SPDM in MBSE context – Collaboration across the Digital Thread

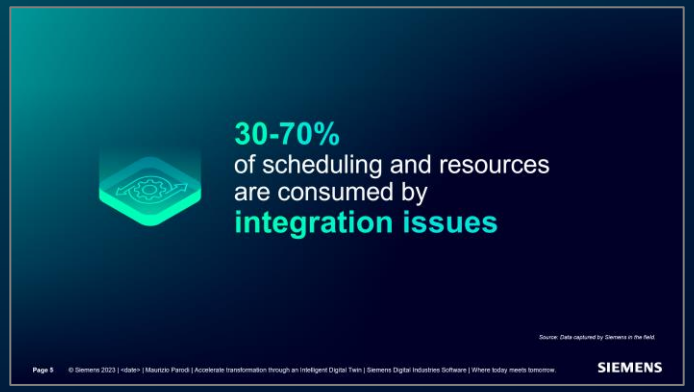
Wouter Dehandschutter
Technical Product Management Director

Seoul - July 6th, 2023

SIEMENS

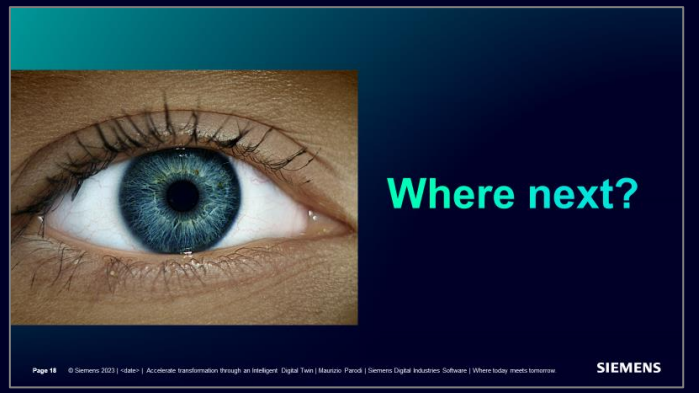
From the keynote…

1 What challenges Industry is facing?



2 What's already possible?

3 What will be possible?



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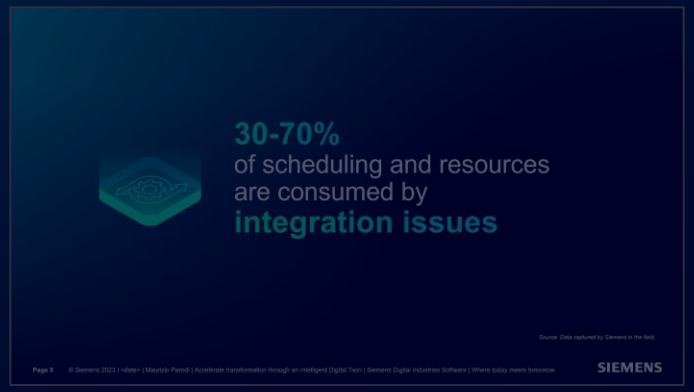

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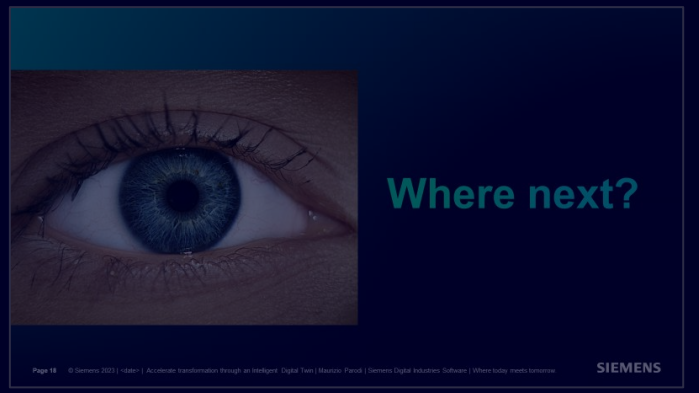

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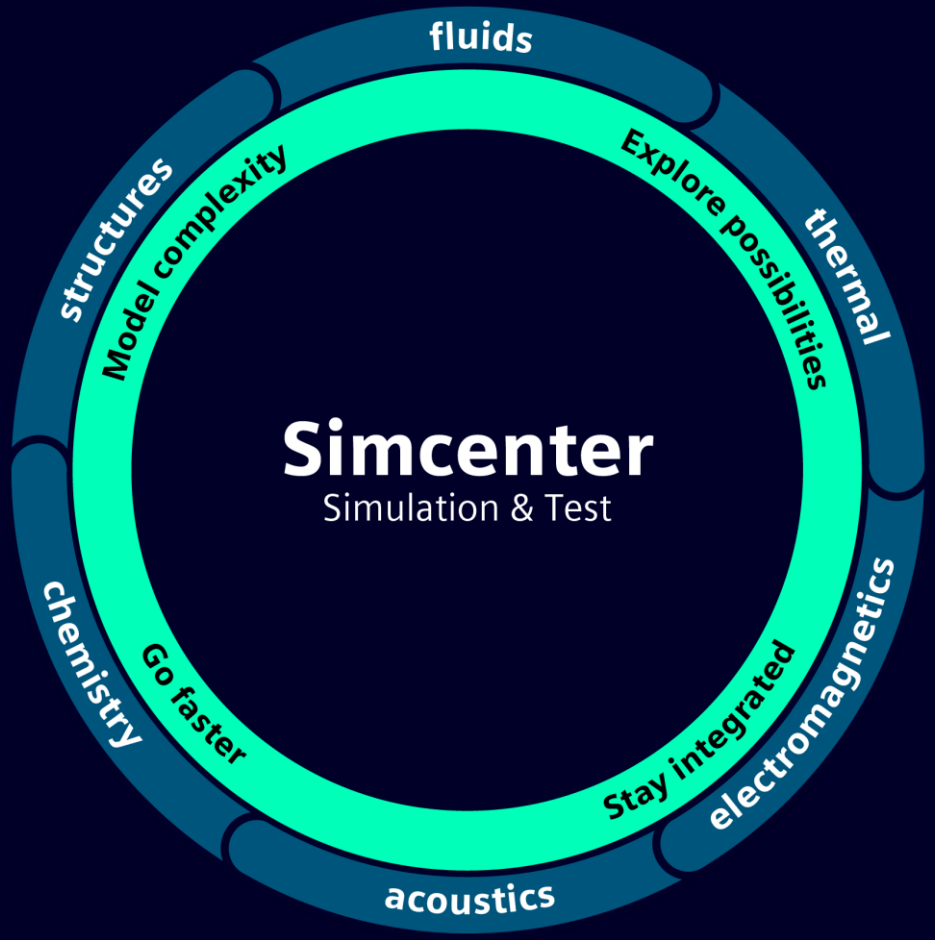
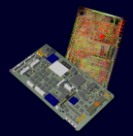
Simcenter, answering Industry's questions

How can I **fix issues before** building a physical **prototype** ?

How can I make my **design process faster** ?



How can I **make design decisions** with **higher confidence** ?



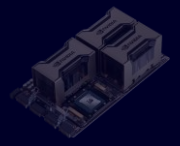
How do I **keep** my simulation and test **data and processes current** ?

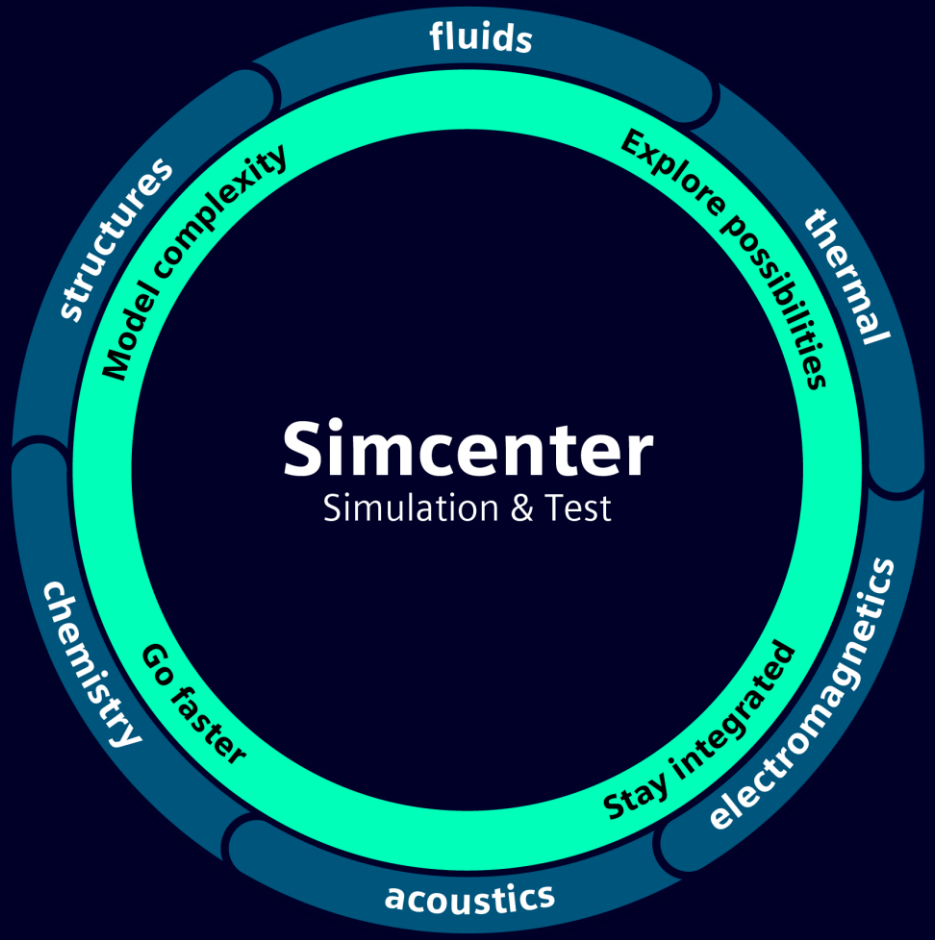
SIEMENS

SPDM in MBSE context
Supporting collaboration across the digital thread

How can I **fix issues before** building a physical **prototype** ?

How can I make my **design process faster** ?





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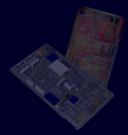

How do I **keep** my simulation and test **data and processes current** ?

