

# Simcenter 3D Durability Wizard

## Quickly predict product fatigue

### Benefits

- Improves robustness by predicting the life of product designs and determining which design features are over- or under-designed
- Reduces physical testing costs by allowing you to analyze product life in a virtual environment
- Accelerates product design by allowing designers to quickly perform what-if "re-analysis" of new designs to understand the impact of changes on product durability

### Summary

Simcenter™ 3D Durability Wizard guides you in validating your product's structural integrity over its entire lifecycle. Simcenter 3D Durability Wizard is an add-on module to either NX™ Modeling, NX Design Simulation or Simcenter 3D Structures that uses stresses or strains from static solutions to examine product durability, helping you to establish which parts are over- or under-designed. Contour plots of fatigue life and safety factors make it easy to understand durability issues.

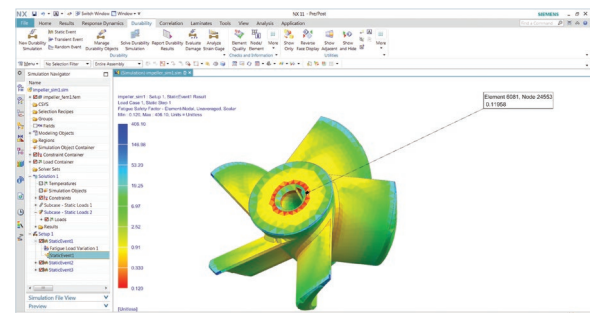
### A simple and flexible way to predict a product's strength and durability

Structural fatigue analysis is used to predict design life and durability. Designers and structural analysts can check whether in-service loadings are likely to cause early failure in parts subjected to cyclic loads.

The Simcenter 3D Durability Wizard provides an intuitive, guided process for designers and less experienced CAE users, enabling them to predict the strength and fatigue safety of products subjected to prescribed cyclic loading.

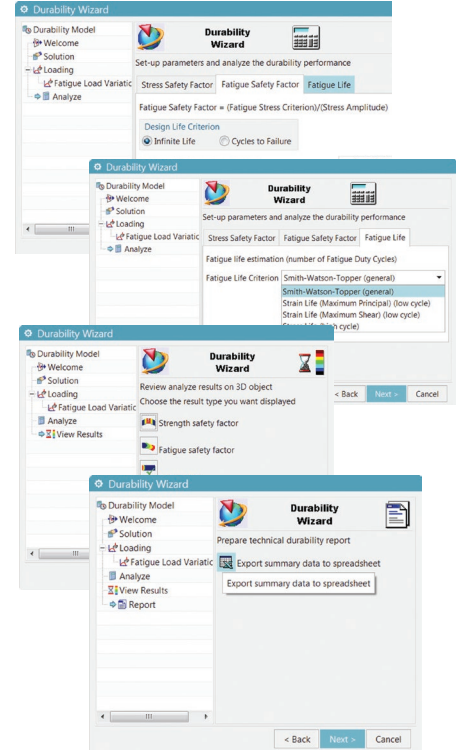
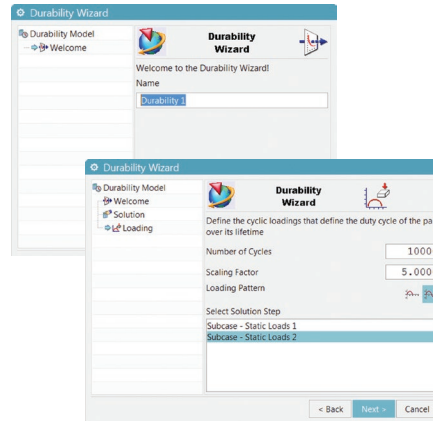
The wizard guides you through these simple steps to assess durability of your model:

1. *Choose the structural solution containing the loading conditions.* You can use linear stress or strain results in static solutions from the NX Stress Wizard, NX Nastran®, MSC Nastran, Abaqus™ or ANSYS®.
2. *Define the cyclic loadings that define the duty cycle of the part over its lifetime.* Parameters you can define include number of cycles, scaling factor, and loading pattern.
3. *Define the results you wish to compute.* You can compute static safety factors, fatigue safety factors and fatigue life.
4. *Define durability parameters and launch the durability solution.* You can select the fatigue criterion you want for the fatigue life calculation: Smith-Watson-Topper, strain or stress life.



