SIEMENS

Virtual Prototyping with Structural, Thermal and Flow Simulation

Jon Sutcliffe
Global Technical Enablement
24th February 2021

Unrestricted | © Siemens 2021 | 2021-02-15 | Siemens Digital Industries Software | Where today meets tomorrow.

SIEMENS

1

Agenda

Structural / Thermal Simulation
Motion Simulation
Flow Simulation

Unrestricted | © Siemens 2021 | 2021-02-15 | Siemens Digital Industries Software | Where today meets tomorrow.
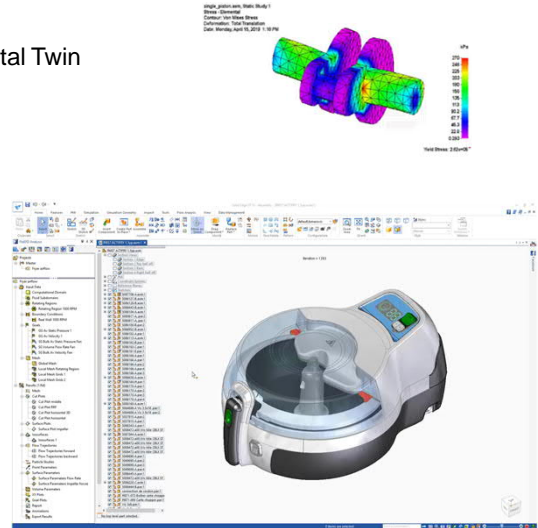
SIEMENS

2

SIEMENS

Simulation Addressing Industry Challenges

Enabling engineers to perform their own validation on the Digital Twin created in Solid Edge

Solid Edge Simulation uses the same underlying geometry and user interface as all Solid Edge applications

Simcenter FLOEFD for Solid Edge is also built right inside the Solid Edge UI to provide a consistent user experience.

Robust, proven and easy to use for any Solid Edge user who has a fundamental understanding of FEA principles

Unrestricted | © Siemens 2021 | 2021-02-15 | Siemens Digital Industries Software | Where today meets tomorrow.

SIEMENS

3

Solid Edge Portfolio Simulation

Solid Edge Portfolio

Simulation

Simulation for design validation and optimization for design engineers

Mechanical Simulation
- Strength of structure
- Vibration
- Heat transfer
- Motion

Solid Edge Simulation

Fluid Flow Simulation
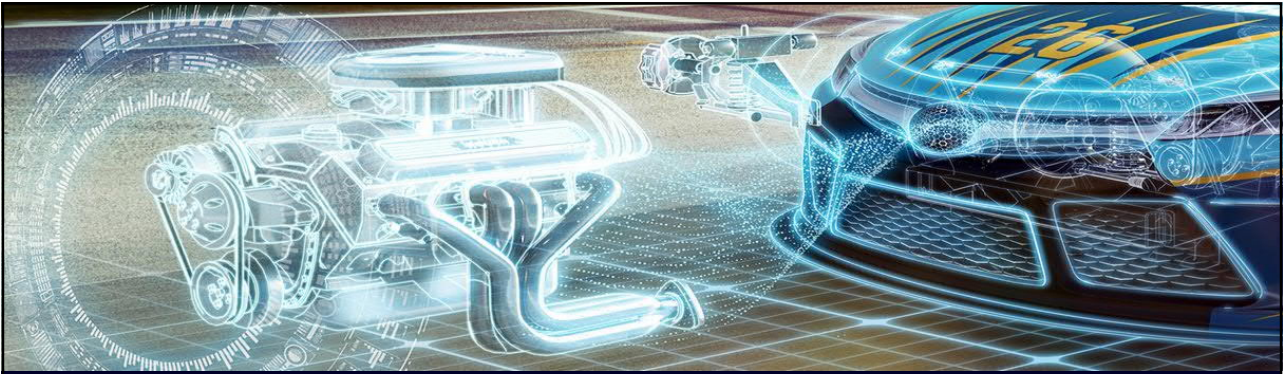- Fluid flow
- Heat convection/conduction

FLOEFD for Solid Edge

Unrestricted | © Siemens 2021 | 2021-02-15 | Siemens Digital Industries Software | Where today meets tomorrow.

