Design & Optimization**
- Initial Design Magnetic / Thermal
- Geometry Input, Adv. Material Properties, EM Validation
- 3D Geometry and templates
- High Performance Computing
- Optimization and ROMs
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- Optimization and ROMs

**Power Electronics Cooling, Parasitics**

**Systems, Power Electronics, Controls**
- Power Electronics Cooling, Parasitics
- Power Electronics Cooling, Parasitics
- Power Electronics Cooling, Parasitics

**Multiphysics: Thermal (CFD), Mechanical (NVH, stress/strain)**
- Automatic Mapping: Magnetic Losses to Thermal
- Multiphysics: Thermal (CFD), Mechanical (NVH, stress/strain)

**Extraction:**
- R, L, C, G
- Multiphysics: Thermal (CFD), Mechanical (NVH, stress/strain)
ANSYS Twin Builder: Technical Capabilities
Battery Design – Overview ANSYS Solutions

Battery

Module

Pack

Cell

Embedded Software

System: using ECM/ROM

Volkswagen at the Pikes Peak mountain race in Colorado Springs/USA


https://tec.ieee.org/newsletter/september-2013/hardware-in-the-loop-hil-for-electric-drive-applications
Sensor Models (Design, review in system or create virtual world)

Camera

LiDAR

Radar
Physics-based simulation of light requires detailed simulation of:

- Light sources
- Propagation
- Reflection
- Camera optics
- Camera electronics
Digital Continuity between data, tools and learned outcomes...