STRESSED – Take an Inventor Simulation Chill Pill

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Class summary

Stressed – Take an Inventor Simulation Chill Pill!

This class is ideally aimed at the Inventor users who have very little knowledge of Inventor Simulation.
This class will demonstrate workflows and processes to help you make better decisions enabling you to make innovative designs. Dynamic Simulation within Inventor Simulation allows you the designer to convert your static CAD models into a moving mechanism, allowing you to determine reaction forces, velocities, accelerations and much more. Whereas Stress Analysis within Inventor Simulation will allow you to determine whether your parts will fail in the real world, including the ability to optimize your designs enabling you reduce weight.

Key learning objectives

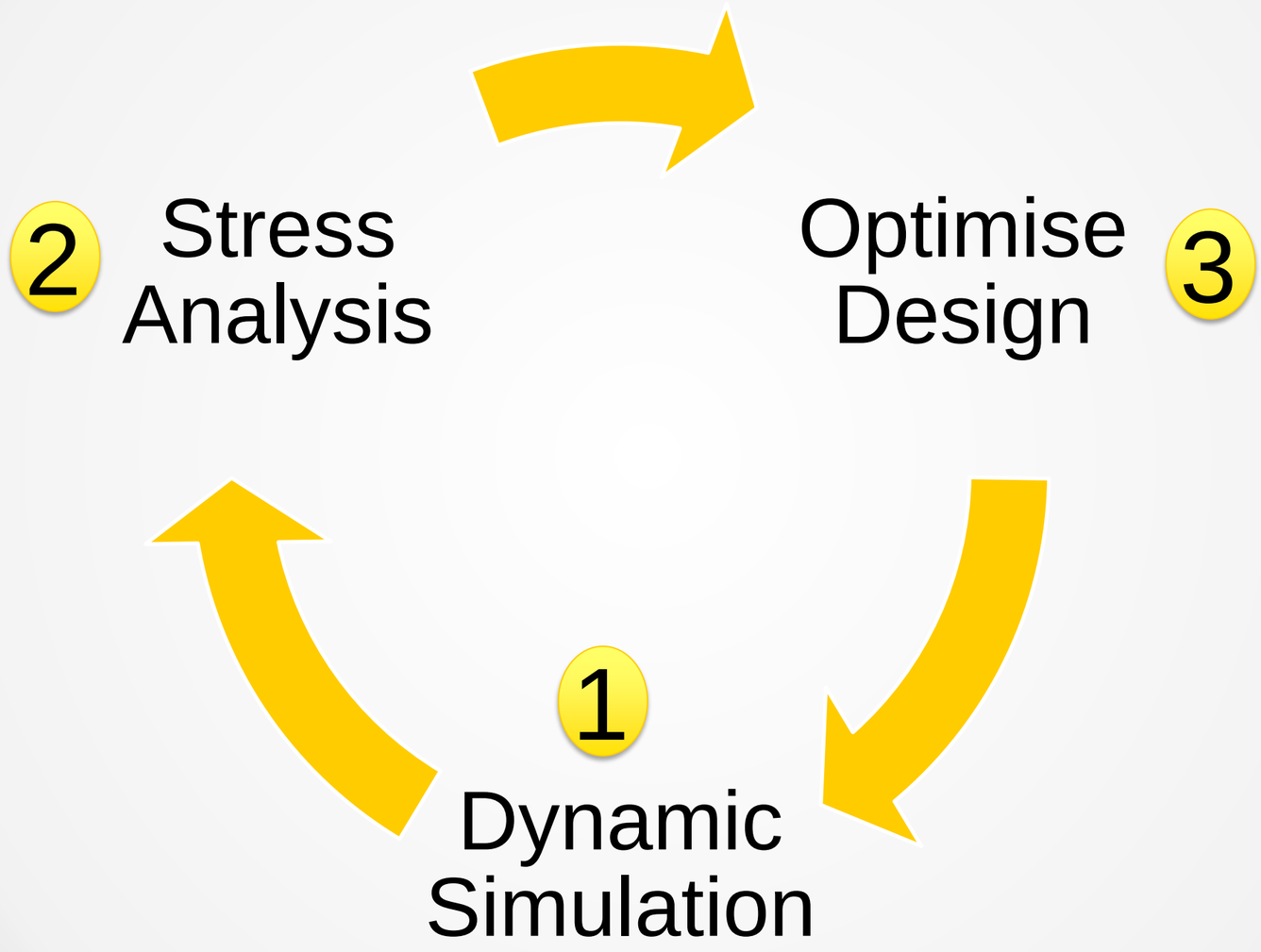
At the end of this class, you will be able to:

- Perform Dynamic Simulation
- Perform Stress Analysis
- Analyze and Interpret Results
- Create Innovative Designs

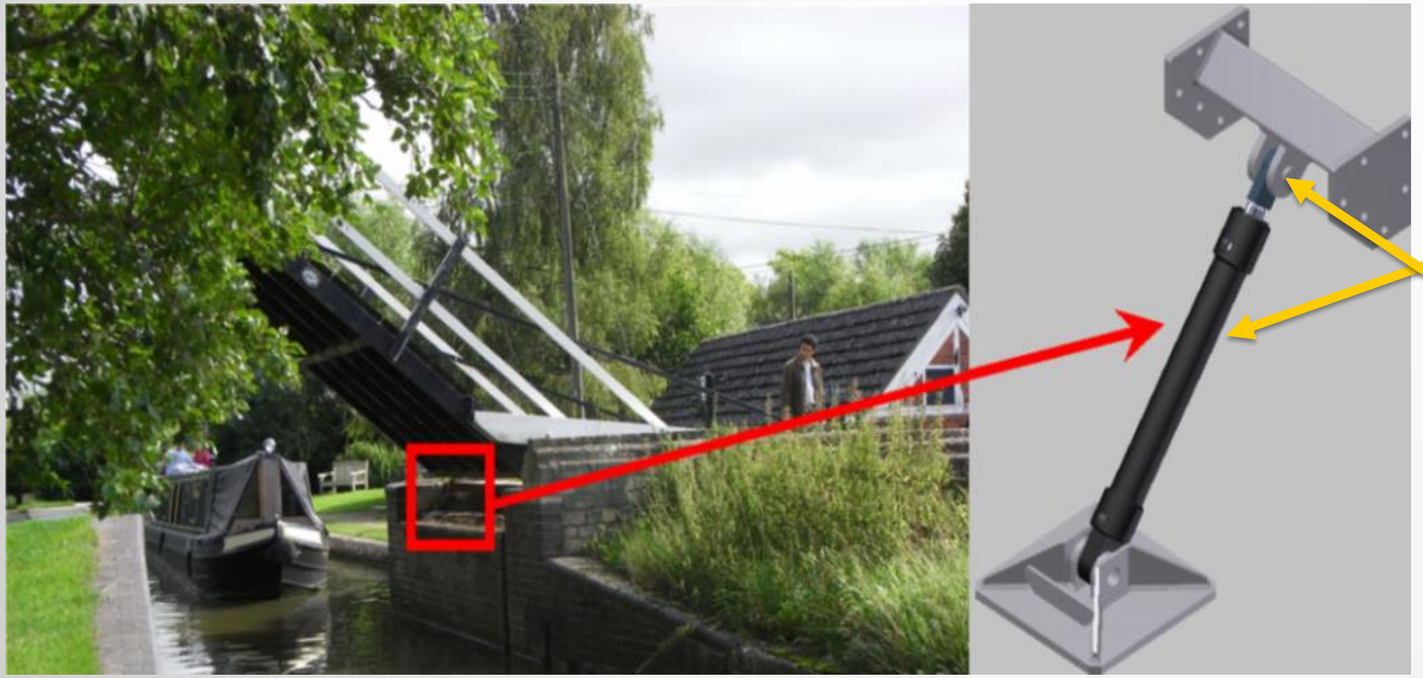
Inventor Simulation can help!