SIEMENS

4

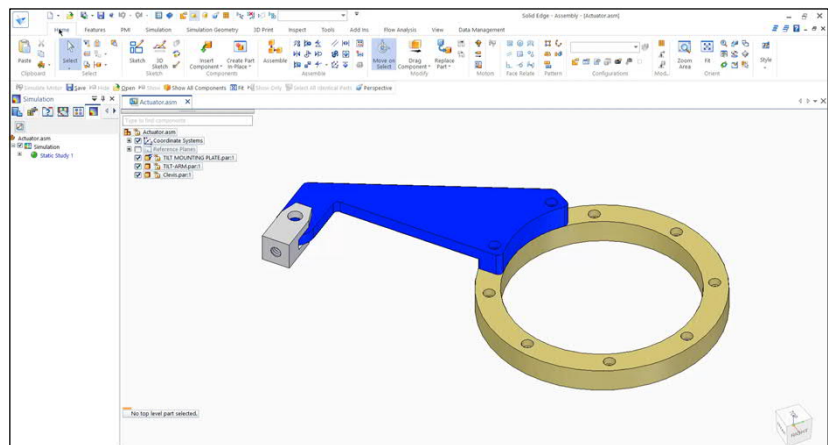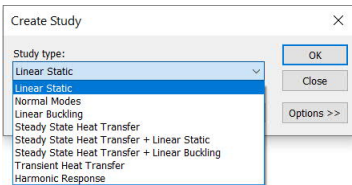# SIEMENS

Structural / Thermal Simulation

SIEMENS

5

Structural and Thermal Simulation

Simulation types supported:

