

What's New in Simcenter 3D 2019.2 Aerostructures

Simcenter 3D Aerostructures

Integrated end-to-end process

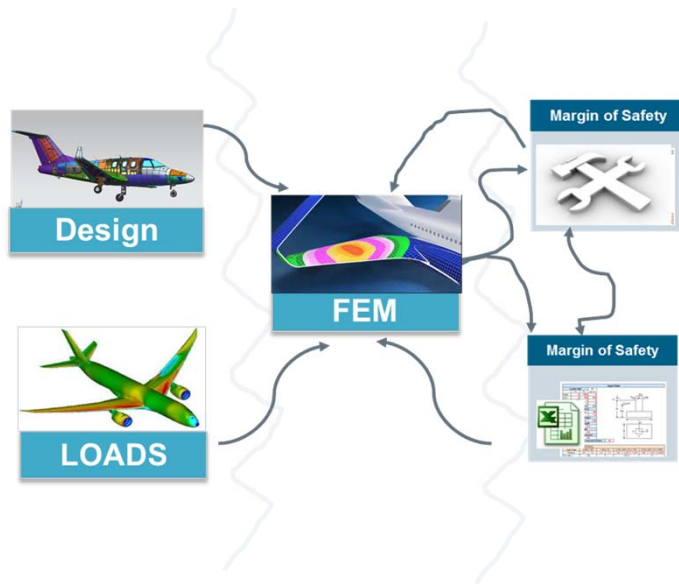


As is typical process

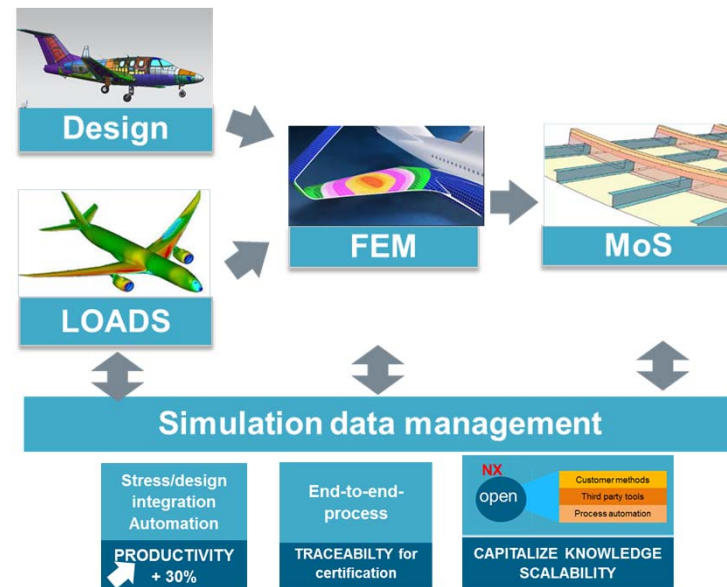


The Siemens solution

Disconnected systems



Integrated end-to-end solution



Simcenter 3D Aerostructures Workflow

SIEMENS
Ingenuity for life

Benefits

Productivity:

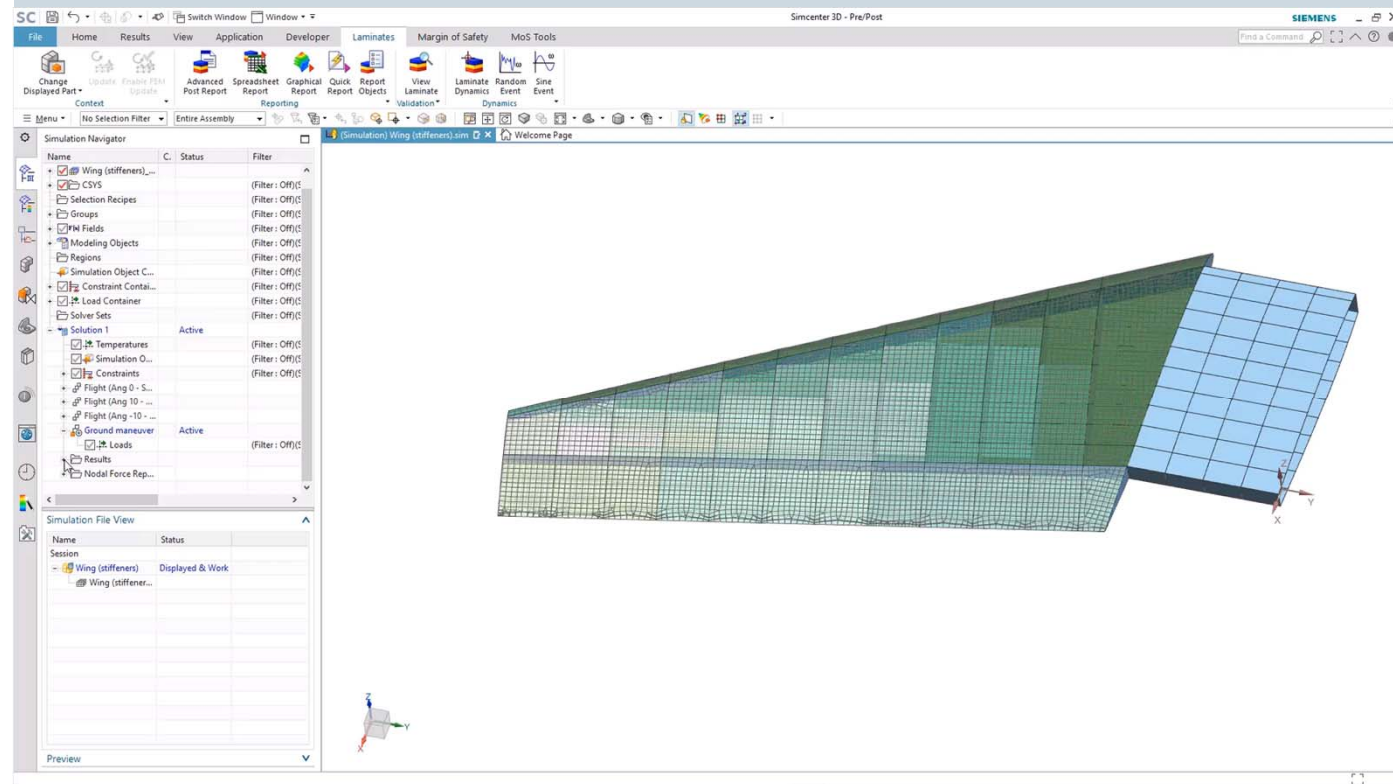
- Associativity to CAD and CAE
- Automate report generation

Knowledge capitalization:

- Standard ready-to-use methods
- Integrate companies methods

Traceability for certification through end-to-end process and methods standardization

Siemens solution: Simcenter 3D



Simcenter 3D 2019.2

Numerous Margin of Safety Calculations



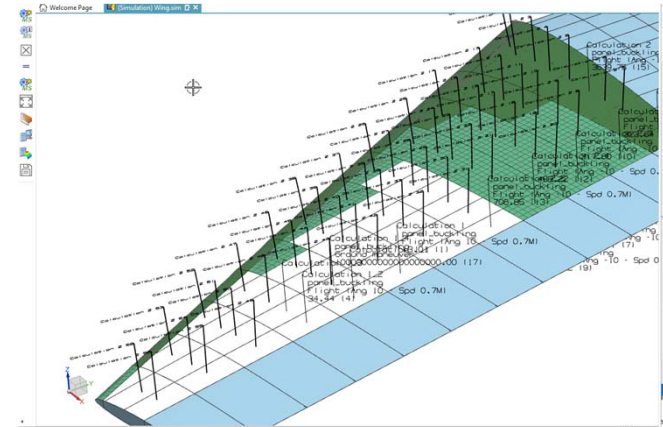
Dedicated UI to manage large amounts of margin calculations on repetitive structures

Challenge:

- Airframe analysis workflow requires to compute 1000s local analytical analyses (e.g. on fuselage, on wings...)

Solution:

- Provide native usability to create, check, edit, large amounts of calculations from a selection in the 3D view
- Edit calculations in a table view (Excel like)