- Reduce design and development times
- Avoid in field failures
- Innovate
- To be more confident in your designs

Inventor Simulation



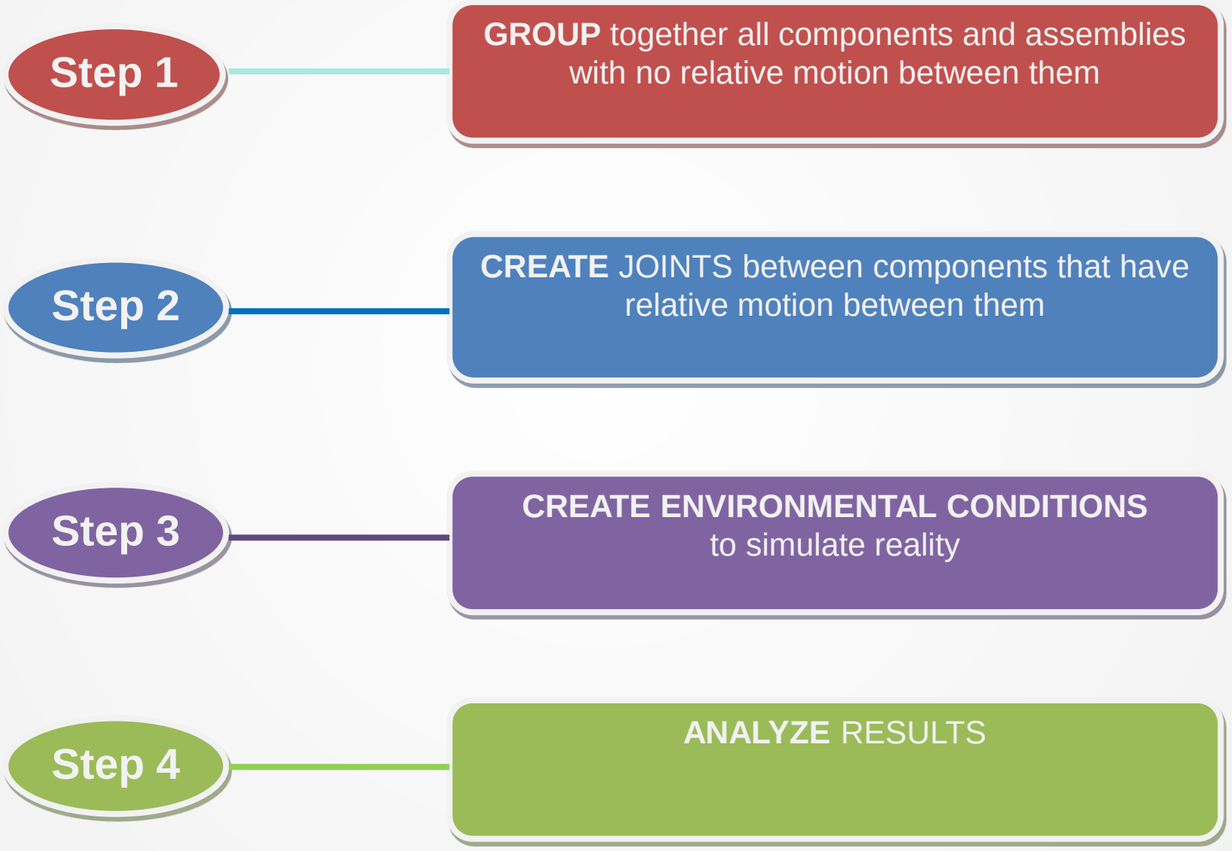
Dynamic Simulation



Goal

- Size a jack
- Determine forces acting on new structure

Dynamic Simulation (DS) – Suggested Workflow



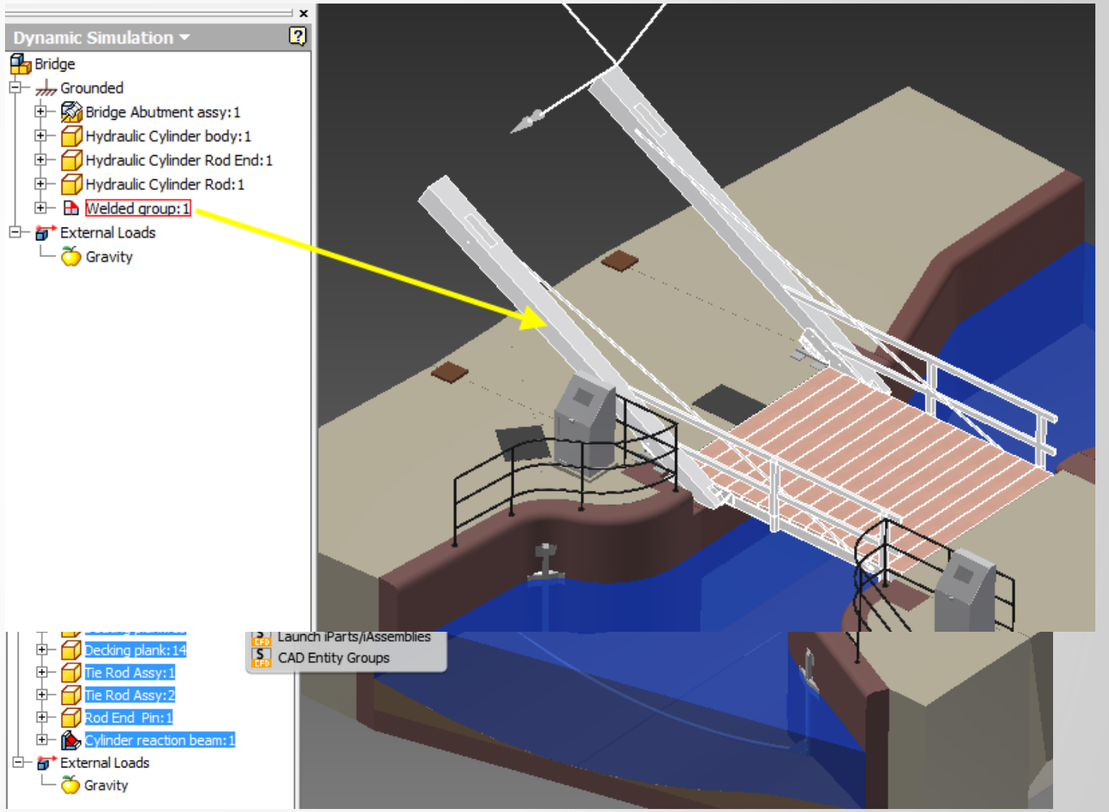
Suggested Workflow – Step 1

Option 1

- Create Subassemblies

Option 2

- Weld Parts



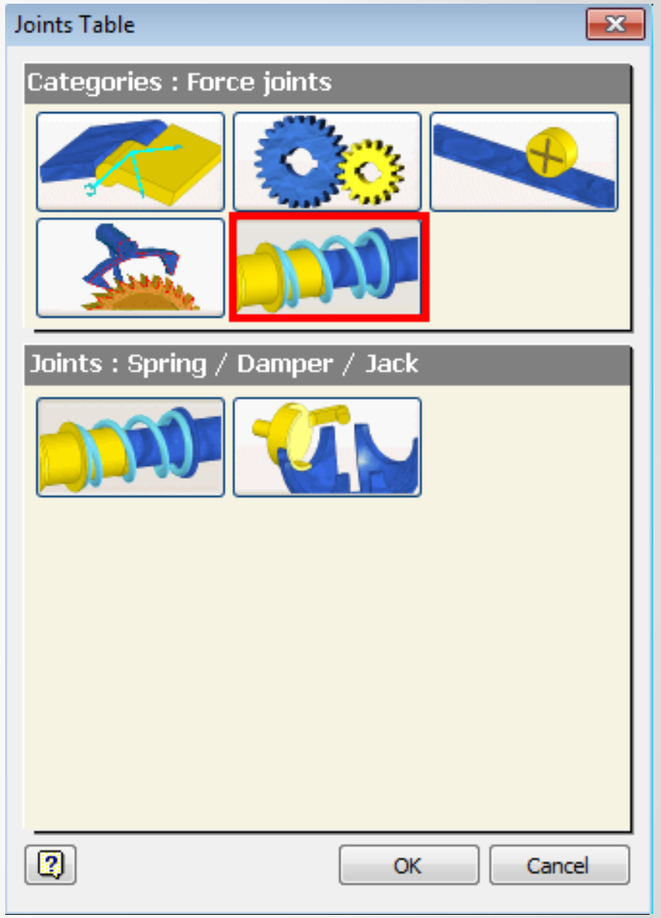
Suggested Workflow – Step 2

Stage 1

- Create Standard joints
  - Revolution
  - Prismatic
  - Spherical etc

Stage 2

- Create Non-Standard joints
  - Rolling
  - Sliding
  - Force Joints etc



Suggested Workflow – Step 2

Stage 1

Option 1

