Smart and Synchronized | Agenda

Discover The Industry Solution Experience to master your product architecture and boost product reliability

• What are we talking about?
• Trends & Challenges in Equipment design
• What are the pains in Equipment design?
• How “Smart & Synchronized” can help?
• Solution Experience content overview
What are we talking about?
Smart and Synchronized | What are we talking about?

Industrial Equipment Solution for Systems Engineering

- Main value for Original Equipment Manufacturer is to offer its customers **reliable** smart products **quicker** than competition.

- For **mechatronics products**, OEMs face some difficulties due to disconnected development processes between disciplines and applications working in silo.

**IF WE** are able to go beyond concurrent engineering, and apply a **smart and synchronized** development approach, we will be better able to deliver reliable industrial machinery on time and with less cost.
Our **Smart & Synchronized** solution, focused on the Product/Equipment design phases, proposes a unique environment for synchronizing all engineering disciplines: 2D schematics and 3D design as well as some capability to validate early the system behavior and the performance.
Smart and Synchronized | What are we talking about?
Focus on Mechatronic
Trends & challenges in Equipment Design
Smart and Synchronized | Trends & Challenges in Equipment Design

Offer diversity, performance and reliability… deal with complexity

Mechatronics products are everywhere….and more complicated to manage

Increasing demands of customized products according to stringent regulations

System elements do not behave as expected when they are integrated

How to master growing systems complexity, increase engineering productivity & accelerate innovation?

How to ensure traceability from needs identification to final product validation?

How to early simulate, optimize and validate the system behavior?
What are the pains in equipment design?
Smart and Synchronized | What are the pains in Equipment Design?

Multi-functional systems engineering not properly sustained

**ORGANIZATION... Work in Silos**
- Bad collaborations between engineering departments,
- Waste of time all along the development process.

**PROCESS... Disconnected**
- Sequential and disconnected processes
- No agility in the development
- Tests performed only on the physical prototype

**SOLUTION... Not integrated**
- System description often incomplete, inconsistent and not sustainable
- Document-centric approach
- Point solutions, various databases software difficult to maintain
How “Smart and Synchronized” solution experience can help?
A systematic approach to mechatronics with all engineering disciplines in a single environment

• Model-Based System Engineering (MBSE)
• Foundation for all designs based on RFLP model(*)

Simplify complex system design

• Evaluate new concepts & design performance
• Reduce number of physical prototypes
• Reduce development time & maintenance cost

Early simulation to Guarantee Performance and Reliability

(*) RFLP = Requirement Functional Logical Physical
Solution Experience content overview
Smart and Synchronized | Solution Experience content overview

A systematic approach to mechatronics with all engineering disciplines in a single environment.
A systematic approach to mechatronics with all engineering disciplines in a single environment

**Accelerate Smarter Components Development**
- Develop complex mechatronic products matching customer needs
- Synchronize all engineering disciplines - both schematics and 3D - in a unique environment

**Boost product reliability and performance**
- Validate holistic system behavior and performance
- Leverage amazing possibilities offered by automation to drive and maintain equipment performance throughout life cycle

**Master Product Architecture**
- Intuitive view of machine architecture / system
- Full traceability all the way, from needs identification to product validation
Multi-discipline System Engineering

**Challenges**
- Share and integrate models between disciplines
- Connect systems architecture and simulation models
- Study alternatives at the virtual equipment level
- Capitalize and re-use architecture across projects and programs

**Value Proposal**
- Allows to design complex systems better, quickly, more reliable, matching with customers needs, while reducing development costs
  - Define functional and logical system architecture from the system requirements
  - Multi-physical system modeling and simulation for concept evaluation
  - RFLP traceability enables to manage consistently the product architecture definition thru the development lifecycle
  - Track product changes

**Benefits**
- Manage efficiently collaboration between all engineering disciplines
- Accelerate technologies integration and product innovations
- More efficient design change & validation process
- Reduce product life cycle development
# Electrical Schematics and 3D Design

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<th>Challenges</th>
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<td>- Manage electrical system definition to harness manufacturing processes</td>
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<td>- Ensure multidiscipline integration &amp; concurrent engineering</td>
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<td>- Avoid wire over length and improve time to document wire and cable harness</td>
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<table>
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<th>Value Proposal</th>
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<td>A unique environment for Electrical design (2D schematics and 3D design) to address the complete process: from electrical design to manufacturing diagram design, harness design and wiring applications</td>
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| - Electrical schematics design in RFLP context |
| - Simultaneous 2D Schematics & 3D design |
| - Generate automatically 3D harness & Cable from schematics & space reservation |
| - Generate documentation for manufacturing |
| - Perform digital mock-up reviews and design quality checks |
| - Collaboration with other engineering disciplines |

<table>
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<td>- Reduce physical integration cost</td>
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<td>- Reduce wire over length cost</td>
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<td>- Reduce electrical system development time</td>
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<td>- Improve electrical systems quality</td>
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Fluid Schematics and 3D Design

### Value Proposal

- **A unique environment for Fluid design (2D schematics and 3D tubing/piping) to address the complete process:** from schematic design to tubing/piping design and manufacturing documentation
  - Complete and unified definition of Fluid systems for all industries integrating company knowhow and managing Standard and specifications regulations.
  - Complete multi-discipline integrated workflow from Systems Architecture up to 2D schematics (block diagrams, P&ID,..) with possible link to 3D design.
  - Full immersion into 3D design to ensure accurate routing of pipes and tubes, thanks to an immersive interface and intuitive 3D manipulators.
  - Placement of piping and tubing parts manually or automatically. Components are retrieved from the database based on route information, attributes, and compatibility rules.
  - Generation of several kind of drawings from the 3D design (spool, assembly, installation) and of reports.

### Challenges

- Integration between fluidic Systems design tools, and 3D product design tools
- Multi-discipline platform to support concurrent engineering
- Seamless integration and validation of fluid systems from requirements to physical design
- Strong focus for Companies on creating intelligent tubing/piping layouts (capturing all appropriate design information in order to validate designs more productively)

### Benefits

- Reduce physical integration cost
- Reduce fluid system development time
- Improve fluid systems quality
# Motion System Modeling and Simulation

## Value Proposal

- Model and simulate the dynamic behavior of complex multi-disciplines systems
  - Realistic 3D simulation for system validation and performance optimization
  - Study the kinematic of a mechanical system with a realistic logical behavior

## Challenges

- Validate technical solutions early in the design
- Make design review
- Improve the quality and the reliability of product

## Benefits

- Evaluate new concepts & design performance
- Reduce number of physical prototypes
- Reduce the development time & maintenance cost
- Improve the communication between stakeholders