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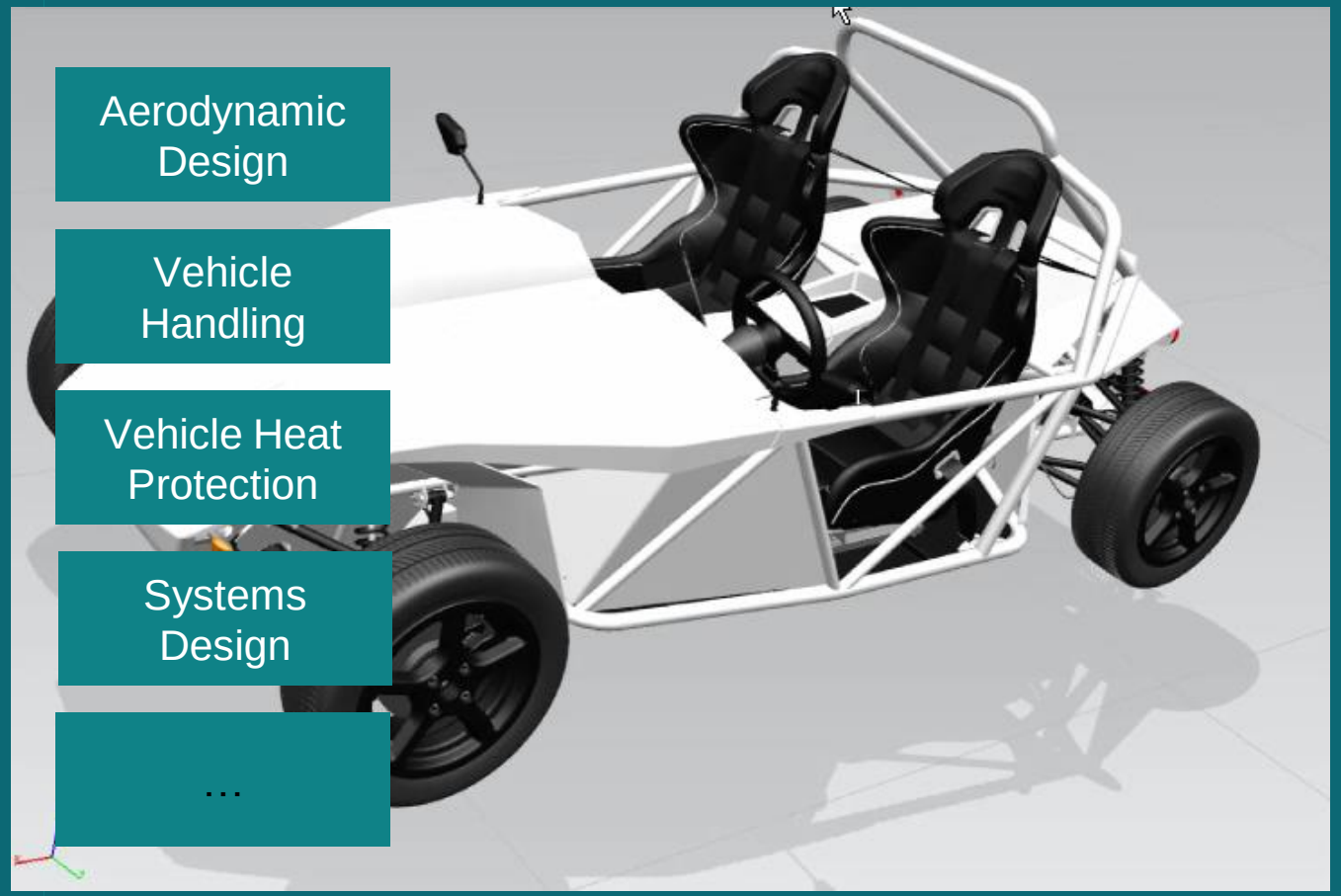
Can you afford not to...

1. Know which analysis result was created on the basis of which product revision, requirement, constraint
2. Optimize & automate your analysis processes getting access to up to date and verified input data
3. Install multi-domain / multi-department collaboration

Challenge

Balancing multiple performance attributes Designing across multiple domains and departments



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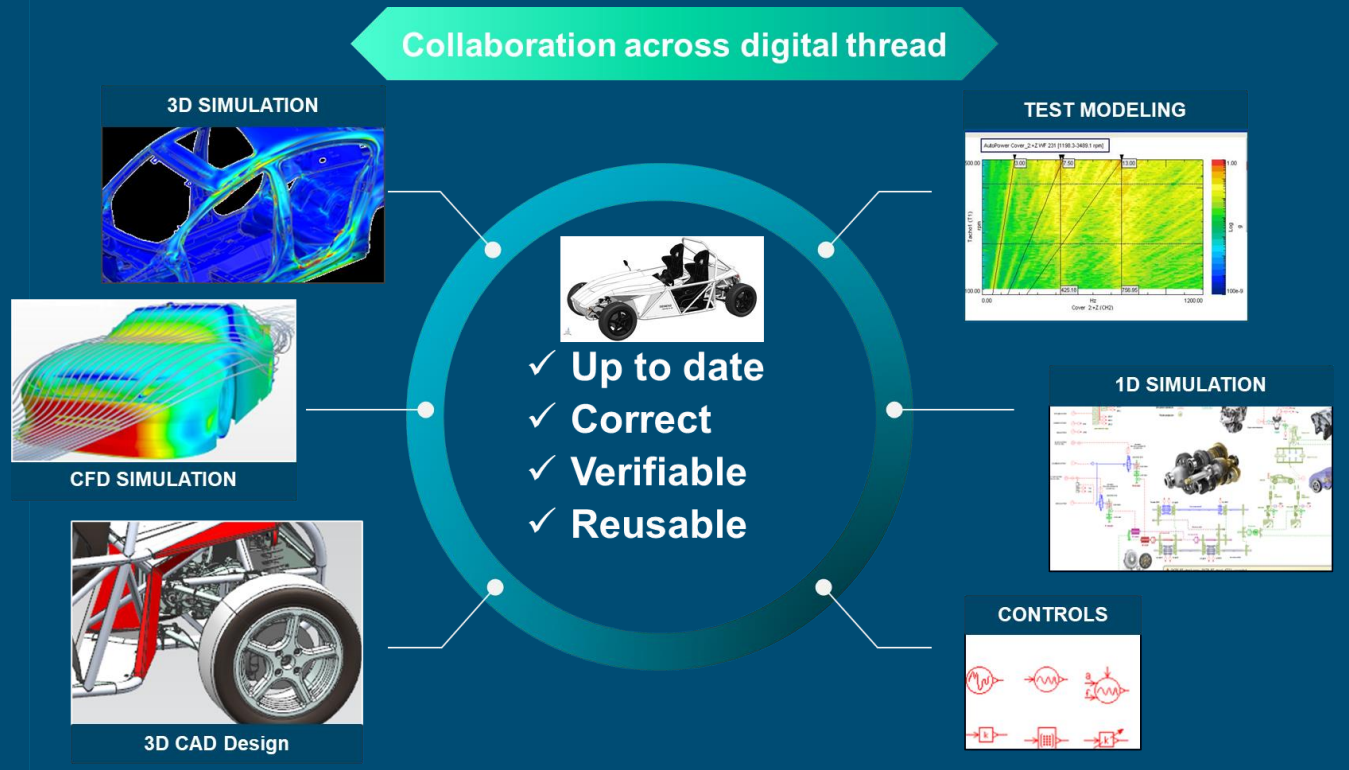
Needs

Ensure that the **right data** is used while performing the **right verification** returning the **required results**



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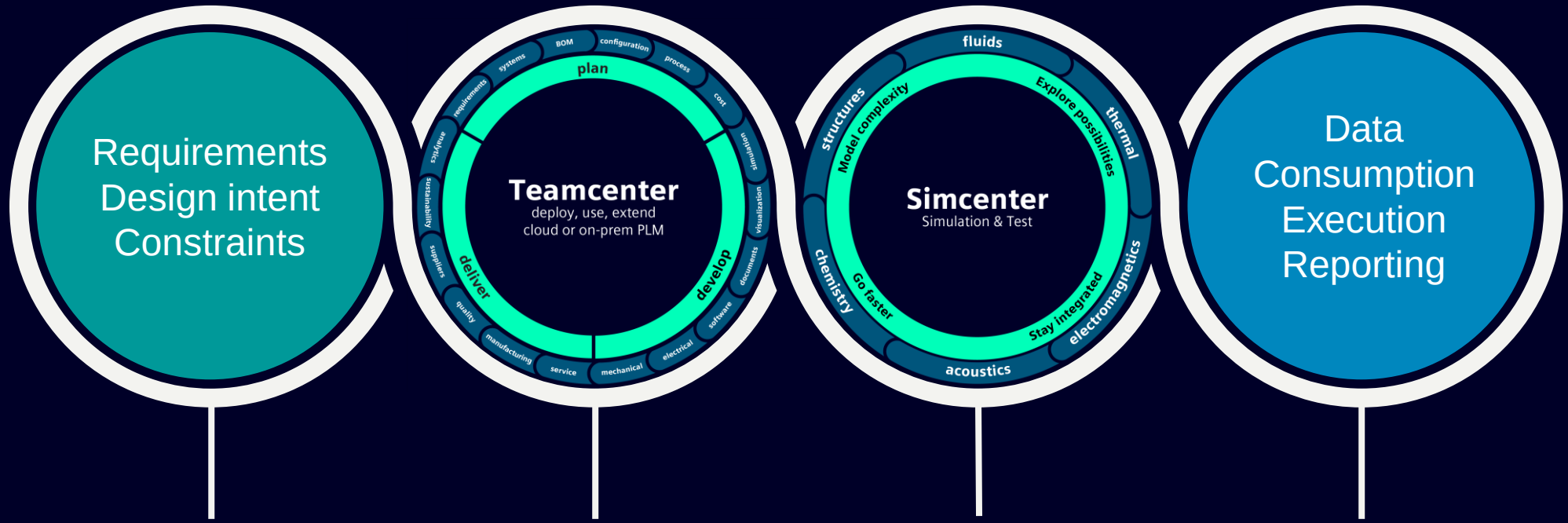
Simulation & Test collaboration across the digital thread



Enterprise level management and comparison of Test and Simulation data

Multi-domain and multi-department collaboration

Traceability from Requirements to analysis results, post processing and reporting