- **Automatic Conversion**

Converts assembly constraints and joints

Option 2

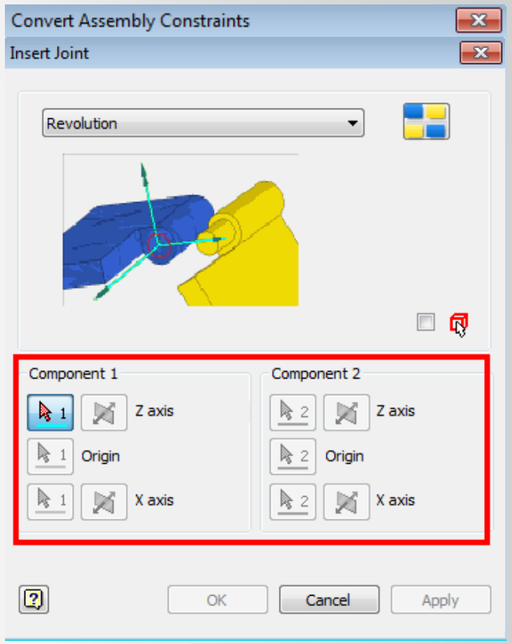
- **Manual Conversion**

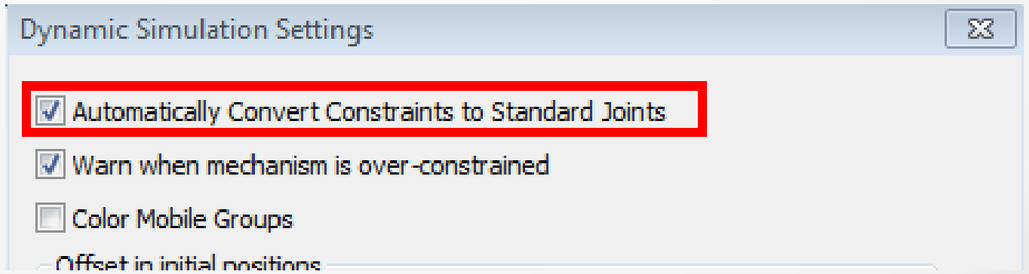
Allows you control which constraint to use to when creating joints

Option 3

- **From Scratch**

Does not make use of assembly constraints and joints



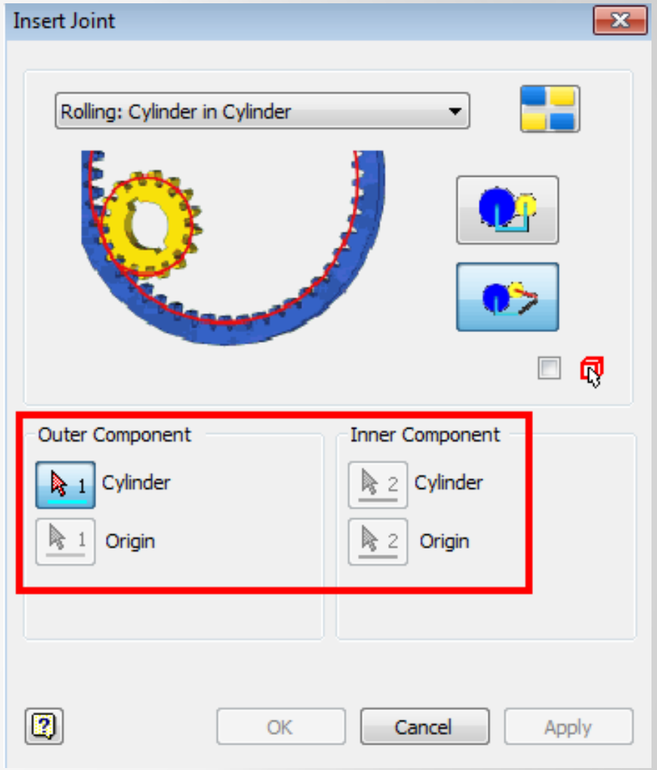


Suggested Workflow – Step 2

Stage 2

Non-Standard Joints

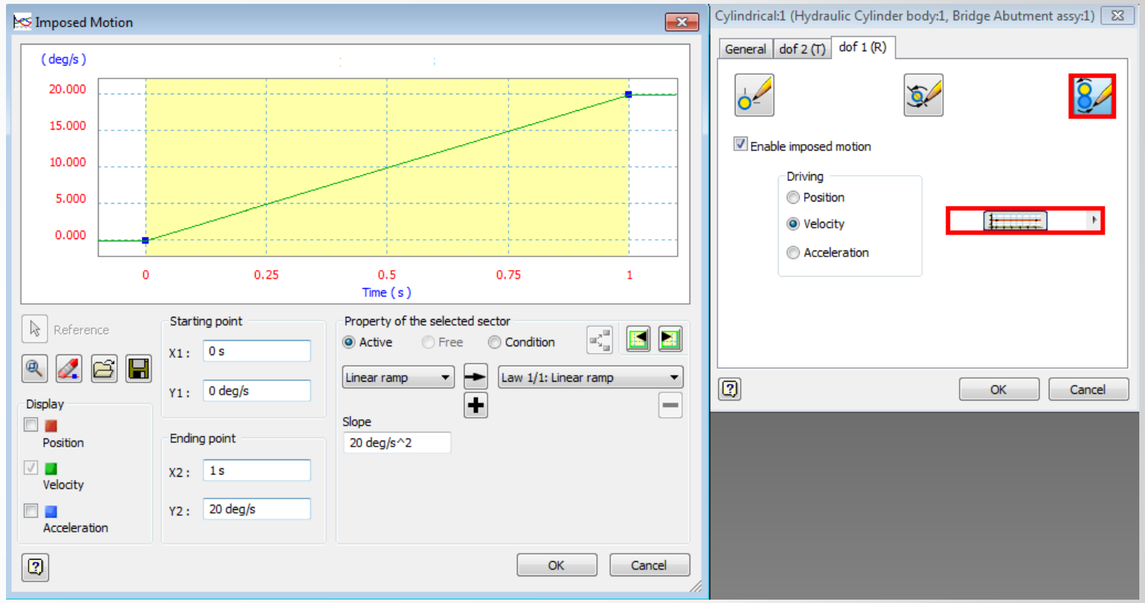
- From Scratch



Suggested Workflow – Step 3

Simulating Reality

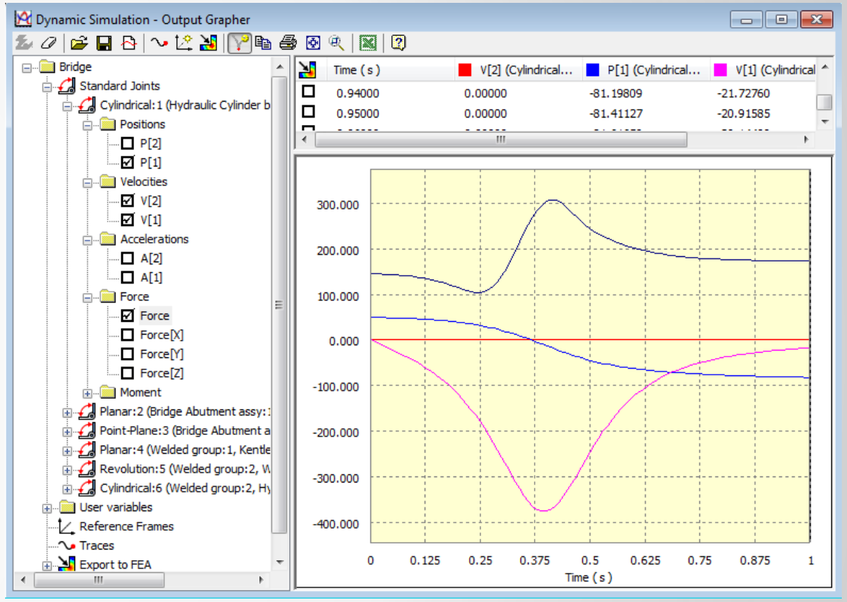
- Joints
  - Initial Positions
  - Friction
- External Loads
  - Force
  - Gravity
  - Torque
- Motion
  - Constant Value
  - Variable (Input Grapher)