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5. Display contour plots on your FE model. You can display contour plots for strength safety factor, fatigue safety factor or fatigue life.
6. Prepare a technical durability report in a spreadsheet. You can export results to an Excel spreadsheet for further evaluation or to share with other members in your organization.
7. Save time with "what-if" redesigns. The durability solution remains associated to your model and geometry, allowing you to rerun the solution with different durability criteria so you can see their effects on your product. Furthermore, as your design changes, you can easily rerun your durability analyses to see how your design changes impact durability performance.



General features for the Simcenter 3D Durability Wizard include:

## NX Integration

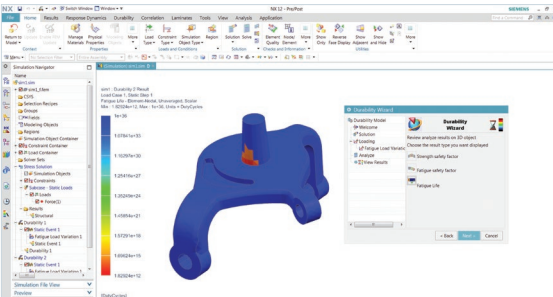
- Designers can run from within NX Modeling leveraging results from the NX Stress Wizard to compute fatigue and strength metrics at preliminary design stages
- Run from NX Design Simulation or Simcenter 3D Structures to leverage stress results from third-party solvers
- Leverage geometry associativity to quickly evaluate the impact of changing geometrical features on fatigue resistance
- Enable Simcenter 3D Advanced Durability to re-use events automatically created by the Durability Wizard

## Solutions and supported solvers

- Supports stress (high-cycle) and strain (low-cycle) approaches
- Supports stress results from NX Stress Wizard, NX Nastran, MSC Nastran, Abaqus or ANSYS

## Postprocessing

- Contour plots for fatigue life, damage and safety factors
- Durability reports



| Durability 2             |                        |                                       |   |
|--------------------------|------------------------|---------------------------------------|---|
| Fatigue Load Variations  |                        |                                       |   |
| 1                        | Load Variation         | Number of Cycles                      | Scaling Factor  |
| 2                        | 5                      | 7000                                  | 7.000000 Full Unit Cycle  |
| Fatigue Analysis Options |                        |                                       |   |
| 3                        | Evaluation Type        | Options                               |   |
| 4                        | 9                      | Ultimate                              |   |
| 5                        | Stress Safety Factors  | Von_Mises                             |   |
| 6                        | 10                     | Number of Fatigue Duty Cycles: 1e+20  |   |
| 7                        | Fatigue Safety Factors | Fatigue Strength Factor: 1            |   |
| 8                        | 11                     | Smith_Watson_Topper                   |   |
| Results                  |                        |                                       |   |
| 9                        | 14                     | Coordinate System                     |   |
| 10                       | 15                     | Number of LoadCases                   | 1   |
| 11                       | 16                     | Load Case 1: Number of Iterations = 1 |   |
| 12                       | 17                     | Iteration 1                           | Strength Safety Factor(Unitless) Fatigue Safety Factor(Unitless) Fatigue Life(DutyCycles) |
| 13                       | 19                     | Max                                   | 1.18E+05 4.96E+03 1.00E+36  |
| 14                       | 20                     | Min                                   | 1.60E+01 2.09E-01 1.45E+14  |
| Durability Report        |                        |                                       |   |

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