- Linear static
- Normal modes
- Buckling
- Thermal (including transient)
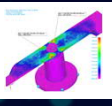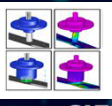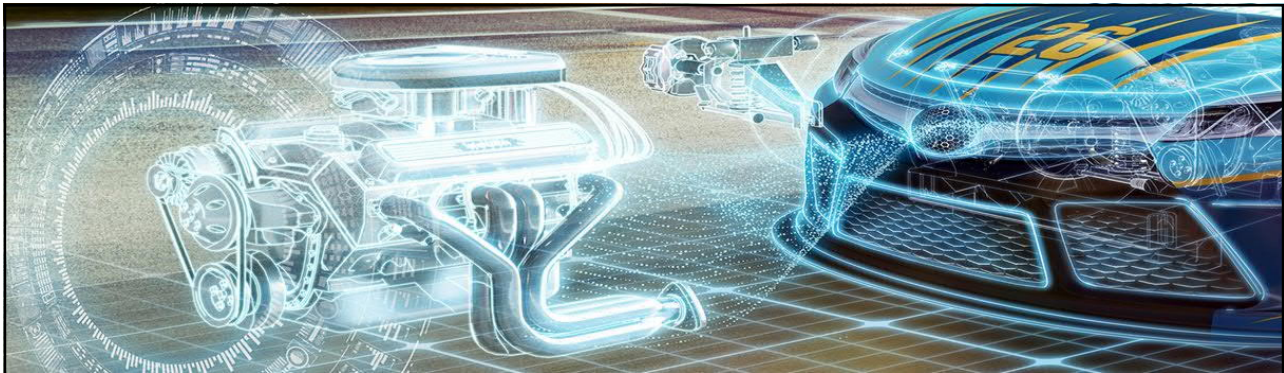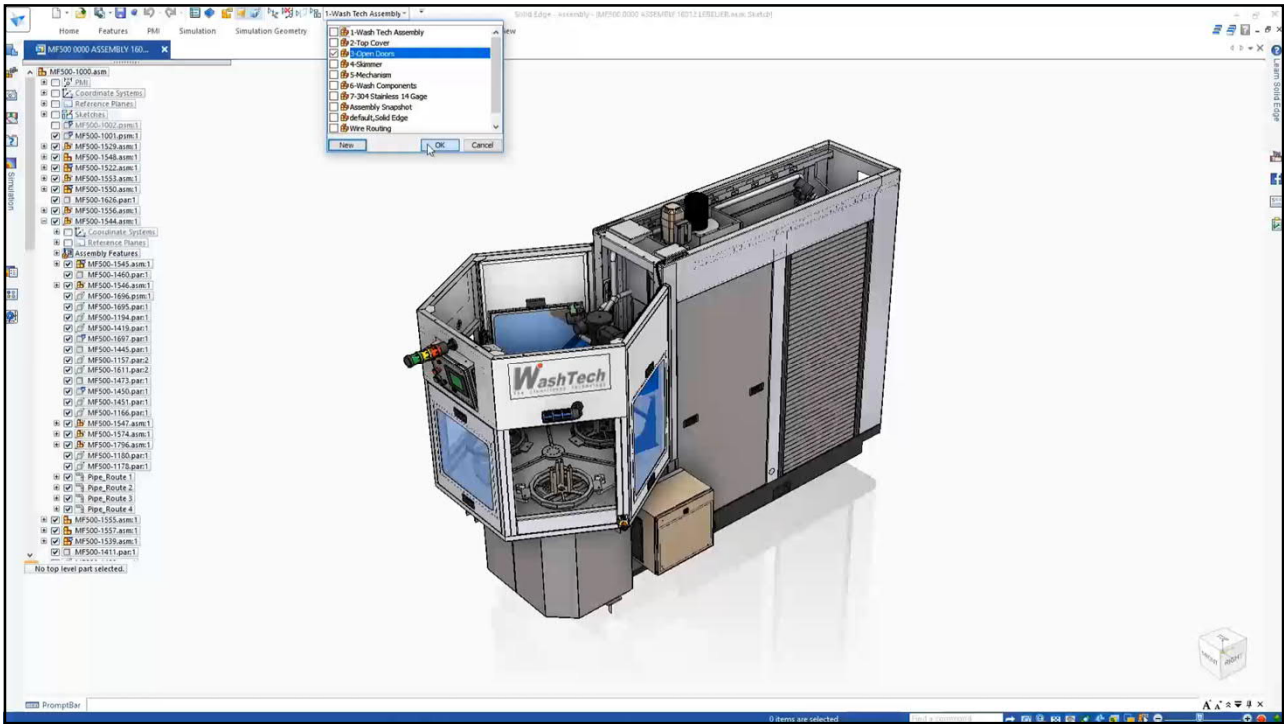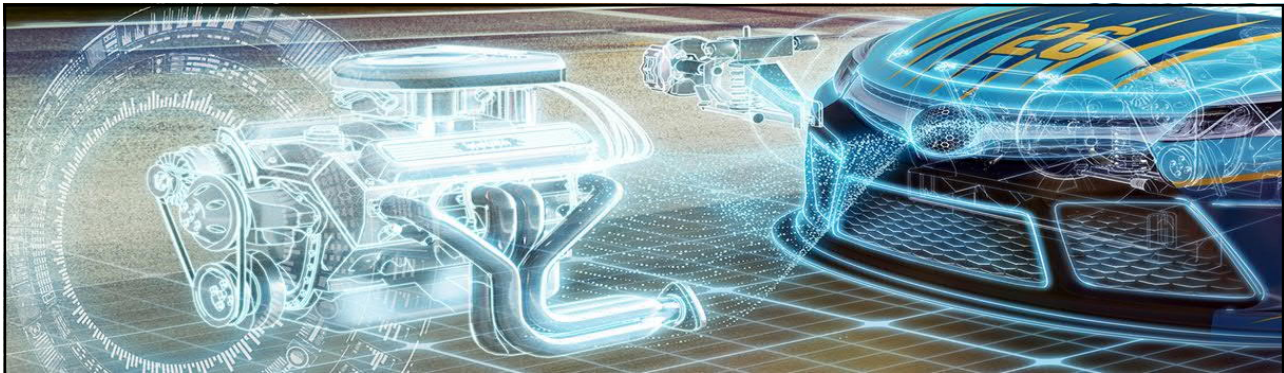- Harmonic response (vibration)