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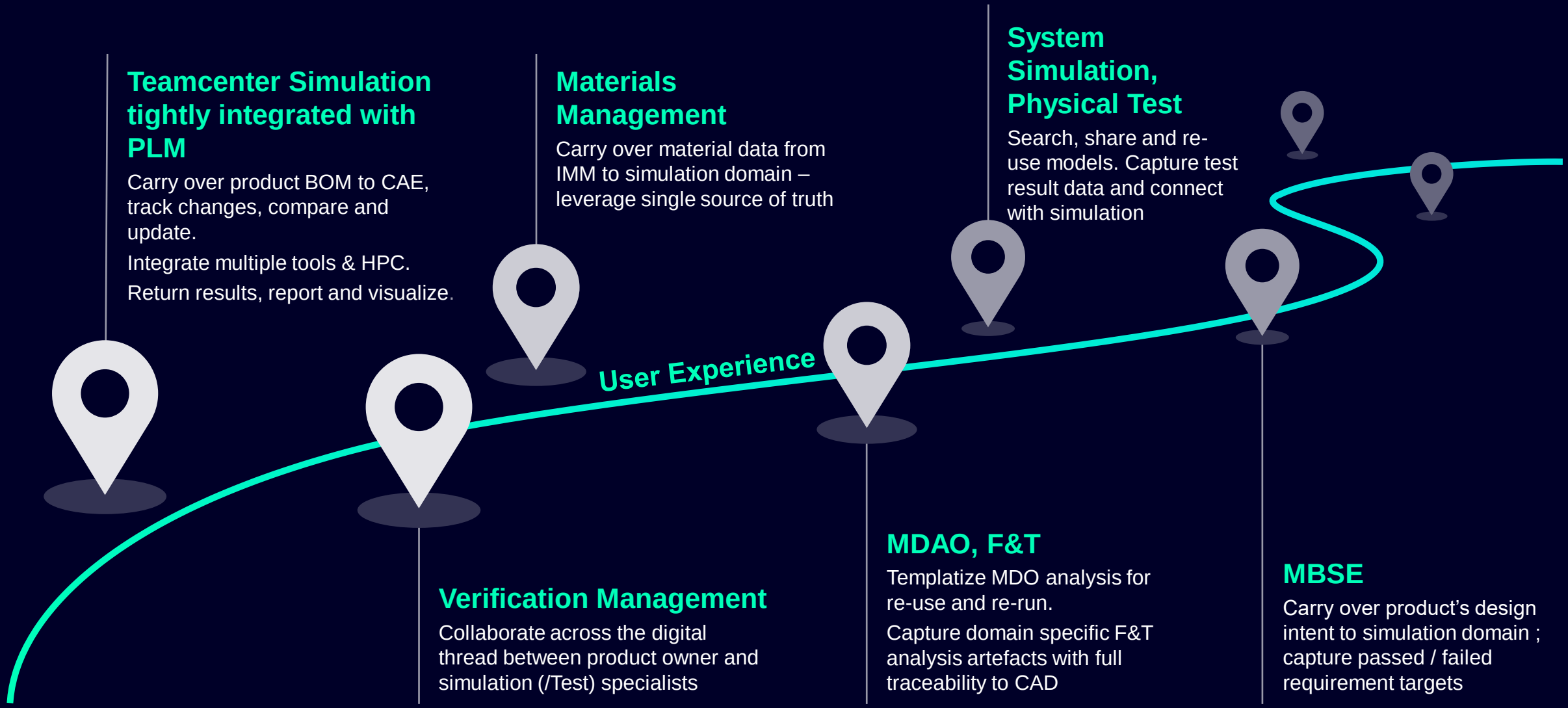
The road to Multi-Domain Verification and Validation



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Use Case
Closed loop MBSE

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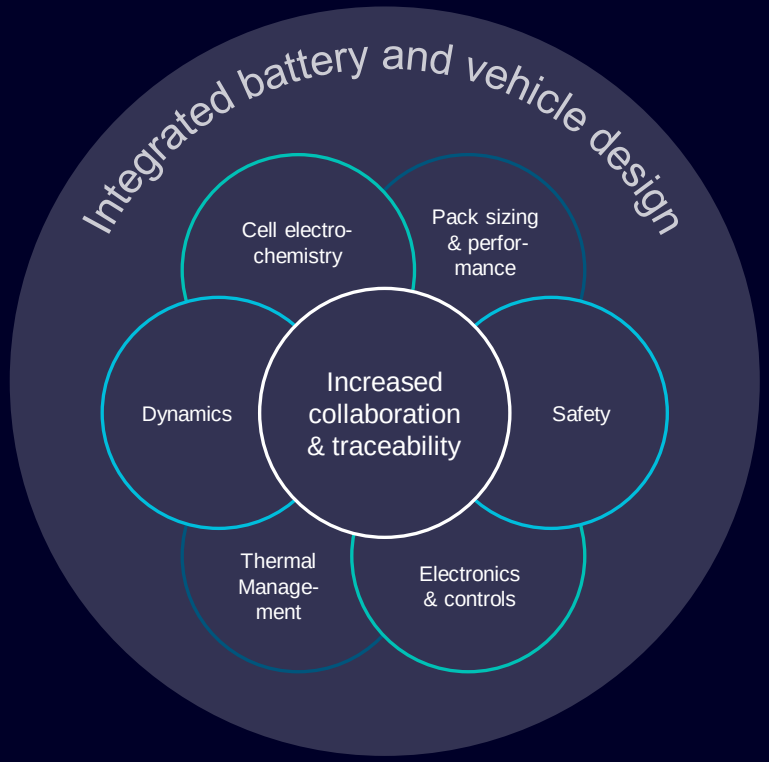
Optimizing innovation
Example battery cell design

Efficient, model-based development



Use simulation and model-based definitions to reduce uncertainty over the functionality of the product's numerous iterations to:

- Maximize your design's potential
- Validate cell chemistry, pack design, and performance
- Substantiate thermal management and structural integrity

By gathering crucial data, simulation and model-based product definitions become the source that drives your innovative designs.

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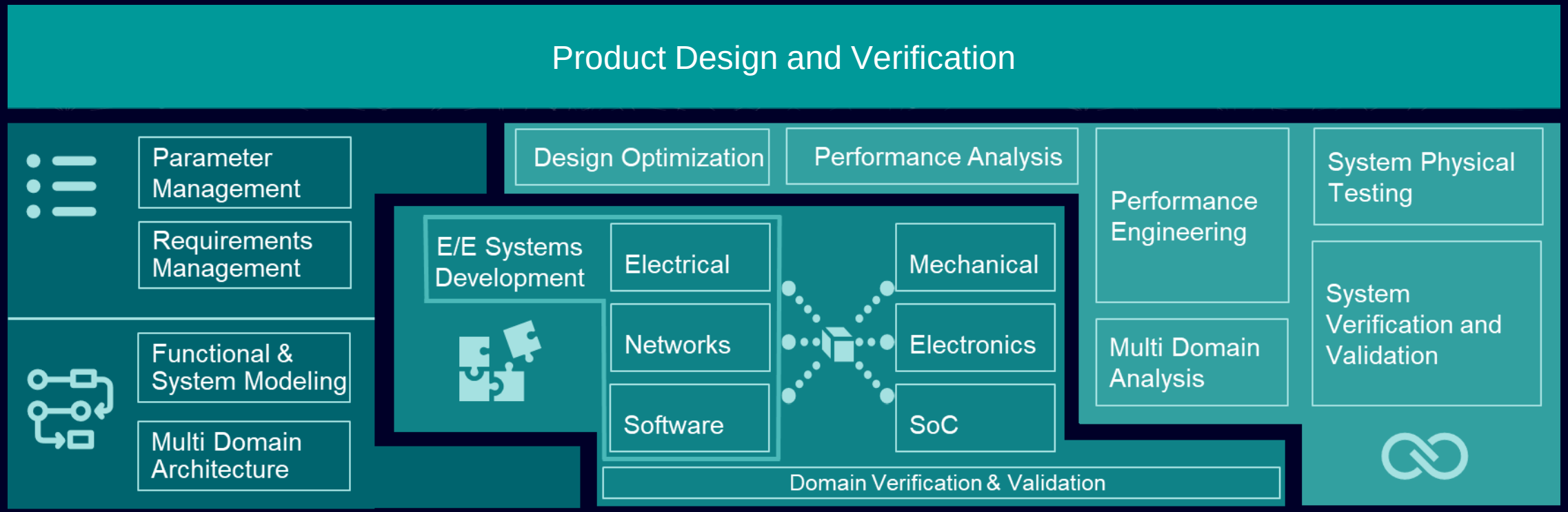
Connect simulation and testing to product design
Verify what has been initially defined



SIEMENS

Verification Management
Verify what has been initially defined

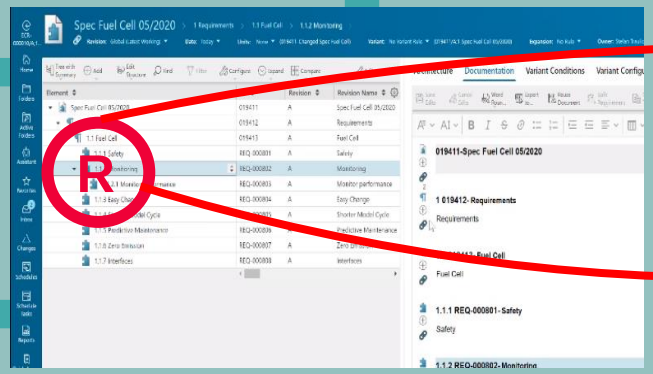
Requirements definition

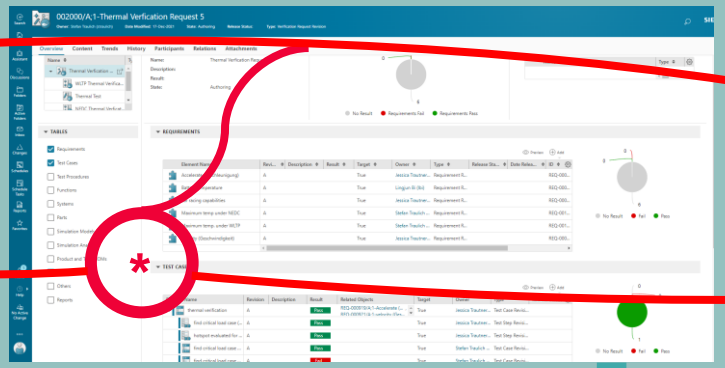
Verification Management

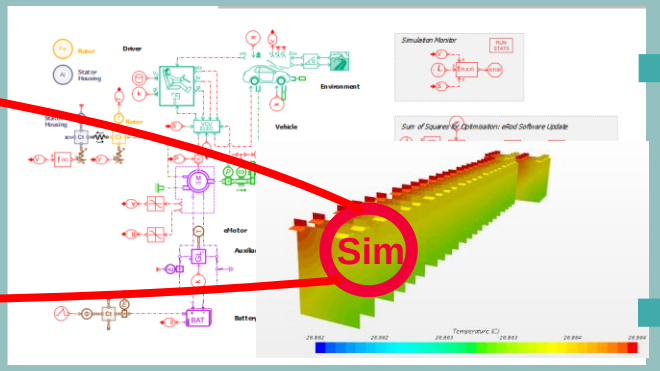
Domain Integration - SPDM

Multi-Domain Information Model

Bundle & publish to workflow







Verify

Downstream Engineering

Stakeholder requirements

Verification Request

1D/3D Simulation

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Demonstration
Multi-domain Parameter Lifecycle Management