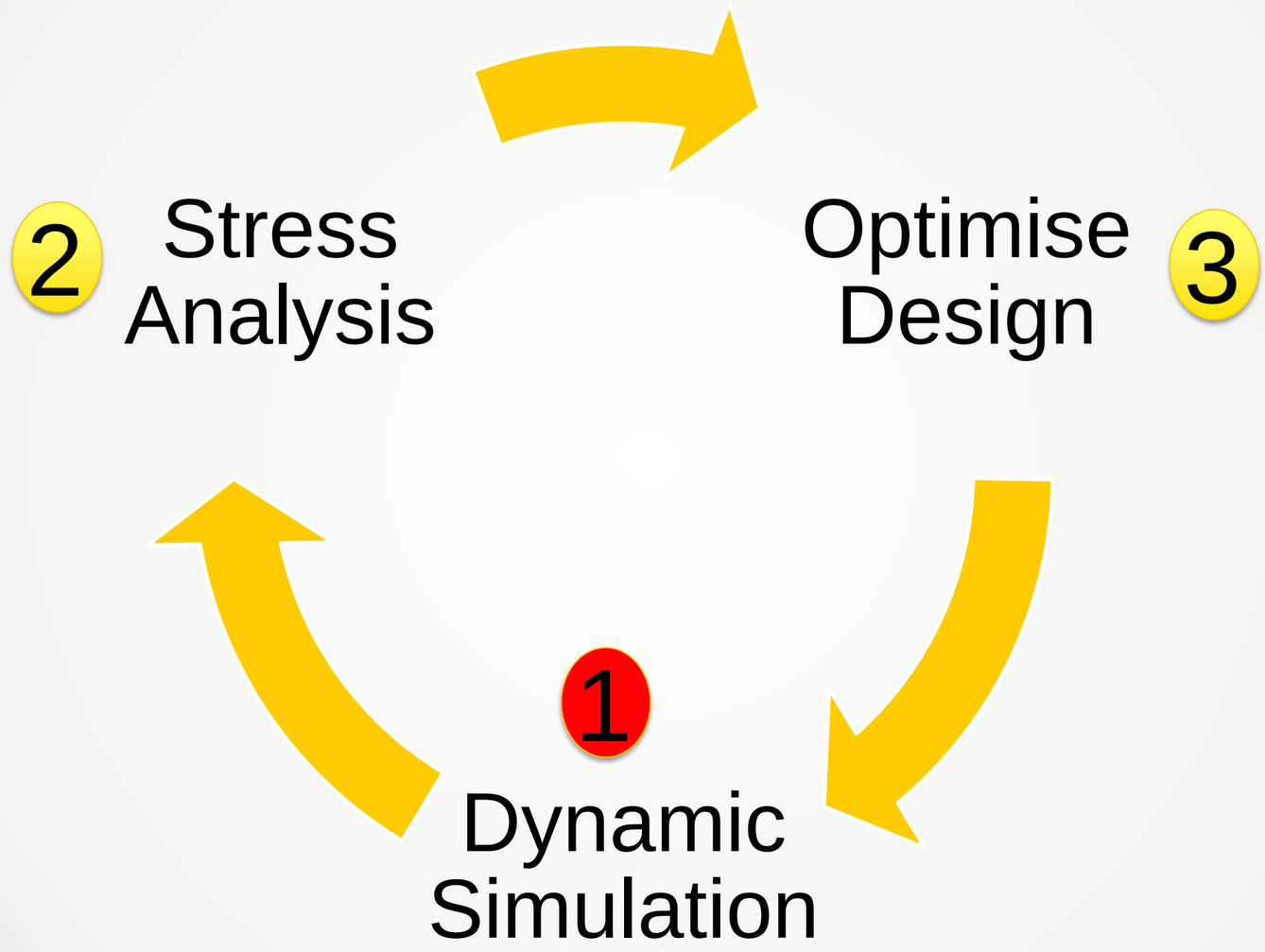
Suggested Workflow – Step 4

Analyzing Designs

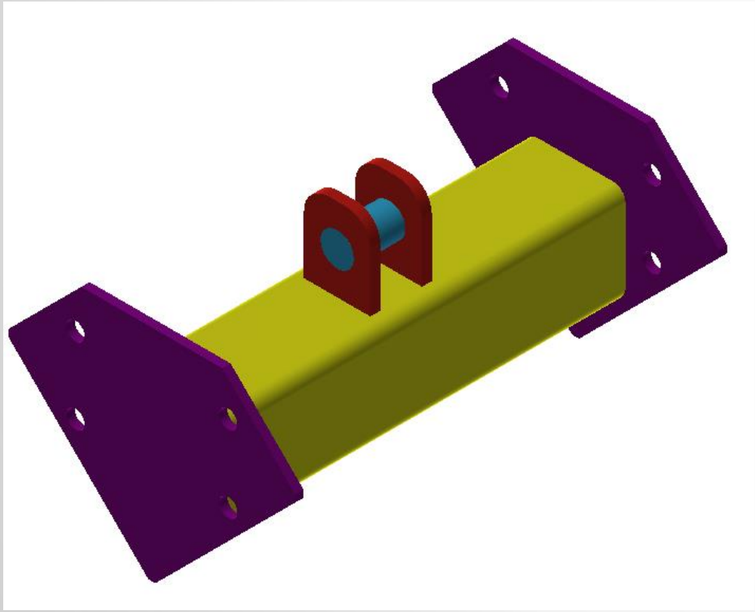
- Positions/Velocities/Accelerations
- Reactions
  - Forces
  - Torques
  - Moments
- Contact Forces