SIEMENS

6

SIEMENS

Solid Edge Simulation Capabilities

Automatic Finite Element Model Creation	• Shell & Solid tetrahedral elements • Local mesh size control • Based on Femap meshing technology
Full Boundary Condition Support	• Geometry based constraints & loads • Handles help define direction and orientation • Quick Bar input options
Powerful Analysis Capability	• Industry standard solver - Simcenter Nastran • Statics, normal modes, buckling & thermal analysis • Automatic element quality checks
Comprehensive Post Processing	• Fringe, color plots and contours • Displacement, animation and mode shapes • Report generation
Synchronous Technology with model associativity	• Remove unnecessary features • Change geometry shape quickly & easily • Mesh automatic update

SIEMENS

7

Simulation Demo

SIEMENS

8

SIEMENS


9

Motion Simulation

SIEMENS

10

SIEMENS

Motion Simulation

Fully embedded motion simulation to validate mechanisms

- Size motors and actuators
- Determine power consumption
- Determine boundary conditions for stress analysis
- Friction
- Force Transmission
- Spring and Damper Stiffness
- Hydraulic actuators
- Reduce vibrations
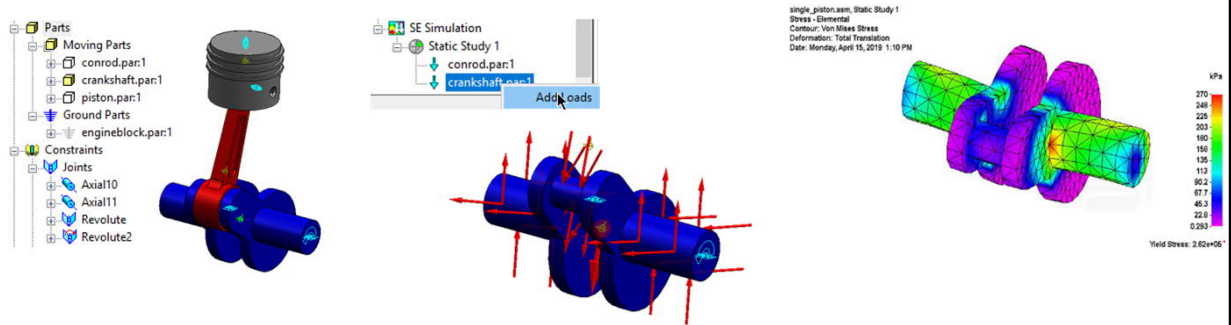- Understand unbalance effects on mechanisms
- Understand bearing loads
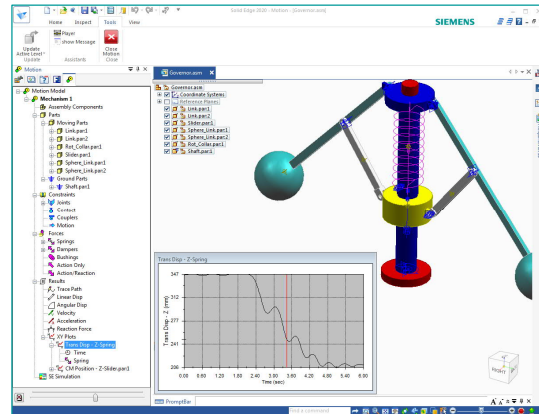
SIEMENS

11

Motion Simulation

Users can utilize forces from Motion Simulation as input to Solid Edge Simulation static studies