Product Owner (Ben)

"…Reviewed & accepted battery design as it meets the temperature requirements"

Product Owner (Ben)

"…our EV vehicle needs to achieve the range requirements as well as security standards and battery life time requirements"

Feature Owner (Ed)
(core engineering)

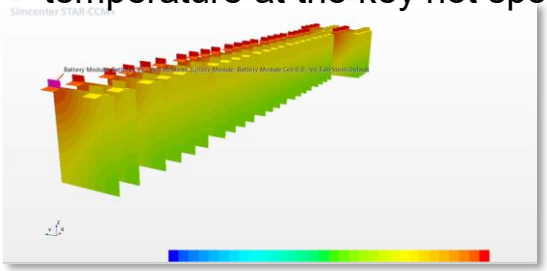
"…in order to meet the those requirements, we need to make sure the battery temperature does not exceed a maximum of 60 degC"

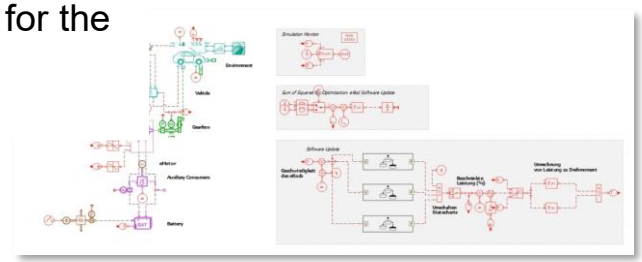
Simulation Engineer (Sam)
(system simulation)

"…performed system simulation for the WLTP driving cycle with battery temperature monitored…"

Simulation Engineer (Linda)
(CFD Simulation)

"…performed detailed analysis on the 3D battery model and monitored temperature at the key hot spots…"





Verification Request
Gathering Requirements and Parameters

Teamcenter - 002000/A;1-Therm

Not secure | thanos:3000/#/com.siemens.splm.clientfx.tcui.xrt.showObject?uid=yKAAAQ3XZxnRqD

002000/A;1-Thermal Verification Request

Owner: Stefan Traulich (straulich) Date Modified: 13-Jan-2022 State: Authoring Release Status: Type: Verification Request Revision

SIEMENS

Overview | Content | Trends | History | Participants | Relations | Attachments

SCOPE

Delete Add

Name
- Thermal Verification Requ...
  - WLTP Thermal Ver...
    - 1D Simulation WLTP

SUMMARY

Edit

Name: WLTP Thermal Verification Battery
Description:
Result:
State: Authoring

TEST RESULTS

PROGRAM EVENTS

Export To... Add

Name	Type	State	Planned	Foreca...
thermal ve...	Event		05-Jan-20...	

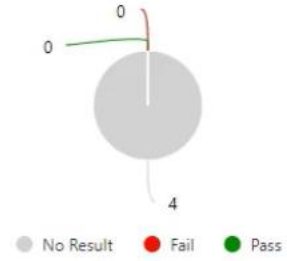
TABLES

- [x] Requirements
- [ ] Test Cases
- [ ] Functions
- [ ] Systems
- [ ] Parts
- [x] Simulation Models
- [x] Simulation Analyses
- [x] Parameters
- [ ] Others
- [ ] Reports

REQUIREMENTS

Preview Add

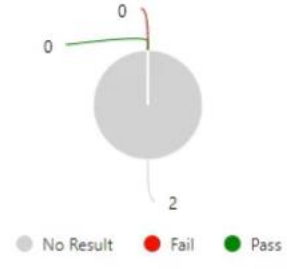
Element Name	Revi...	Description	Result	Target	Owner	Type	Release Sta...	Di
Accelerate (Beschleunigung)	A			True	Jessica Trautner...	Requirement R...		
Battery temperature	A			True	Lingjun Bi (lbi)	Requirement R...		
car racing capabilities	A			True	Jessica Trautner...	Requirement R...		
velocity (Geschwindigkeit)	A			True	Jessica Trautner...	Requirement R...		



SIMULATION MODELS

Preview Add

Element Name	Revi...	Description	Result	Target	Owner	Type	Release Sta...	Date Relea...	ID
eRod Battery CFD Model	A			True	Lingjun Bi (lbi)	CAE 3D Model ...			002015
eRod Software Update Model	A			True	Lingjun Bi (lbi)	CAE 1D Model ...			002057



Teamcenter - 003135/A;1-eRod | Teamcenter - Simulation Tool Pr

Not secure | thanos:3000/#/com.siemens.splm.clientfx.tcui.xrt.showObject?uid=yWJAAchYZxnRqD

003135/A;1-eRod Battery temp analysis 1D

CAE Status: Out-of-date | Owner: Lingjun Bi (lbi) | Date Modified: 09-Feb-2022 | Release Status: | Type: CAE 1D Analysis Revision

SIEMENS

Simulation Engineer (Sam)
(system simulation)

Home | Home | Assistant | Discussions | Folders | Active Folders | Inbox | Changes | Schedules | Schedule Tasks | Reports | Favorites | Alerts | Help | No Active Change

Simulation | Classification | Where Used | Attachments | History | Study | Files | Parameters | Relations

PROPERTIES

ID:	003135
Revision:	A
Name:	eRod Battery temp analysis 1D
Description:	
Type:	CAE 1D Analysis Revision
Release Status:	
Date Released:	
Effectivity:	
Owner:	Lingjun Bi (lbi)
Group ID:	Engineering
Last Modifying User:	Lingjun Bi (lbi)
Checked-Out:	
Checked-Out By:	

TRACEABILITY INFORMATION

CLASSIFICATION

PROJECTS

Owning Project:

Projects:

RELATED CAE 1D MODEL REVISION

Table | Selection Mode | Select All

Object	Type	Release Status	Date Released	Owner
003128/A;1-Battery tem...	CAE 1D Model Revision			Lingjun Bi (lbi)

PREVIEW

Open in Simulation Tool

Close

All | Favorites

- Extract and Write Parameters
- Simcenter Amesim - Execute An...
- Simcenter Flomaster - Execute A...
- Simcenter System Architect - Ex...

Simcenter Amesim - Execute Analysis

Information | Discuss | Open | Cut | Copy | Paste | New | Edit | Manage | Share | View

Simcenter Amesim - [C:\Users\b4zyvc\AppData\Local\Temp\tmprhgmlvub\eRod_Battery_Temp.ame *]

File Edit Sketch Configure Simulate Interfaces Tools Help

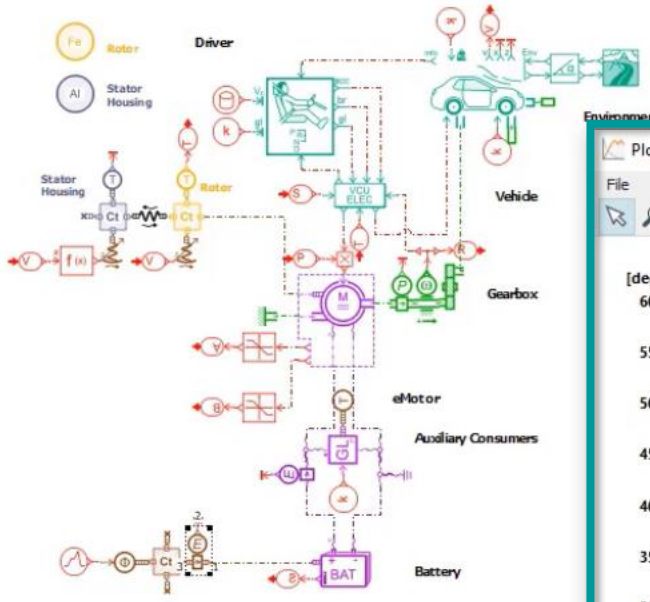
SIEMENS

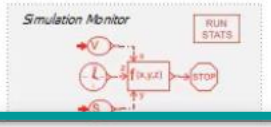
SKETCH | SUBMODEL | PARAMETER | SIMULATION

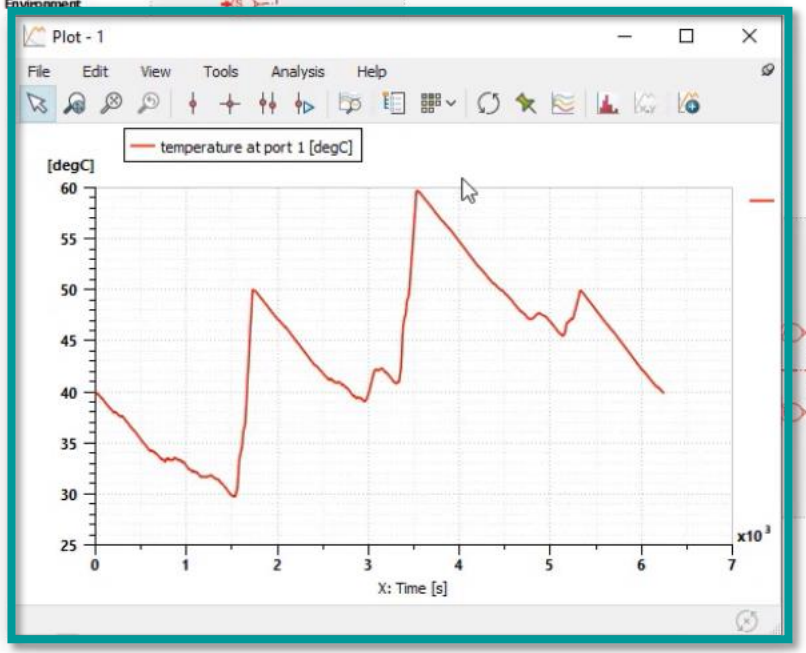
Update | App space | Plots | Animations | Dashboards | Scripts | Table Editor