Calculation Manager									
Composite Plate Buckling Flat Longitudinal Shear C									
Calculation	Status	Load Case	Loaded Edge	Unloaded Edge	Edges bound	Laminate	Compressive Stress (sigma)	Shear Stress (tau)	
1 Calculation 2	Success	Set 1	9	10	CSCS	[+45_2/90/0_2]	Stress - Elemental / XX	Shell Resultants - Elemental / Membrane Force NX	
2 FrontFace	Success	Set 1	9	10	CSCS	[+45_2/90/0_2]	Stress - Elemental / XX	Shell Resultants - Elemental / Membrane Force NX	
3 Calculation 2_1	Not Run	Set 1	9	10	CSCS	[+45_2/90/0_2]	Stress - Elemental / XX	Shell Resultants - Elemental / Membrane Force NX	
4 Calculation 2_2	Success	Set 1	9	10	CSCS	[+45_2/90/0_2]	Stress - Elemental / XX	Shell Resultants - Elemental / Membrane Force NX	
5 Calculation 2_3	Success	Set 1	9	10	CSCS	[+45_2/90/0_2]	Stress - Elemental / XX	Shell Resultants - Elemental / Membrane Force NX	
6 Calculation 2_4	Success	Set 1	9	10	CSCS	[+45_2/90/0_2]	Stress - Elemental / XX	Shell Resultants - Elemental / Membrane Force NX	
7 Calculation 2_5	Success	Set 1	9	10	CSCS	[+45_2/90/0_2]	Stress - Elemental / XX	Shell Resultants - Elemental / Membrane Force NX	
8 FrontFace_1	Not Run	Set 1	9	10	CSCS	[+45_2/90/0_2]	Stress - Elemental / XX	Shell Resultants - Elemental / Membrane Force NX	
9 FrontFace_2	Success	Set 1	9	10	CSCS	[+45/90/0/+45]	Stress - Elemental / XX	Shell Resultants - Elemental / Membrane Force NX	
10 FrontFace_3	Success	Set 1	9	10	CSCS	[+45/90/0/+45]	Stress - Elemental / XX	Shell Resultants - Elemental / Membrane Force NX	
11 FrontFace_4	Success	Set 1	9	10	CSCS	[+45/90/0/+45]	Stress - Elemental / XX	Shell Resultants - Elemental / Membrane Force NX	
12 FrontFace_5	Error	Set 1	9	10	CSCS	No laminate	Stress - Elemental / XX	Shell Resultants - Elemental / Membrane Force NX	

Simcenter 3D 2019.2

Increased flexibility for method integration



Increased integration capabilities

Challenge:

- In-house or third party tools require specific capabilities to be easily integrated in the environment

Solution :

- Add Python to the list of available programming languages for method integration
- Streamline file management for files associated to an integrated third-party or in-house tool
- Compute all calculations of a given method in one step (for more performance when connecting with external tools)
- Method-specific detailed post-processing (e.g. open in a dedicated UI)

```
TestCase_2019_2.py.py"  X
1  #HEAD ColumnEulerMethod PYTHON AEROSTRUCT
2  #=====
3  # Copyright 2019 Siemens Industry Software SA
4  # Unpublished -All rights reserved
5  #=====
6
7  # File description
8  # Aerostructures scripting template: Visual Basic method implementation
9  # Created with Simcenter 1872.600.0.0
10 #=====
11 # Date      Name      Description of Change
12 # 01-02-2019 msbdu      Creation
13 # $HISTORY$
14 #=====
15
16 import math
17 import NXOpen
18 import NXOpen.CAE.AeroStructures
19 import NXOpen.CAE.AeroStructures.Author
20
21 class EulerColumnMethod:
22
23     def Evaluate(calculationContext):
24
25         # Obtain session and part objects
26         session = NXOpen.Session.GetSession()
27         listing = session.ListingWindow
28         listing.Open()
29         calculationName = calculationContext.Name
30
31         calculationContext.Log("Starting method EulerColumnMethod for calculation: "+ calculationName)
32
33         # ABB entry point ( aeroStruct Application Building Block)
34         #=====
```