SIEMENS

12

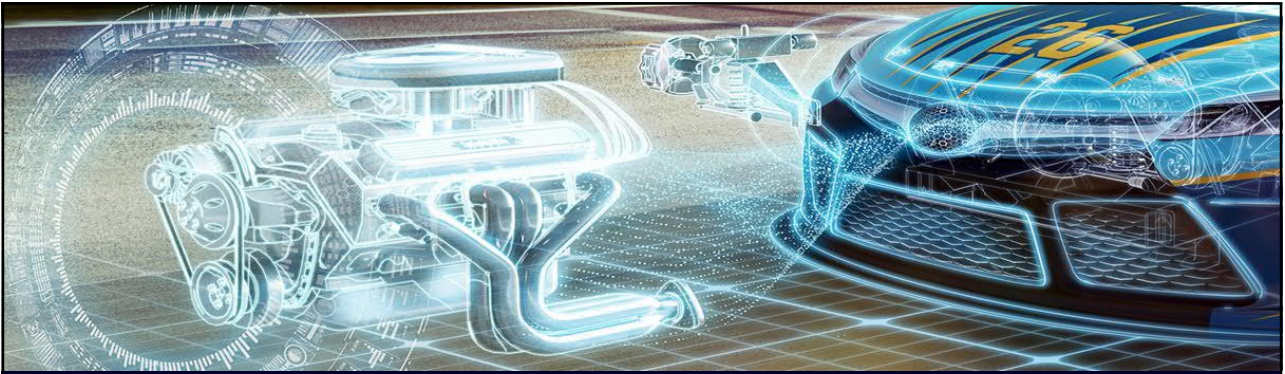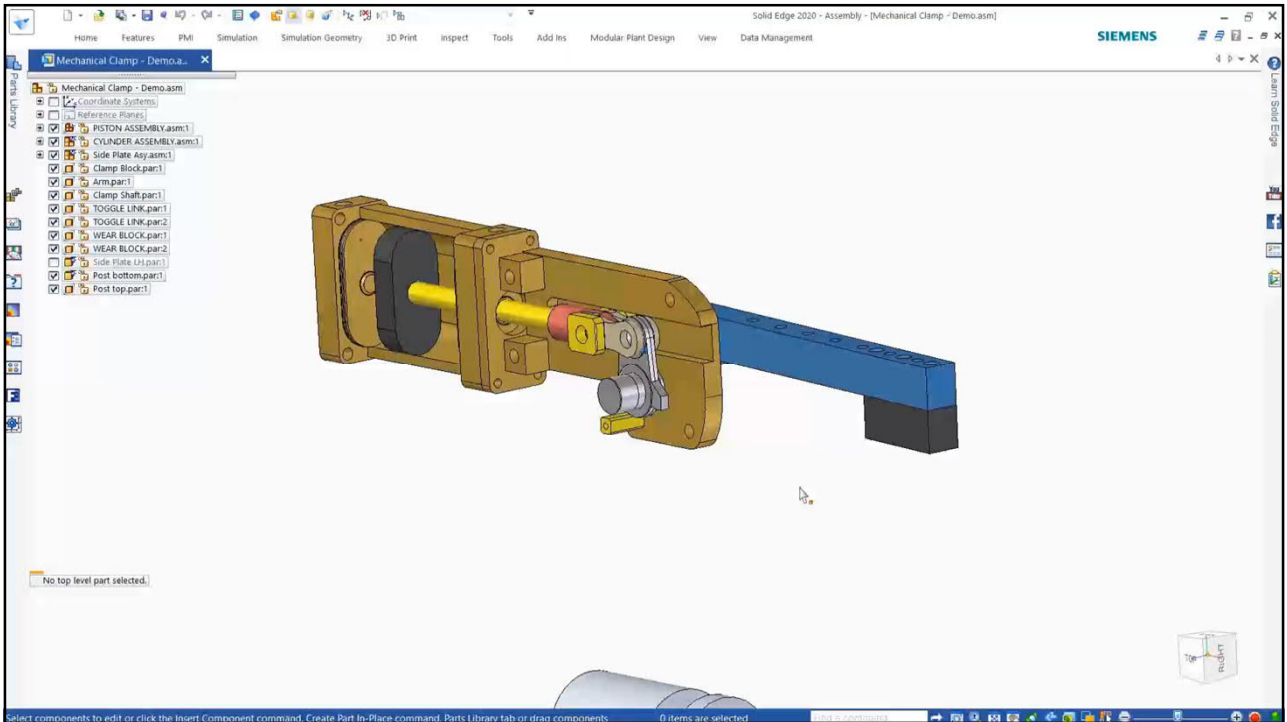# SIEMENS