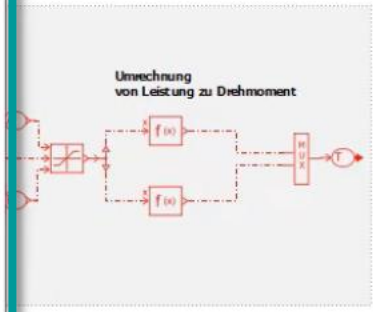
Run simulation | Run Parameters | Global parameters | Performance Analyzer | Study Manager | Temporal analysis

eRod_Battery_Temp.ame *









Parameters of sensor_thermal_energy_1 [THPOT0-1]

Title	Value	Unit	Tags	Name
positive thermal energy	0	J		Enpos
negative themal energy	0	J		Enneg
output computation	energy			comp
offset to be subtracted from energy	0	J		offsete
energy gain for signal output	-1	1/J		gaine

Parameters of sensor_thermal_energy_1 [THPOT0-1] | Watch parameters

Variables of sensor_thermal_energy_1 [THPOT0-1]

Title	Value	Unit	Time in s	Saved	Tags
heat flow rate at port 1	7.14318	W	6250	✓	
thermal energy sensor output signal	68619.7	null	6250	✓	
temperature at port 1	39.857	degC	6250	✓	
power	-7.14318	W	6250	✓	
positive power	0	W	6250	✓	
negative power	-7.14318	W	6250	✓	
battery thermal energy losses	-68619.7	J	6250	✓	
positive thermal energy	4.69237	J	6250	✓	
negative themal energy	-68624.4	J	6250	✓	

Variables of sensor_thermal_energy_1 [THPOT0-1] | Watch variables

Run monitor - eRod...

Simulation time: 6250 / 6250 s

100%

Post processing

Name	Title	Expression	Default Result Set	Value	Unit

Adding component is only possible in sketch mode

Results and KPIs from System Simulation are **automatically updated** in a traceable manner with relation to the model

Teamcenter - 003135/A;1-eRod | Teamcenter - Simulation Tool Pr

Not secure | thanos:3000/#/com.siemens.splm.clientfx.tcui.xrt.showObject?uid=yWJAAchYZxnRqD

003135/A;1-eRod Battery temp analysis 1D

CAE Status: Out-of-date | Owner: Lingjun Bi (lbi) | Date Modified: 09-Feb-2022 | Release Status: | Type: CAE 1D Analysis Revision

SIEMENS

Simulation | Classification | Where Used | Attachments | History | Study | Files | Parameters | Relations

PROPERTIES

ID:	003135
Revision:	A
Name:	eRod Battery temp analysis 1D
Description:	
Type:	CAE 1D Analysis Revision
Release Status:	
Date Released:	
Effectivity:	
Owner:	Lingjun Bi (lbi)
Group ID:	Engineering
Last Modifying User:	Lingjun Bi (lbi)
Checked-Out:	
Checked-Out By:	

TRACEABILITY INFORMATION

CLASSIFICATION

PROJECTS

Owning Project:

Projects:

RELATED CAE 1D MODEL REVISION

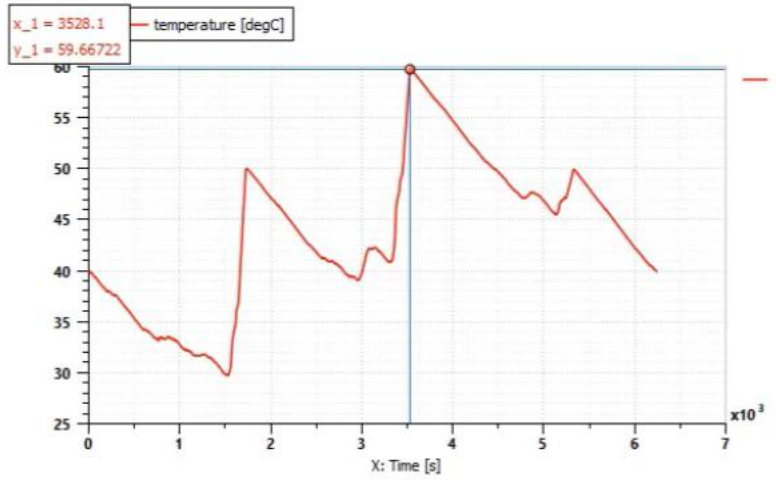
Table | Selection Mode | Select All | Export To...

Object	Type	Release Status	Date Released	Owner
003128/A;1-Battery tem...	CAE 1D Model Revision			Lingjun Bi (lbi)

PREVIEW

eRod_Battery_Temperature_Hotspot.png | Image | 09-Feb-2022 | 22 Kb

Show Markups | Markup Panel | Highlight Markup | Freehand Markup | Markup Shapes | Stamp Panel | Print Markups | Checkout | Cancel Checkout | Checkin | Rotate Countercloc... | Rotate Clockwise | Full Screen



Home | Assistant | Discussions | Folders | Active Folders | Inbox | Changes | Schedules | Schedule Tasks | Reports | Favorites | Alerts | Help | No Active Change

Information | Discuss | Open | Cut | Copy | Paste | New | Edit | Manage | Share | View

Verification Request **is updated** after the system simulation results are available

Teamcenter - 002000/A;1-Therm

Not secure | thanos:3000/#/com.siemens.splm.clientfx.tcui.xrt.showObject?uid=yKAAAQ3XZxnRqD

002000/A;1-Thermal Verification Request

Owner: Stefan Traulich (straulich) Date Modified: 13-Jan-2022 State: Authoring Release Status: Type: Verification Request Revision

SIEMENS

Overview | Content | Trends | History | Participants | Relations | Attachments

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- [ ] Functions
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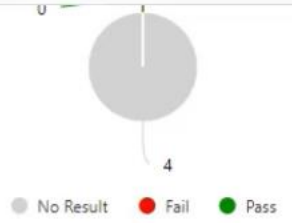
- [x] Parameters
- [ ] Others
- [ ] Reports

Element Name	Revi...	Description	Result	Target	Owner	Type	Release Sta...	D
Accelerate (Beschleunigung)	A			True	Jessica Trautner...	Requirement R...		
Battery temperature	A			True	Lingjun Bi (lbi)	Requirement R...		
car racing capabilities	A			True	Jessica Trautner...	Requirement R...		
velocity (Geschwindigkeit)	A			True	Jessica Trautner...	Requirement R...		



SIMULATION MODELS

Preview Add

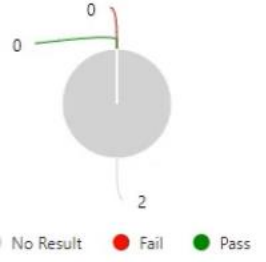
Element Name	Revi...	Description	Result	Target	Owner	Type	Release Sta...	Date Relea...	ID
eRod Battery CFD Model	A			True	Lingjun Bi (lbi)	CAE 3D Model ...			002015
eRod Software Update Model	A			True	Lingjun Bi (lbi)	CAE 1D Model ...			002057

SIMULATION ANALYSES

Preview Remove From...

Element Name	Revi...	Description	Result	Target	Owner	Type	Release Sta...	Date R
eRod Battery Temperature Analysis	A			True	Lingjun Bi (lbi)	CAE 3D Analysi...		
eRod Software Update Analysis	A			True	Lingjun Bi (lbi)	CAE 1D Analysi...		

Fail
Pass



PARAMETERS

After System Simulation validation, a **detailed CFD analysis** is performed

Simulation Engineer (Linda)
(CFD Simulation)

002153/A;1-eRod Battery Temperature Analysis

CAE Status: N/A | Owner: Lingjun Bi (lbi) | Date Modified: 13-Jan-2022 | Release Status: | Type: CAE 3D A

SIEMENS

No previous location | Home | Assistant | Discussions | Folders | Active Folders | Inbox | Changes | Schedules | Schedule Tasks | Reports | Favorites | Quick Access | Settings | Alerts | Help | No Active Change

Overview | CAE Engineering Properties | Simulation | KPI | Classification | Where Used

PROPERTIES

ID:	002153
Revision:	A
Name:	eRod Battery Temperature Analysis
Description:	
Type:	CAE 3D Analysis Revision
Analysis Type:	
Solution Step:	
Solution Type:	
Solver Name:	
Release Status:	
Date Released:	
Effectivity:	
Owner:	Lingjun Bi (lbi)
Group ID:	Engineering
Disciplines:	
Last Modifying User:	Lingjun Bi (lbi)
Checked-Out:	
Checked-Out By:	

CLASSIFICATION

PROJECTS

Owning Project:

Projects:

PREVIEW

ACTIONS

Open in Simulation Tool | Close

- Simcenter 3D - Nastran
- Simcenter 3D - Nastran HPC
- Simcenter 3D - Thermal/Flow
- Simcenter 3D Results Viewer
- Simcenter 3D Results Viewer ...
- Simcenter 3D Results Viewer ...
- Simcenter FLOEFD Viewer
- Simcenter Nastran
- Simcenter Nastran Staging Dir
- Simcenter Nastran URL
- Simcenter STAR-CCM+
- Simcenter STAR-CCM+ HPC
- Simcenter STAR-CCM+ Viewer

Information | Discuss | Open | Cut | Copy | Paste | New | Edit | Manage | Share | View