Simcenter 3D 2019.2 Combined loadcases



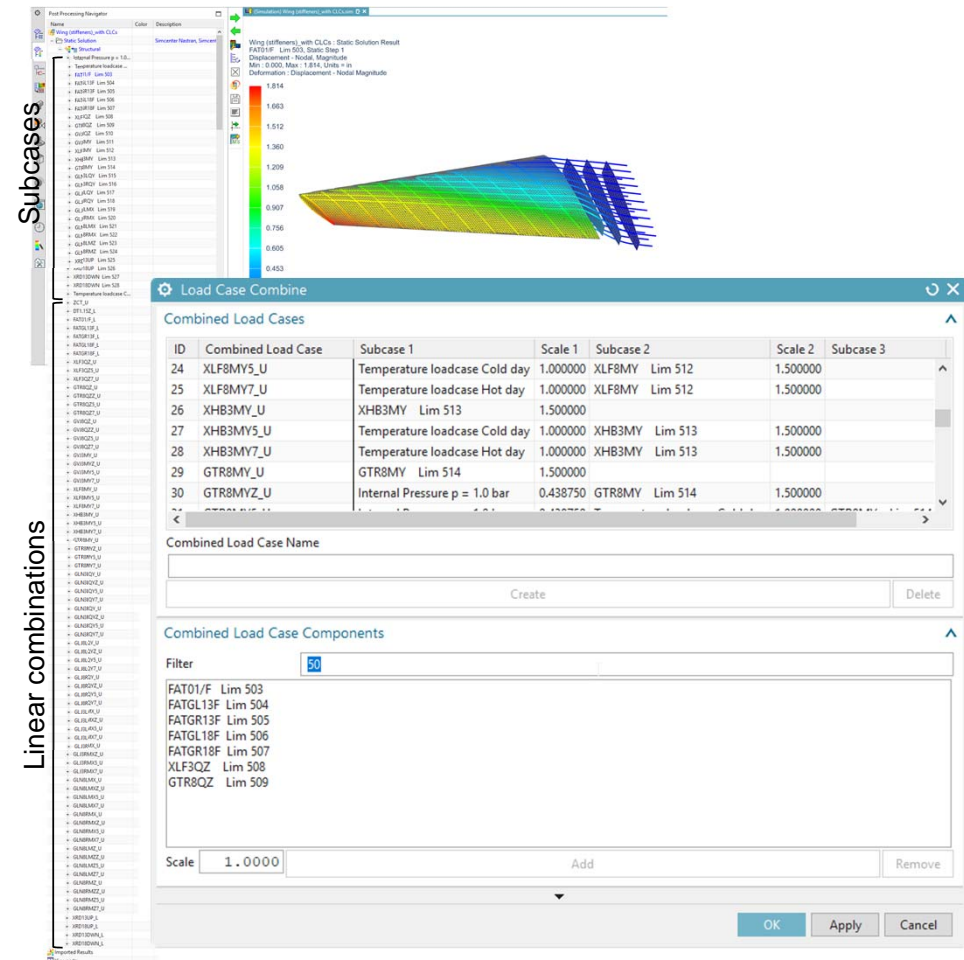
Efficient definition and reuse of linear combinations of load cases

Challenge:

- Enable definition and reuse of up to 100's of linear combinations, only needed at post-treatment level, without any increase on result file size

Solution:

- UI approach enabling load case combination, even with high number of subcases / combinations
- XL/CSV export/import ensuring flexible reuse and update
- Journaling providing scalable integration & automation



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Shell resultant CSYS transformation



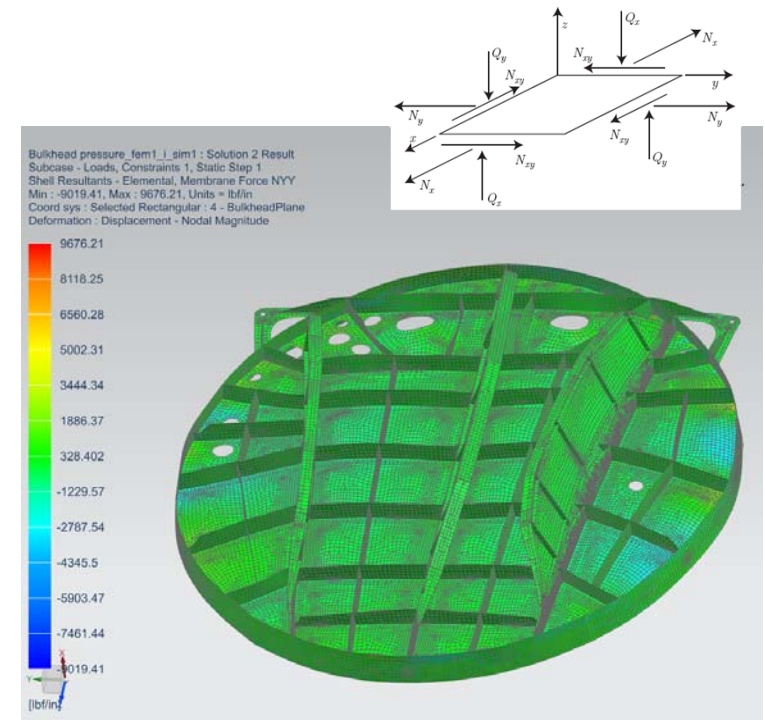
Flexible post-treatment enabling local sizing of shell structures (2D)

Challenge:

- Provide directional shell membrane forces (2D constraints assumption) post-treatment regardless of the model native/material orientation

Solution:

- Allow user-defined CSYS to be projected into Shell element's plane to define Shell resultant X and Y axes
- Also available at Margin of Safety level to perform easily local sizing of metallic structures (constant membrane forces – varying thickness)



Thank You!