Now lets see software in Action - DEMONSTRATION



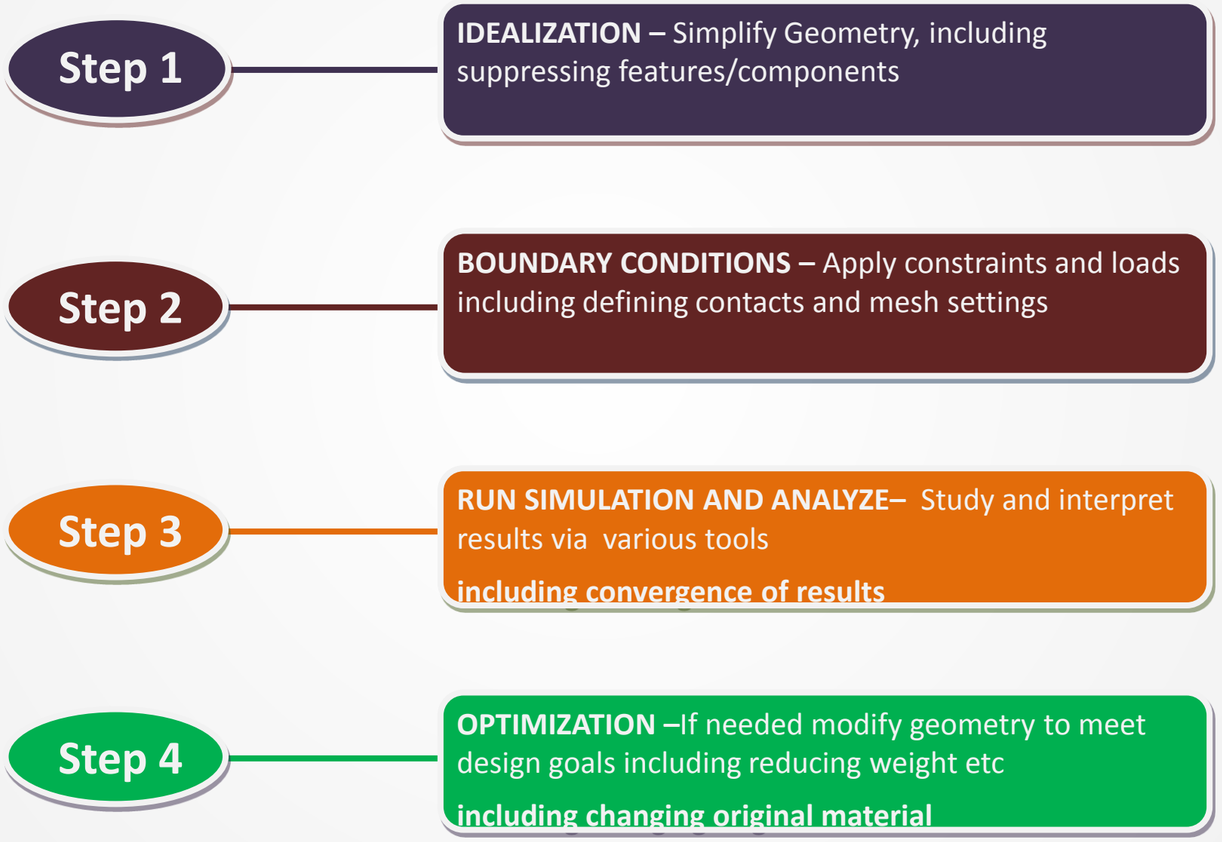
Stress Analysis



Goal

- Analyze design subjected to jack forces
- Optimize design – reduce material

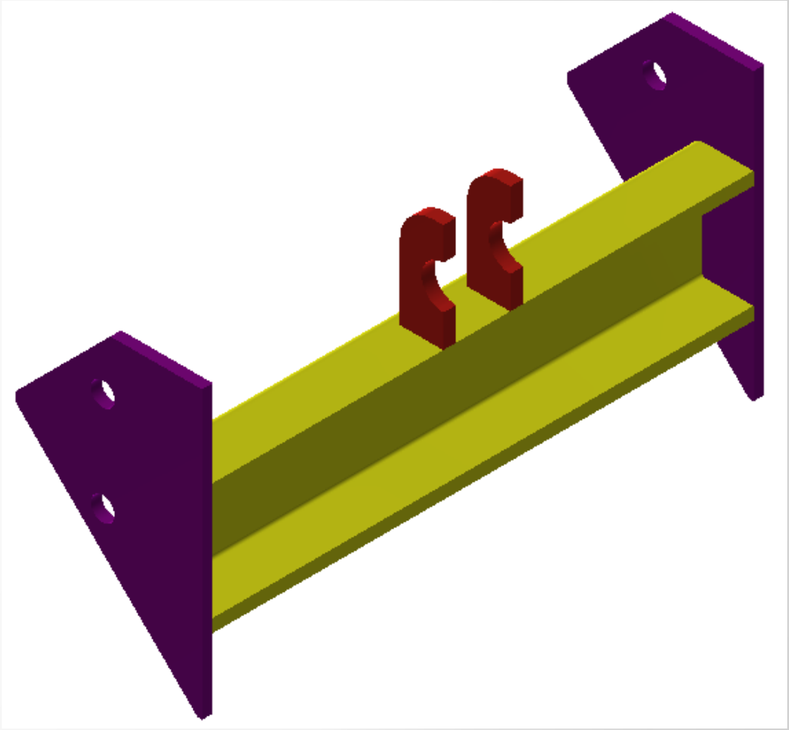
Stress Analysis (SA) – Suggested Workflow



Suggested Workflow – Step 1

Idealization

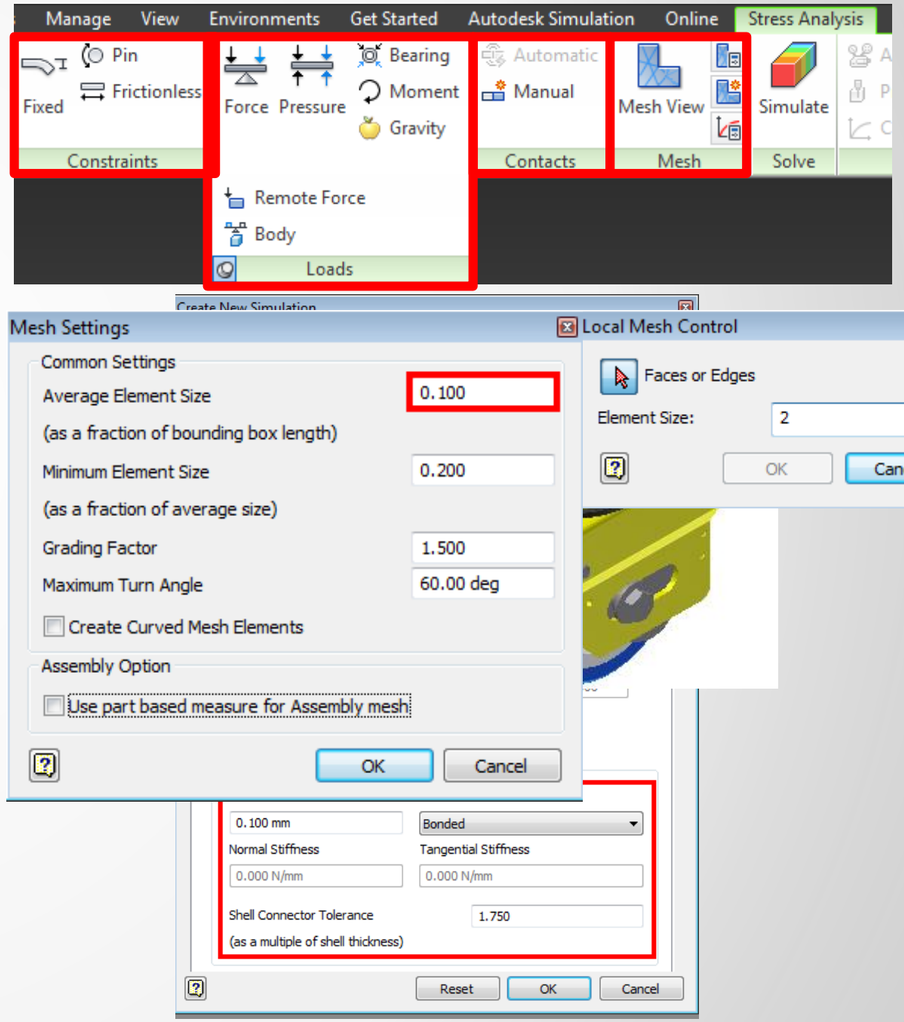
- Suppress features/components
- Make use of Symmetry
  - Half
  - Quarter
  - Eight
  - Cyclic



Suggested Workflow – Step 2

Boundary Conditions

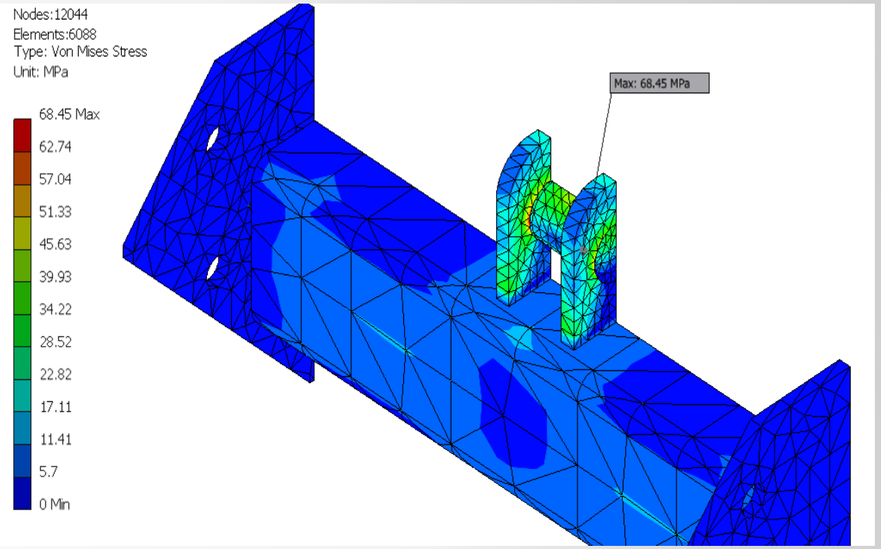
- **Constraints**
  - Fixed
  - Pinned and
  - Frictional
- **Loads**
  - General
  - Body
  - Face
- **Connections**
  - Contacts
  - Connectors – applies to shells only
- **Mesh**
  - Global
  - Local - option

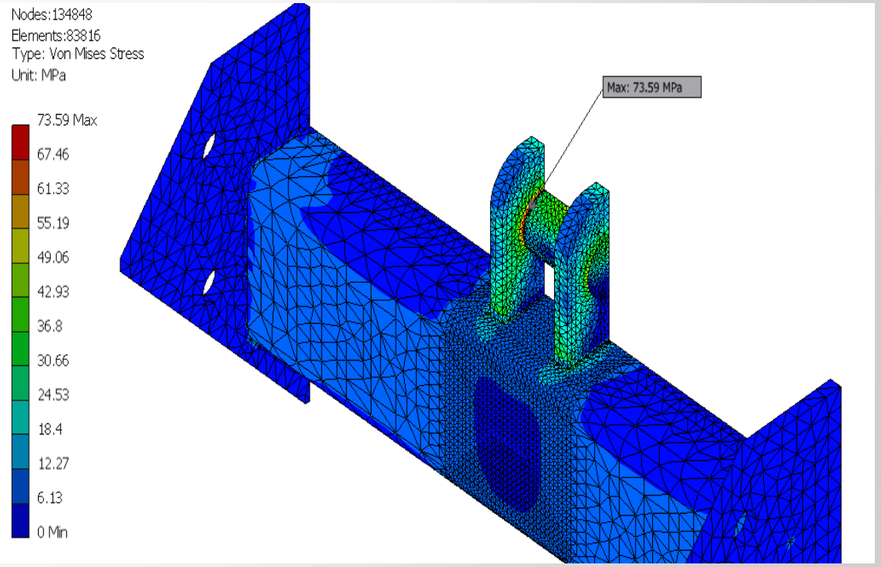


Suggested Workflow – Step 3

Results

- Do the results make sense?
- Are the results what you expected?
- Are the results converging???????