Detailed CFD analysis is performed to validate temperature at hot spots

FullVehicle_BAT_30cell_WLTC - Simcenter STAR-CCM+

File Edit Mesh Solution Tools Window Help

Servers | FullVehicle_BAT_30cell_WLTC

Simulation | Scene/Plot

- Battery Module: Battery Module Cell 0,0: -Ve Tab Stem.Default
- Battery Module: Battery Module Cell 0,1: -Ve Tab Stem.-Ve Tab Stem Bott
- Battery Module: Battery Module Cell 0,1: -Ve Tab Stem.-Ve Tab Stem Bott
- Battery Module: Battery Module Cell 0,1: -Ve Tab Stem.Default
- Battery Module: Battery Module Cell 0,2: -Ve Tab Stem.-Ve Tab Stem Bott
- Battery Module: Battery Module Cell 0,2: -Ve Tab Stem.-Ve Tab Stem Bott
- Battery Module: Battery Module Cell 0,2: -Ve Tab Stem.Default
- Battery Module: Battery Module Cell 0,3: -Ve Tab Stem.-Ve Tab Stem Bott
- Battery Module: Battery Module Cell 0,3: -Ve Tab Stem.-Ve Tab Stem Bott
- Battery Module: Battery Module Cell 0,3: -Ve Tab Stem.Default
- Battery Module: Battery Module Cell 0,4: -Ve Tab Stem.-Ve Tab Stem Bott
- Battery Module: Battery Module Cell 0,4: -Ve Tab Stem.-Ve Tab Stem Bott
- Battery Module: Battery Module Cell 0,4: -Ve Tab Stem.Default
- Battery Module: Battery Module Cell 0,5: -Ve Tab Stem.-Ve Tab Stem Bott
- Battery Module: Battery Module Cell 0,5: -Ve Tab Stem.-Ve Tab Stem Bott
- Battery Module: Battery Module Cell 0,5: -Ve Tab Stem.Default
- Battery Module: Battery Module Cell 0,6: -Ve Tab Stem.-Ve Tab Stem Bott
- Battery Module: Battery Module Cell 0,6: -Ve Tab Stem.-Ve Tab Stem Bott
- Battery Module: Battery Module Cell 0,6: -Ve Tab Stem.Default
- Battery Module: Battery Module Cell 0,7: -Ve Tab Stem.-Ve Tab Stem Bott
- Battery Module: Battery Module Cell 0,7: -Ve Tab Stem.-Ve Tab Stem Bott
- Battery Module: Battery Module Cell 0,7: -Ve Tab Stem.Default

Color Bar - Properties

Properties

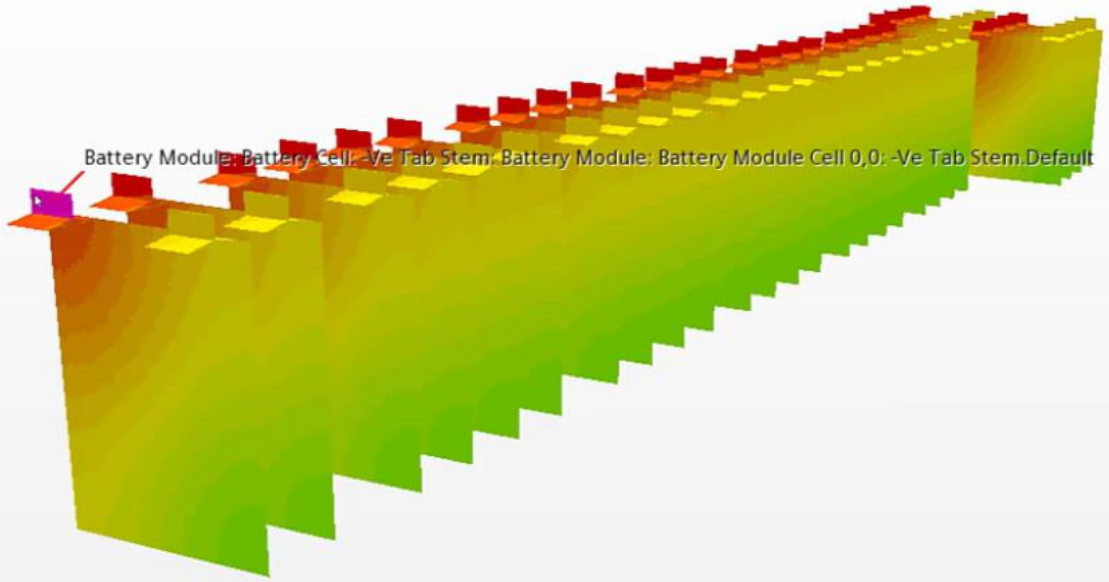
Color Map	blue-red
Levels	32
Width	0.6
Font	*Lucida Sans Italic*
Background	☐
Background Color	☐ White
Shadow	☑
Reverse	☐
Text Position	Succeeding
Height	0.044
Title Height	0.0275
Label Height	0.024
Orientation	Horizontal
Position	[0.309781790820..., 0.002086553323...]

Color Bar

The Color Bar

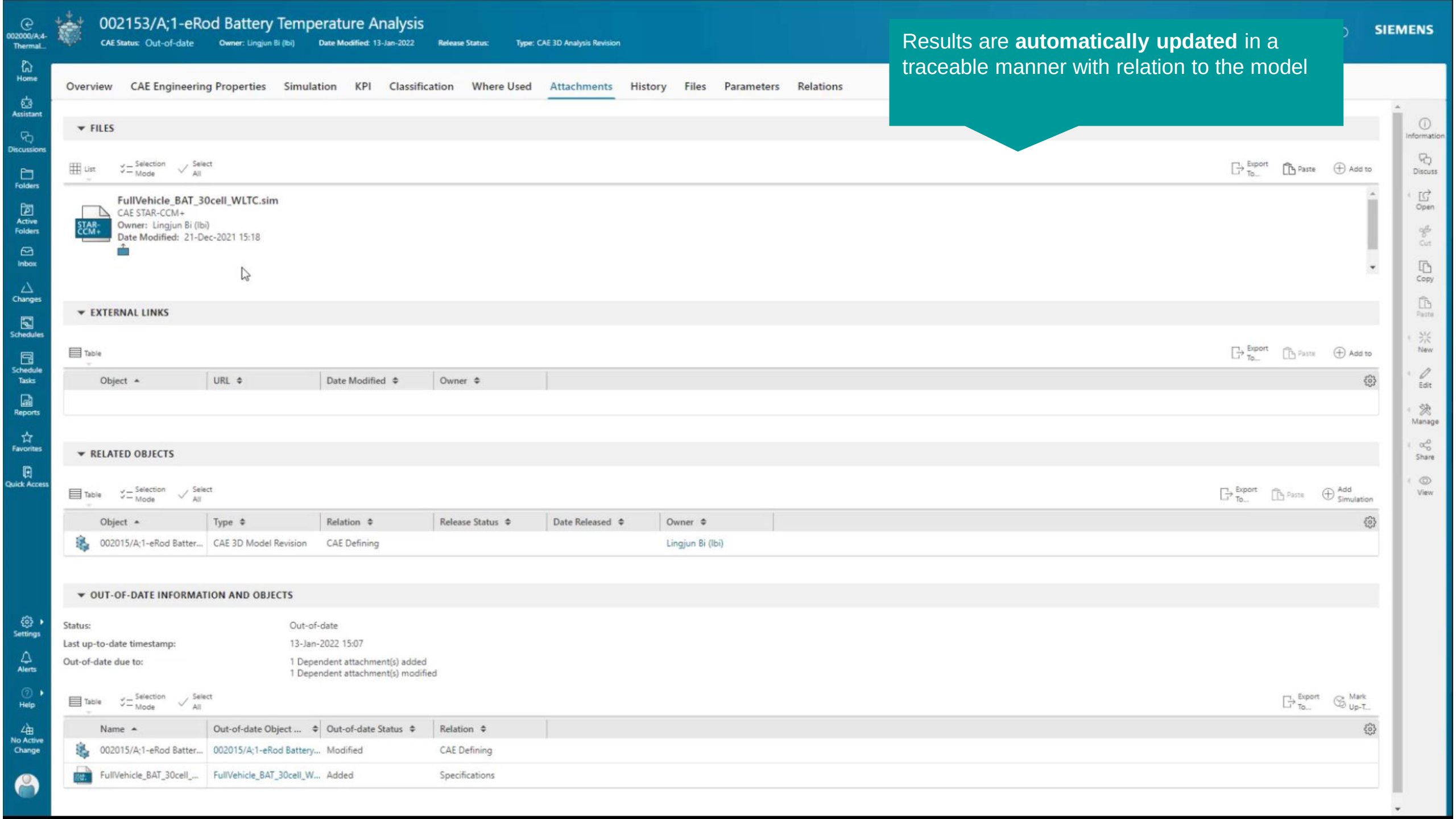
Scalar Scene 1 | Scalar Scene 2

Simcenter STAR-CCM+



Output - FullVehicle_BAT_30cell_WLTC

```
C:\Users\b4zyvc\AppData\Local\CD-adapco\STAR-CCM+ 17.02.007\var\journal\star3559799435058408870.java
Loading/configuring connectivity (old|new partitions: 4|4)
  Battery Module: Battery Cell: Stack (index 0): 3837841 cells, 25870919 faces, 24784702 verts.
  Battery Module: Battery Cell: +Ve Tab Root (index 1): 1812686 cells, 11379499 faces, 11165528 verts.
  Battery Module: Battery Cell: +Ve Tab Stem (index 2): 733891 cells, 4679240 faces, 4291620 verts.
  Battery Module: Battery Cell: -Ve Tab Root (index 3): 1808159 cells, 11335998 faces, 11158850 verts.
  Battery Module: Battery Cell: -Ve Tab Stem (index 4): 497827 cells, 2977256 faces, 2825804 verts.
Configuring finished
Reading material property database "C:\Program Files\Siemens\17.02.007\STAR-CCM+17.02.007\star\data\props.mdb"...
Zero-area face(s); area adjusted for 38 faces in Battery Module: Battery Cell: +Ve Tab Root
Zero-area face(s); area adjusted for 90 faces in Battery Module: Battery Cell: -Ve Tab Root
```