| Motion Simulation Demo

Unrestricted | © Siemens 2021 | 2021-02-15 | Siemens Digital Industries Software | Where today meets tomorrow.
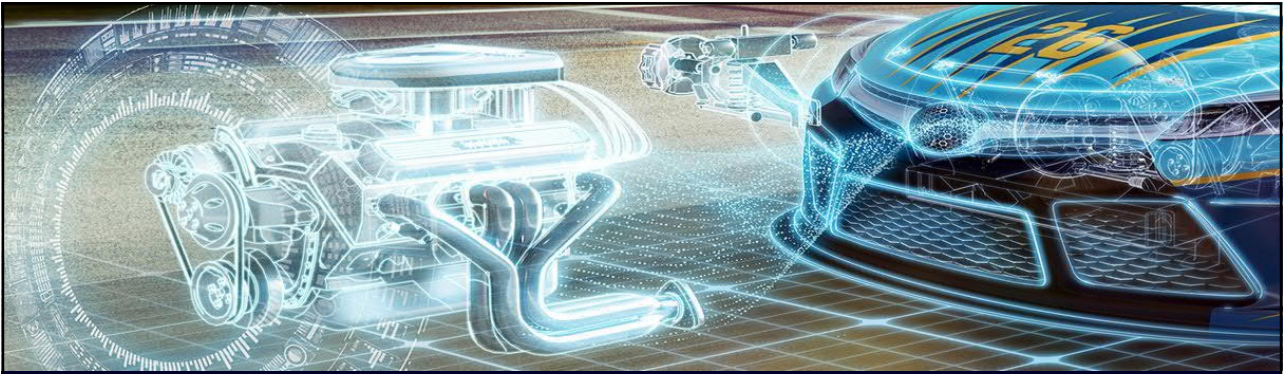
SIEMENS

13

14

SIEMENS

Integrated CFD: FLOEFD for Solid Edge

SIEMENS

15

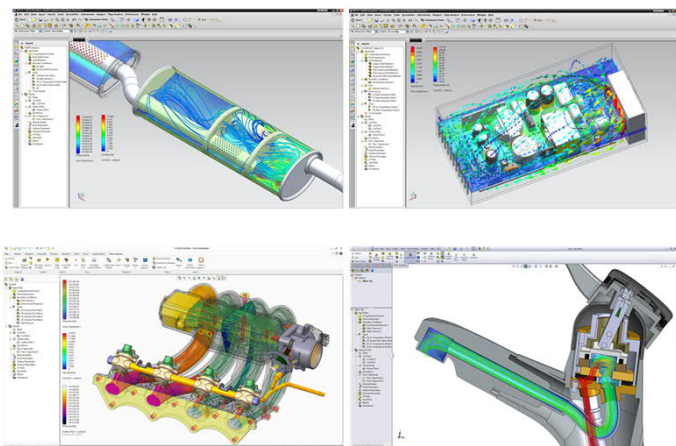### Simcenter FLOEFD for Solid Edge

General Purpose CFD
- Fluid flow and Heat transfer
- Internal & External flow
- Combustion and high-speed flow
- Mixing and rotational flow

Embedded in Solid Edge
- No need to transfer geometries
- Leverage parametric CAD
- Robust mesher & solver
- Parametric Optimization

Unique Features
- Ease-of-use and Accuracy
- No need to model the fluid volume
- Laminar/Transitional/Turbulent flow

SIEMENS

16

SIEMENS

Typical FLOEFD Applications

Aerospace
- Aerodynamics, Avionics, Fuel Handling, Cabin AC, LEDs

Automotive
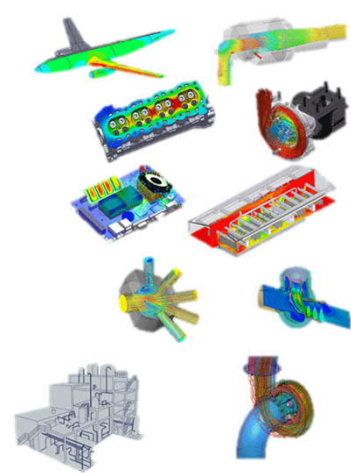- VTM, Aero, ECU, Hydraulics, Lubrication, Lighting, Turbomachinery