Suggested Workflow – Step 4

Optimize

- Change material
- Parametric Geometry experimentation

Parametric Table

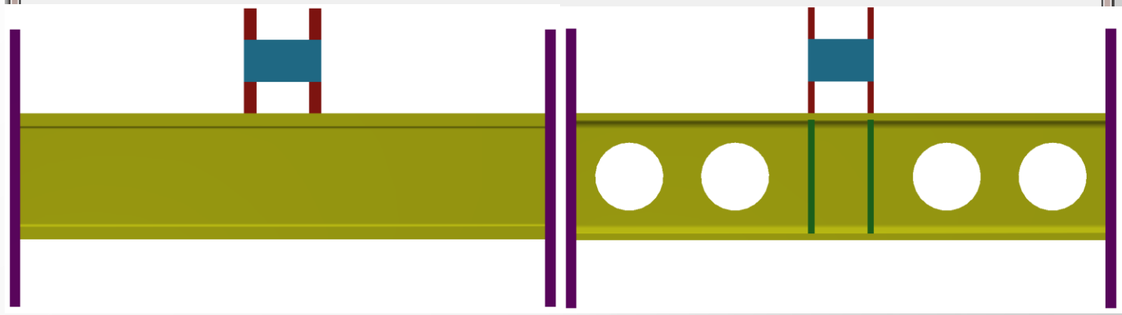
Parametric Table

Design Constraints

Constraint Name	Constraint Type	Limit	Safety Factor	Result Value	Unit
Max Von Mises Stress	View the value				MPa
Mass	View the value				kg

Parameters

Component Name	Feature Name	Parameter Name	Values		Current Val	Unit
120 x 120 x 8 x 500 SHS		Boxsectionthickness	6,12		12	mm
Pivot Base Gusset		PivotBaseGussetThickness	6,12		12	mm



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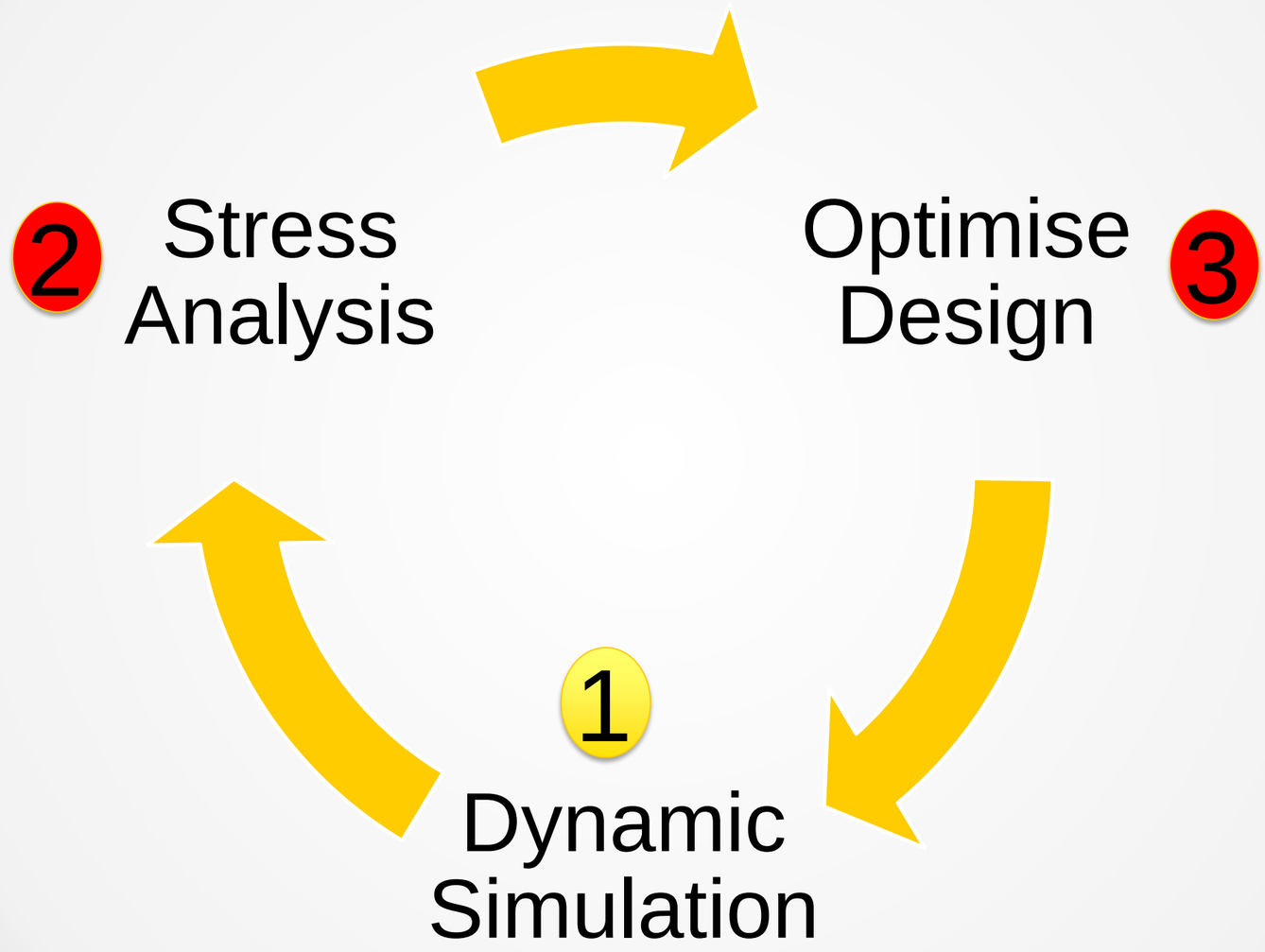
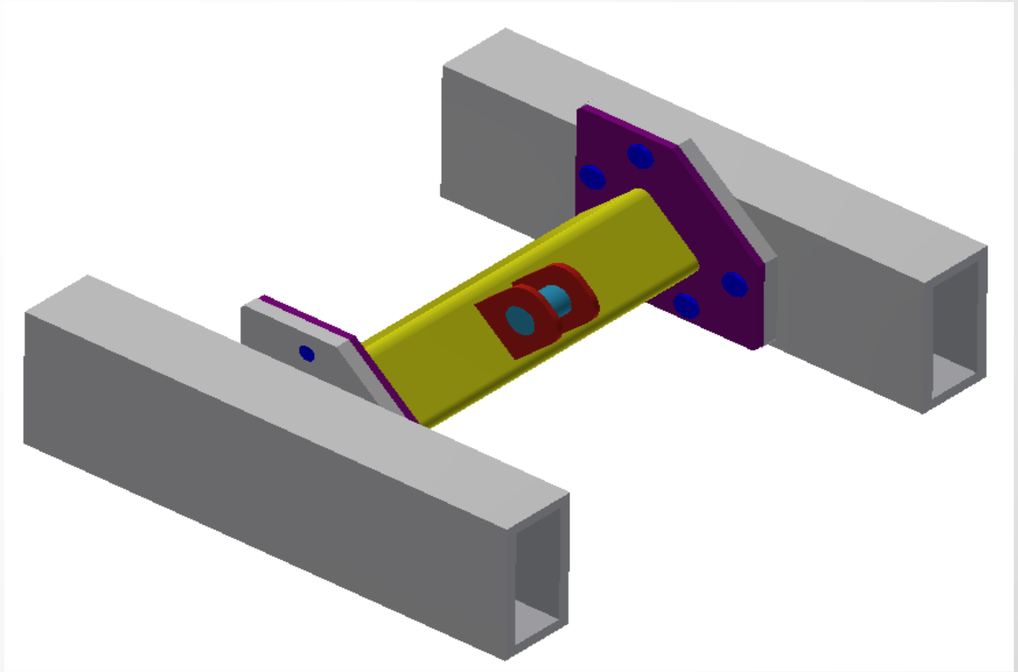


Nastran IN-CAD

Simulation Super Pill!