002153/A;1-eRod Battery Temperature Analysis
CAE Status: Out-of-date
Owner: Lingjun Bi (lbi)
Date Modified: 13-Jan-2022
Release Status:
Type: CAE 3D Analysis Revision
SIEMENS
Results are automatically updated in a traceable manner with relation to the model
Overview
CAE Engineering Properties
Simulation
KPI
Classification
Where Used
Attachments
History
Files
Parameters
Relations
FILES
FullVehicle_BAT_30cell_WLTC.sim
CAE STAR-CCM+
Owner: Lingjun Bi (lbi)
Date Modified: 21-Dec-2021 15:18
EXTERNAL LINKS
Object
URL
Date Modified
Owner
RELATED OBJECTS
Object
Type
Relation
Release Status
Date Released
Owner
002015/A;1-eRod Batter...
CAE 3D Model Revision
CAE Defining
Lingjun Bi (lbi)
OUT-OF-DATE INFORMATION AND OBJECTS
Status: Out-of-date
Last up-to-date timestamp: 13-Jan-2022 15:07
Out-of-date due to: 1 Dependent attachment(s) added
1 Dependent attachment(s) modified
Name
Out-of-date Object ...
Out-of-date Status
Relation
002015/A;1-eRod Batter...
002015/A;1-eRod Battery...
Modified
CAE Defining
FullVehicle_BAT_30cell_...
FullVehicle_BAT_30cell_W...
Added
Specifications

Verification Request **automatically updates** Validated Detailed (CFD) calculation confirms the system simulation results

002000/A;4-Thermal Verification Request

Owner: Stefan Traulich (straulich) | Date Modified: 10-Mar-2022 | State: Authoring | Release Status: | Type: Verification Request Revision

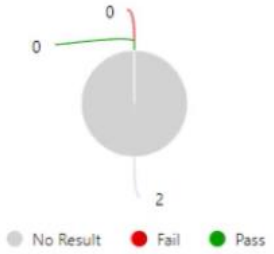
SIEMENS

Overview | Content | Trends | History | Participants | Relations | Attachments

SIMULATION MODELS

Preview | Add

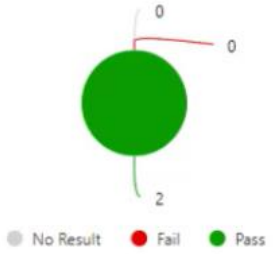
Element Name	Revi...	Description	Result	Target	Owner	Type	Release Sta...	Date Relea...	ID
eRod Battery CFD Model	A			True	Lingjun Bi (lbi)	CAE 3D Model ...			002015
eRod Software Update Model	A			True	Lingjun Bi (lbi)	CAE 1D Model ...			002057



SIMULATION ANALYSES

Preview | Add

Element Name	Revi...	Description	Result	Target	Owner	Type	Release Sta...	Date Relea...
eRod Battery Temperature Analysis	A		Pass	True	Lingjun Bi (lbi)	CAE 3D Analysi...		
eRod Software Update Analysis	A		Pass	True	Lingjun Bi (lbi)	CAE 1D Analysi...		



PARAMETERS

Selection Mode | Select All | Hide Unused | Excel Report | Start Edit | Manage Values and Units | Add

Name	Rev...	Releas...	Description	Source	Usage	Result	Units	Measu...	Go...
acceleration (Time from...	A		Time from 0 to ...	Accelerate (Beschleunigung)	Output	Pass	sec	4	3.9
Max. Battery Temperatu...	A		Hotspot of Batt...	Battery temperature	Output	Pass	deg	46	60
Max. Speed	A		max. speed of ...	velocity (Geschwindigkeit)	Output		kph	1	[1*0]

Home | Assistant | Discussions | Folders | Active Folders | Inbox | Changes | Schedules | Schedule Tasks | Reports | Favorites | Quick Access | Settings | Alerts | Help | No Active Change

Information | Discuss | Open | Cut | Copy | Paste | New | Edit | Manage | Share | View

002000/A;4-Thermal Verification Request

Owner: Stefan Traulich (straulich) | Date Modified: 21-Apr-2022 | State: Authoring | Release Status: | Type: Verification Request Revision

Verification Request
All requirements are met

Product Owner (Ben)

Overview | Content | Trends | History | Participants | Relations | Attachments

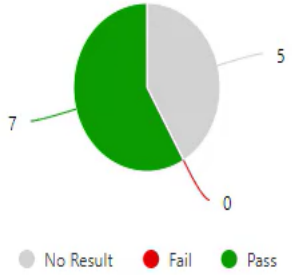
SCOPE

Name	Type
Thermal Verification Requ...	Verification Request R
WLTP Thermal Verifica...	Simulation Request Re
1D Simulation WLTP	Run Revision
3D Simulation WLTP	Run Revision
NEDC Thermal Verficat...	

SUMMARY

Name: Thermal Verification Request
Description:
Result: Pass
State: Authoring

TEST RESULTS



PROGRAM EVENTS

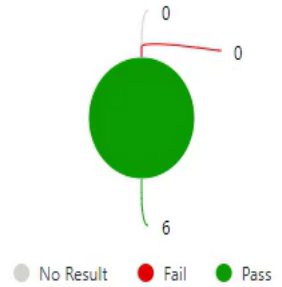
Name	Type	State	Planned
thermal ve...	Event		05-Jan-2022 00:00

TABLES

- [x] Requirements
- [ ] Test Cases
- [ ] Test Procedures
- [ ] Functions
- [ ] Systems
- [ ] Parts
- [ ] Simulation Models
- [ ] Simulation Analyses
- [ ] Product and Test EBOMs
- [x] Parameters
- [ ] Others
- [ ] Reports

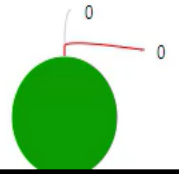
REQUIREMENTS

Element Name	Revi...	Description	Result	Target	Owner	Type	Release Sta...
Accelerate (Beschleunigung)	A		Pass	True	Jessica Trautner (jtrautner)	Requirement R...	
Battery temperature	A		Pass	True	Lingjun Bi (lbi)	Requirement R...	
car racing capabilities	A		Pass	True	Jessica Trautner (jtrautner)	Requirement R...	
Maximum battery temp under NEDC	A		Pass	True	Stefan Traulich (straulich)	Requirement R...	
Maximum battery temp under WLTP	A		Pass	True	Stefan Traulich (straulich)	Requirement R...	
velocity (Geschwindigkeit)	A		Pass	True	Jessica Trautner (jtrautner)	Requirement R...	



PARAMETERS

Name	Rev...	Releas...	Description	Source	Usage	Result	Units	Measu...	Goal	Min	Max
acceleration (Time from...	A		Time from 0 to ...	Accelerate ...	Output	Pass	sec	4	3.9	0	5
Max. Battery Temperatu...	A		Hotspot of Batt...	Battery te...	Output	Pass	deg	46	60	10	80



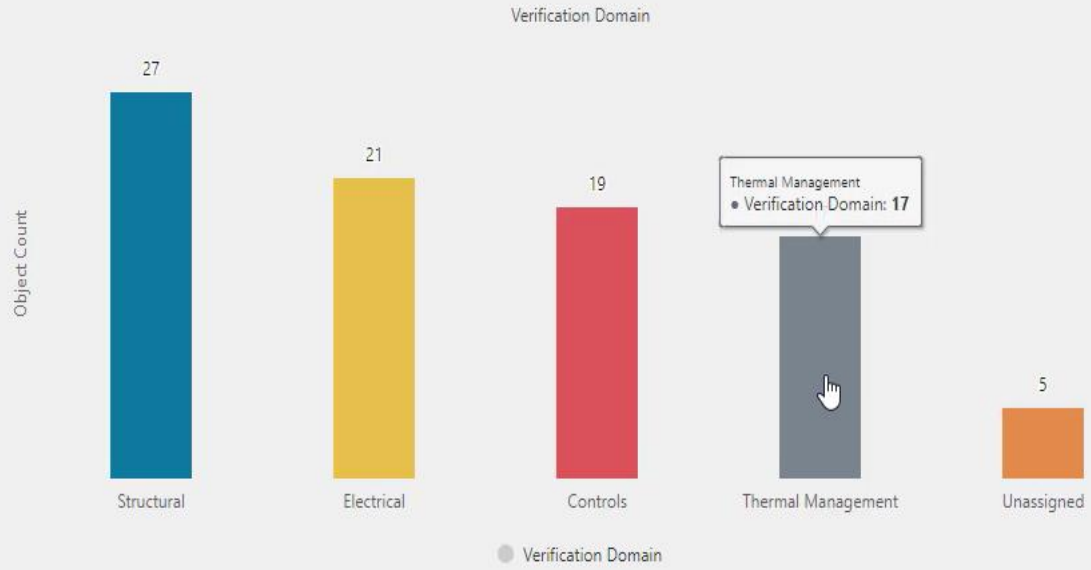
Verification Status

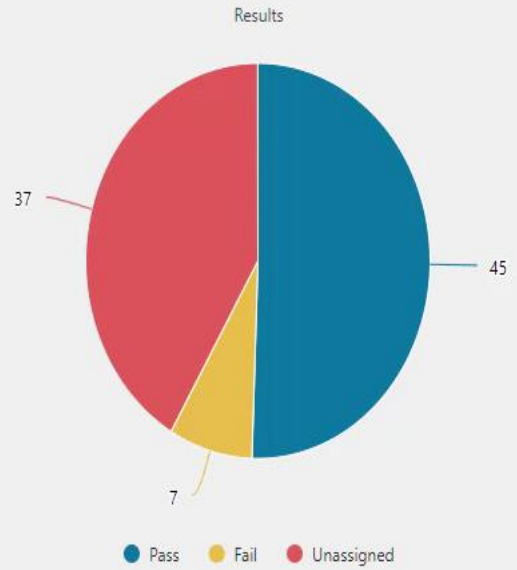
Product Owner (Ben)

Verification of Thermal management as one element of **integrate planning and verification**

Total Objects Found: 89
Last Updated: 21-Apr-2022 16:43

Verification Status





Name	Verification Domain	Result	Owner
Verification of fast charging Detection Cont...	Controls	Pass	David Schwegler (dschwegler)
Test of controller of fast charging	Controls	Fail	Jessica Trautner (jtrautner)
Simulation of controller function: detection ...	Controls	Pass	Jessica Trautner (jtrautner)
Test of controller function: detection availab...	Controls	Pass	Jessica Trautner (jtrautner)
Simulation of controller function: detection ...	Controls	Fail	Jessica Trautner (jtrautner)
Test of controller function: detection of char...	Controls	Pass	Jessica Trautner (jtrautner)
Simulation of controller of fast charging	Controls	Pass	Jessica Trautner (jtrautner)
MBSE_Showcase	Controls		Jessica Trautner (jtrautner)
VR_3	Controls		Jessica Trautner (jtrautner)