Electronics
- PCB, Heatsinks, Fans, LEDs, System Level Analysis

HVAC
- Office Comfort, Fire & Smoke, Contamination, Ducting, Fans

Oil/Gas
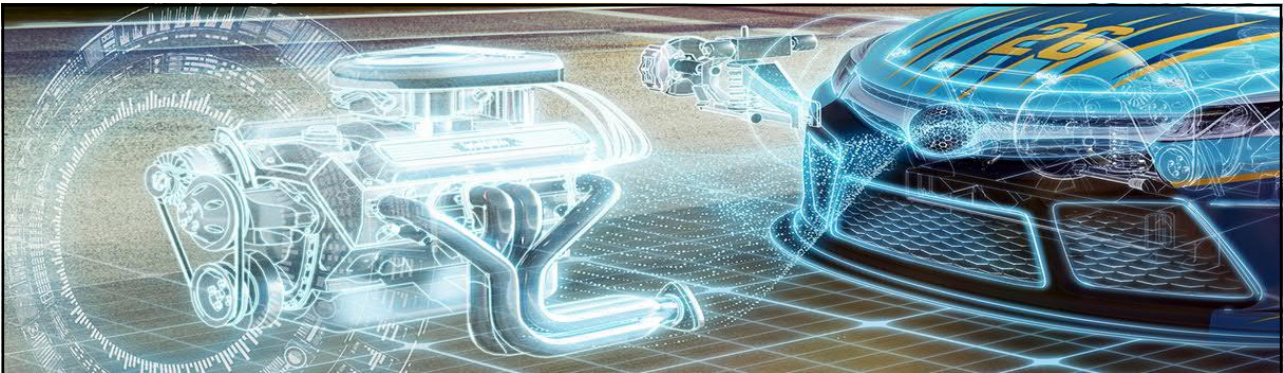- Piping, Pumps, Valves, Heat Exchangers, Accumulators, Cyclones

SIEMENS

17

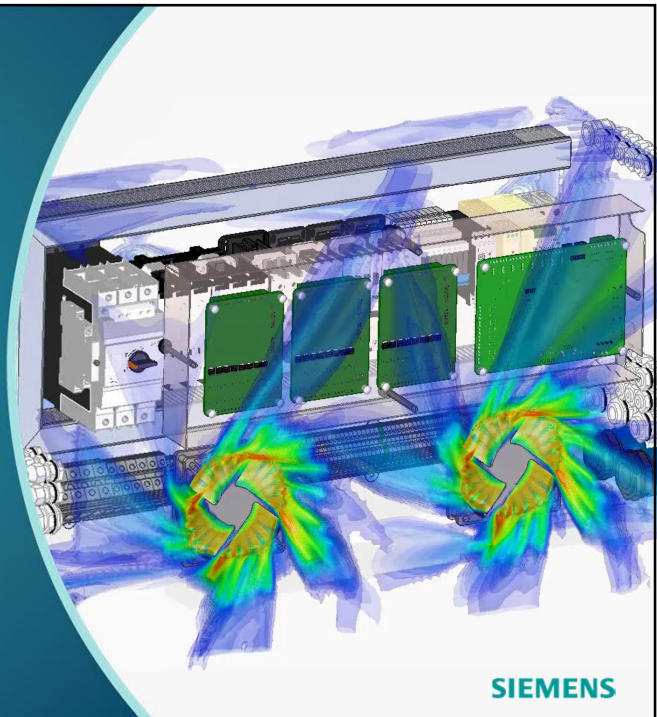# | Flow Simulation Demo

SIEMENS

18

19

Solid Edge Simulation

Robust and proven structural, thermal, motion and flow simulation technologies.

Digitally validate designs by subjecting parts and assemblies to real-world conditions

20

SIEMENS

| Thank You

Jon Sutcliffe
Director of Global Technical Enablement
jon.sutcliffe@siemens.com

SIEMENS

21