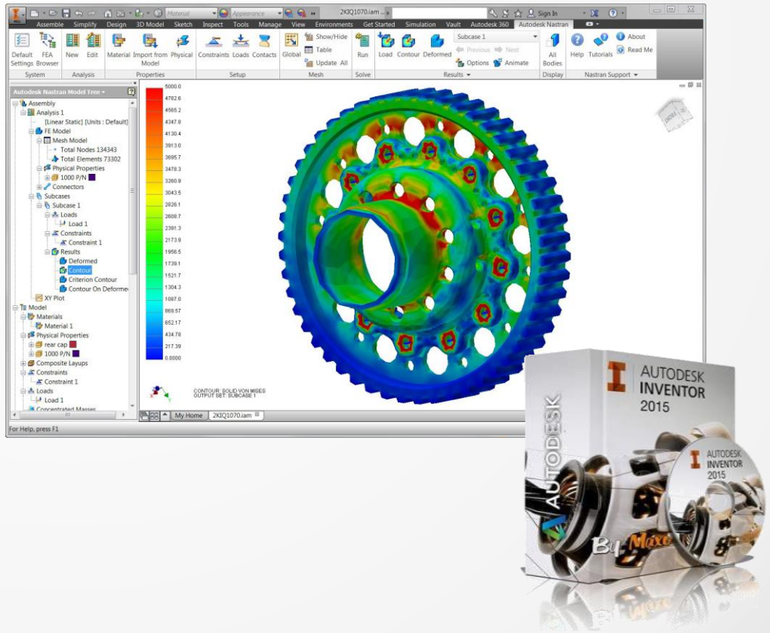
Goal

- Analyze Bolts
- Fatigue!!!



Nastran IN-CAD

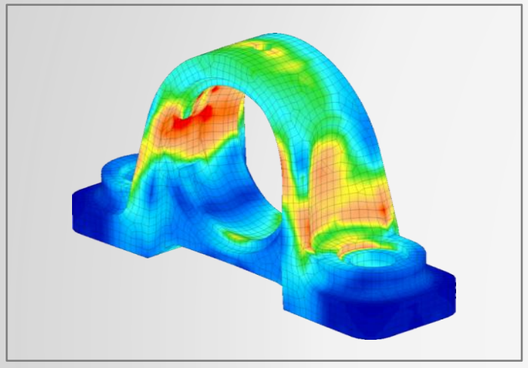
- Works directly inside Inventor
- Network License
- Uses industry standard NASTRAN solver
- Offers more simulation than Inventor