Conclusion

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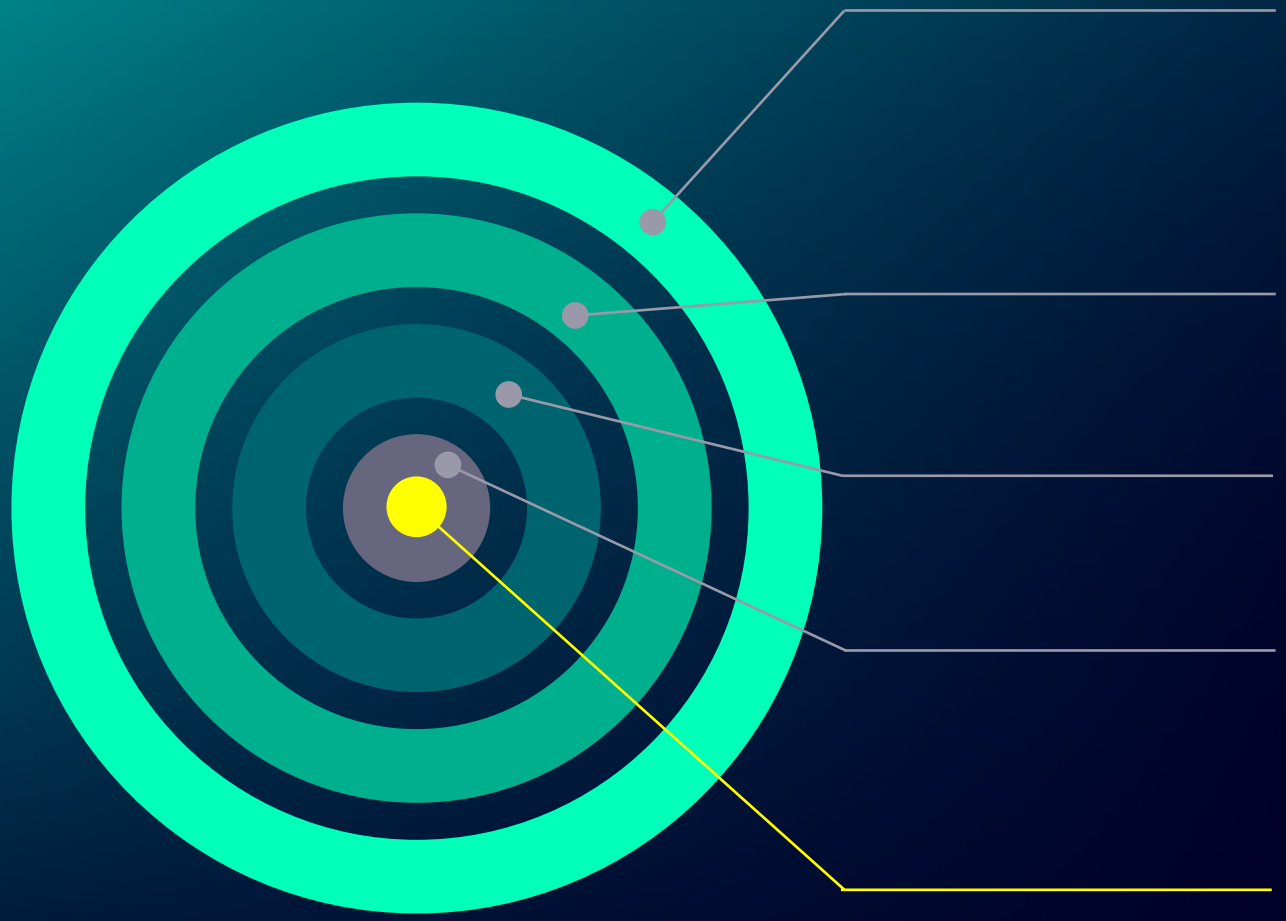
Key take-aways



Integration is the next challenge

Targets:

- Reduction of product design cycles
- Traceability of results
- Quality (of models and results)

Digitalization is the answer

Multi-domain collaboration across the Digital Thread

Siemens enables Digitalization

Supporting “Integrate - then - build”

Turning complexity into a competitive advantage

- Better designs achieved faster
- Verifiable performance
- Increased quality

Come and talk to us

We’ll discuss how to personalize this approach for your Company

SIEMENS

Product development

From “disconnected & slow” to “integrated & agile”

Shift left

Frontloading through Simulation & Test

Today

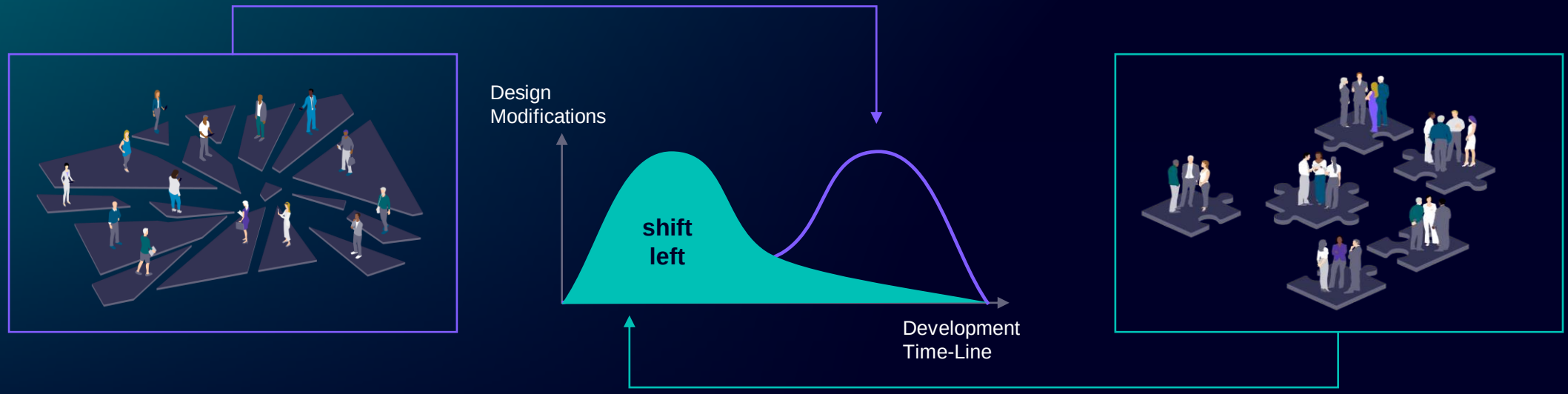
Disconnected, slow

“Build - then - integrate”

Tomorrow

Integrated, agile

“Integrate - then - build”



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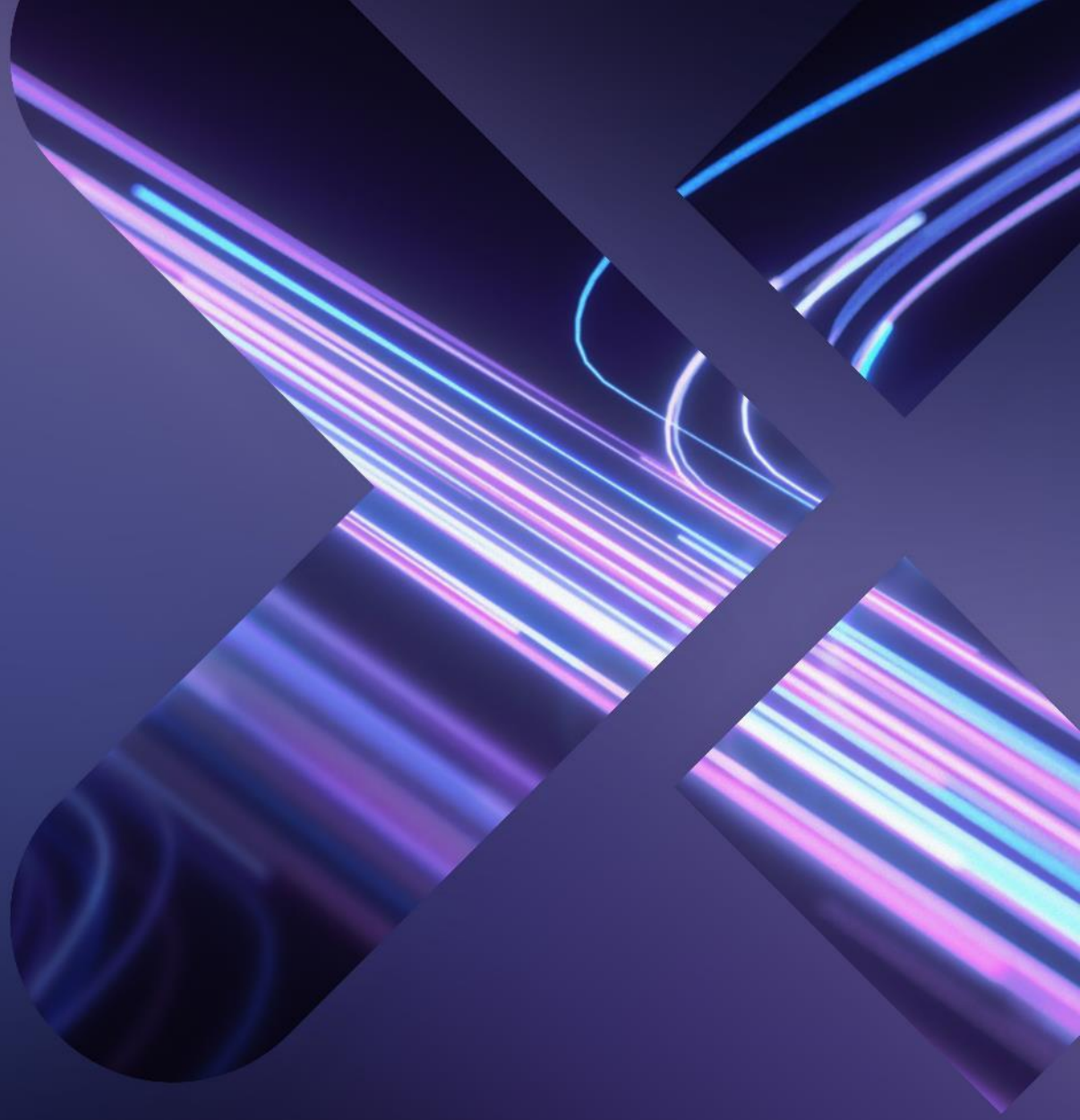
Thank you!



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