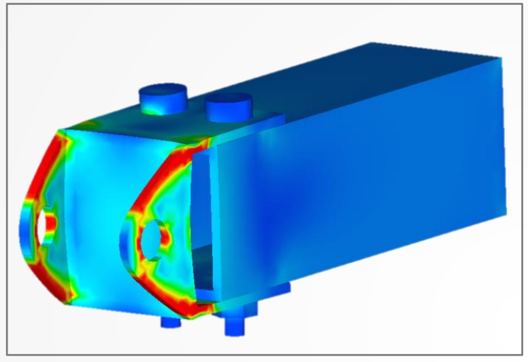
AUTODESK® NASTRAN®

Basic analysis capabilities

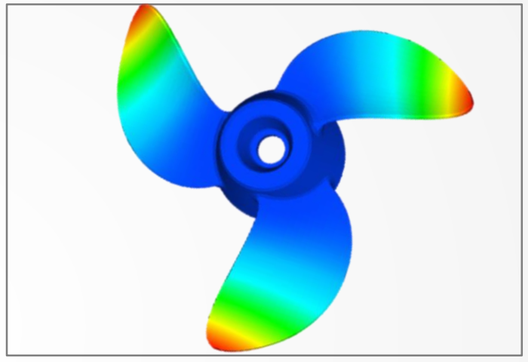
Linear Statics



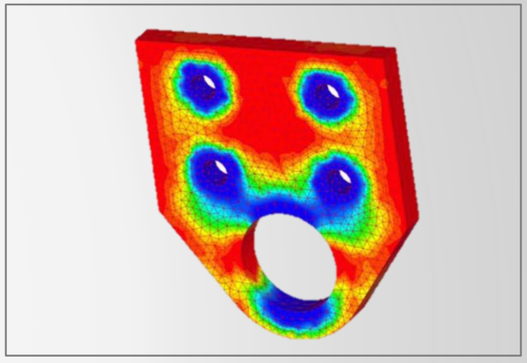
Assembly Modeling with Contact



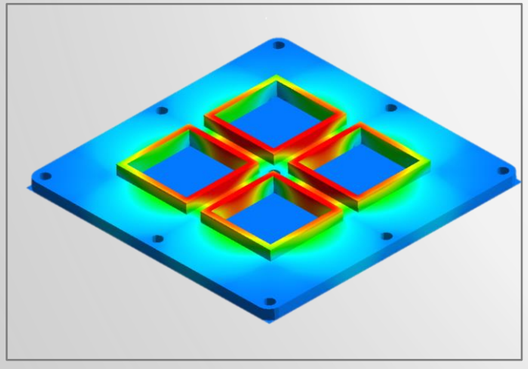
Normal Modes



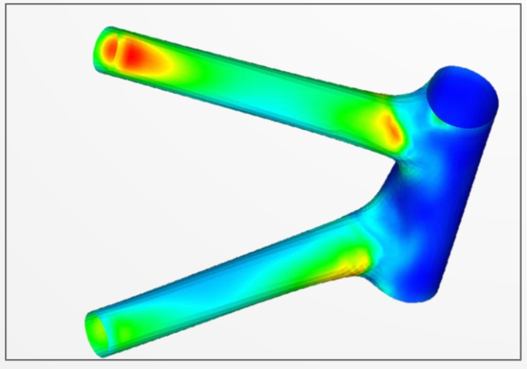
Prestress Static and Normal Modes



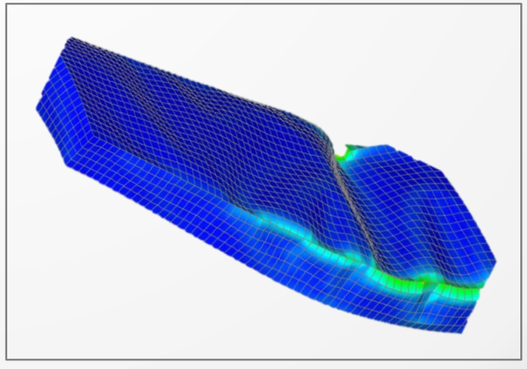
Linear Steady State Heat Transfer



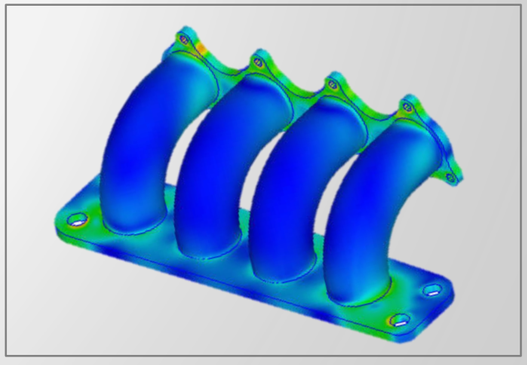
Composites



Buckling

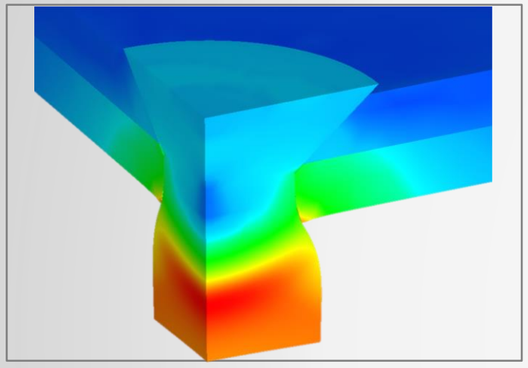


Thermal Stress

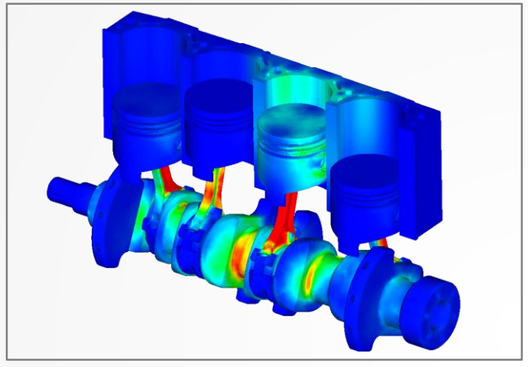


Advanced analysis capabilities

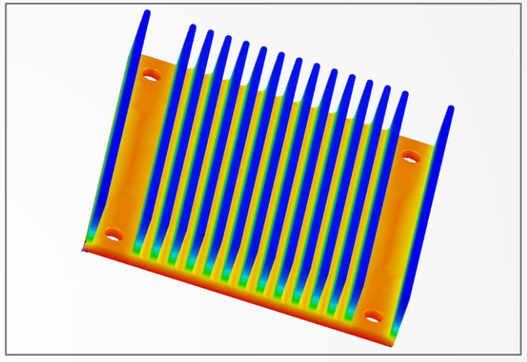
Nonlinear Statics



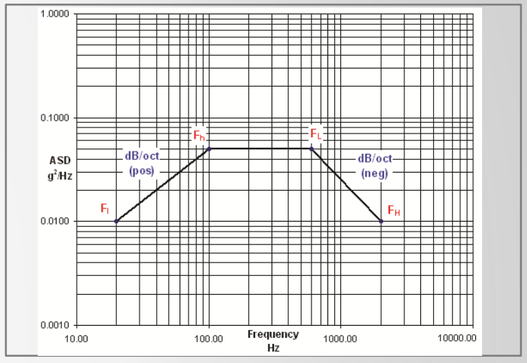
Nonlinear Transient Heat Transfer



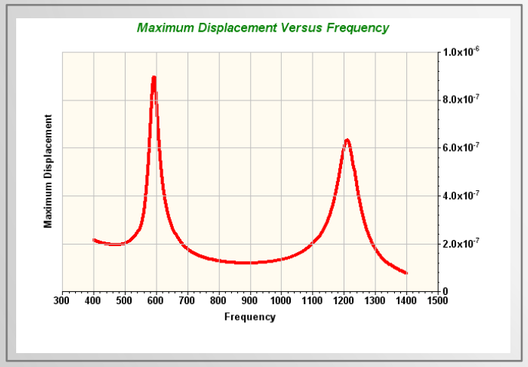
Nonlinear Steady State Heat Transfer



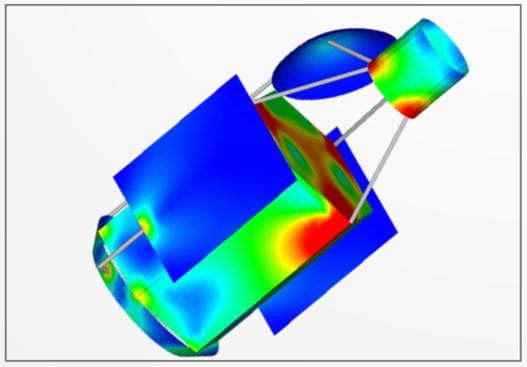
Random Response



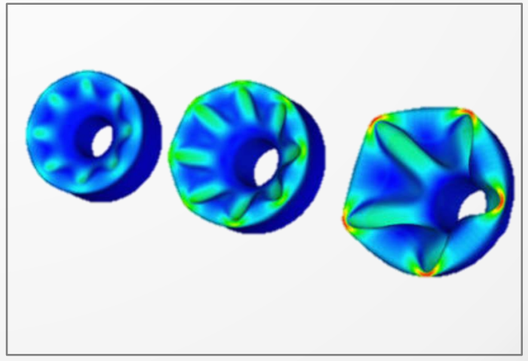
Frequency Response



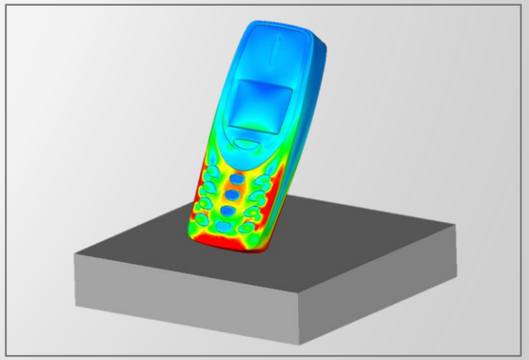
Linear and Nonlinear Transient Response



Advanced Nonlinear and Hyperelastic Materials



Automated Impact Analysis (AIA) and Drop Test



Now lets take a brief look- Nastran IN-CAD DEMONSTRATION

Nastran IN-CAD Sessions at AU 2015

Nastran IN-CAD hands on lab

IM10577-L - BAM—Let’s Throw a Little In-CAD into Your Simulation Soup

Other suggested Nastran Sessions

MFG11131 - The World is Nonlinear! Seeing and capturing nonlinear in real-world problems

IM11105 - “A Job Weld Done”: Getting to the bottom of modeling welds in FEA… Debunking common perceptions.

IM11234 - Goal-Driven Design—Using Simulation and Optimization in the Design Process

AT11462 - Shaking All Over - Using simulation to understand vibrating products

Look out for Nastran In-CAD power track for a complete list of session

Questions

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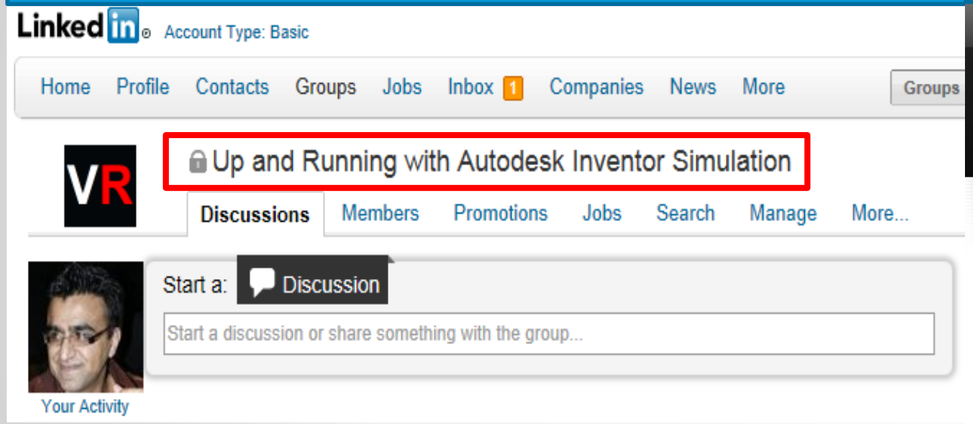
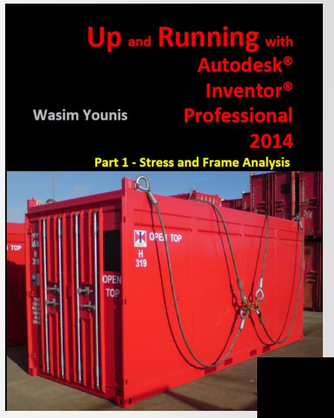
Additional Inventor Simulation Resources

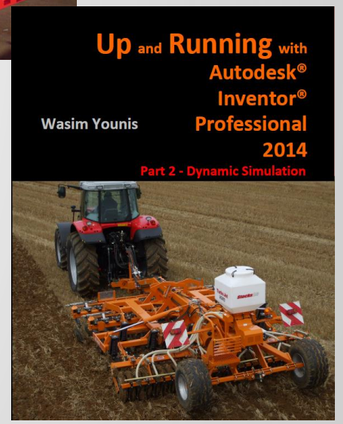
LinkedIn Support Forum



Simulation Blog

http://vrblog.info/





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