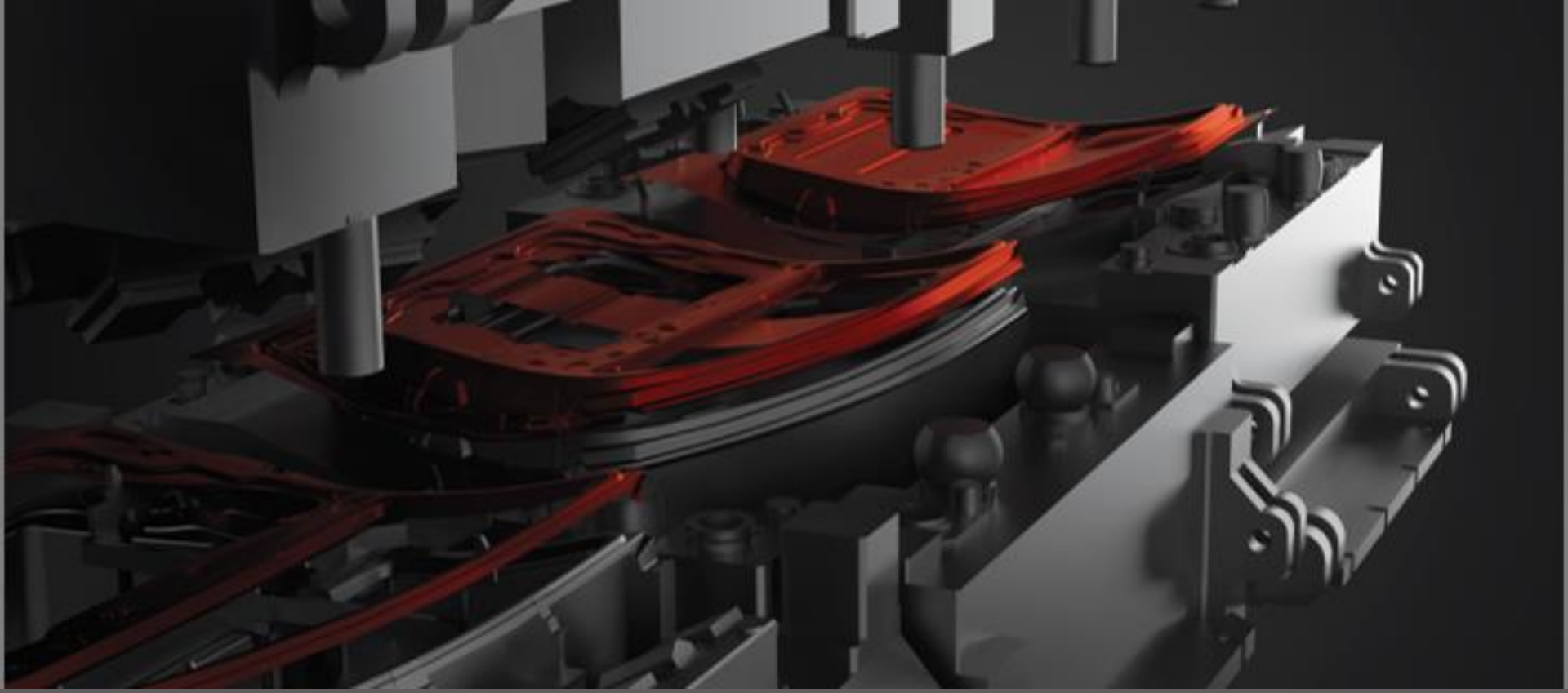

Inspire Form 실전 (1) Feasibility(one step) 해석

한국알테어 • 김성문 기술사 • 2019-05-13

Altair

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발표 순서

- Altair Inspire Platform
- Inspire Form Feasibility

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Altair Inspire Platform

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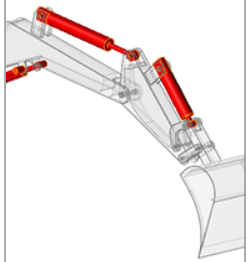
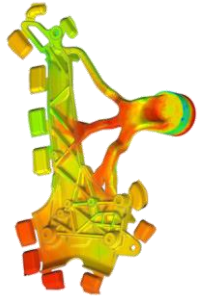
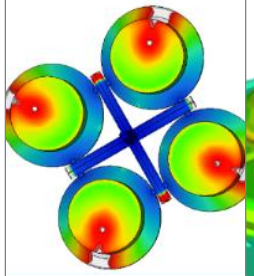
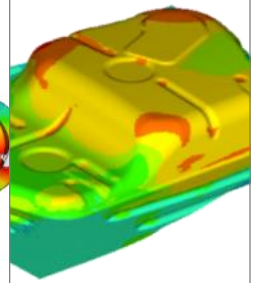
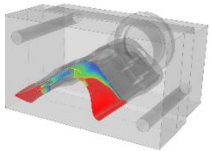
Altair Inspire - From Studio To Manufacturing

Studio	Structures	Motion	Casting	Molding (coming soon)	Forming	Extrusion	Additive (coming soon)

The industry’s most powerful and intuitive solution for design engineers to create high performing and manufacturable products.

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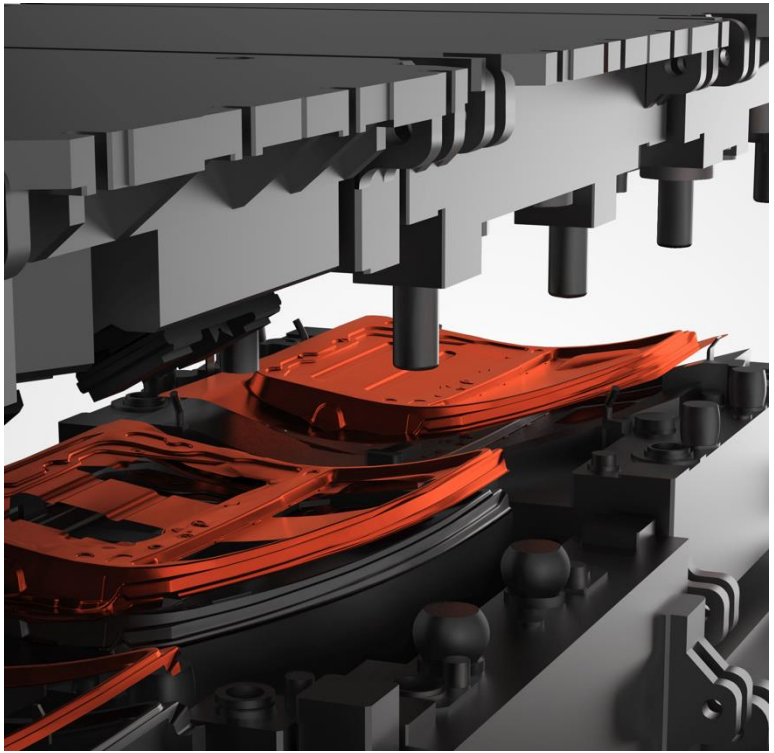
What Is Altair Inspire Form?

A streamlined stamping simulation software to

- Design better products with early check for forming feasibility
- Reduce scraps and improve material utilization
- Improve productivity with accurate formability analysis
- Optimize the process through single and multi-stage virtual tryout



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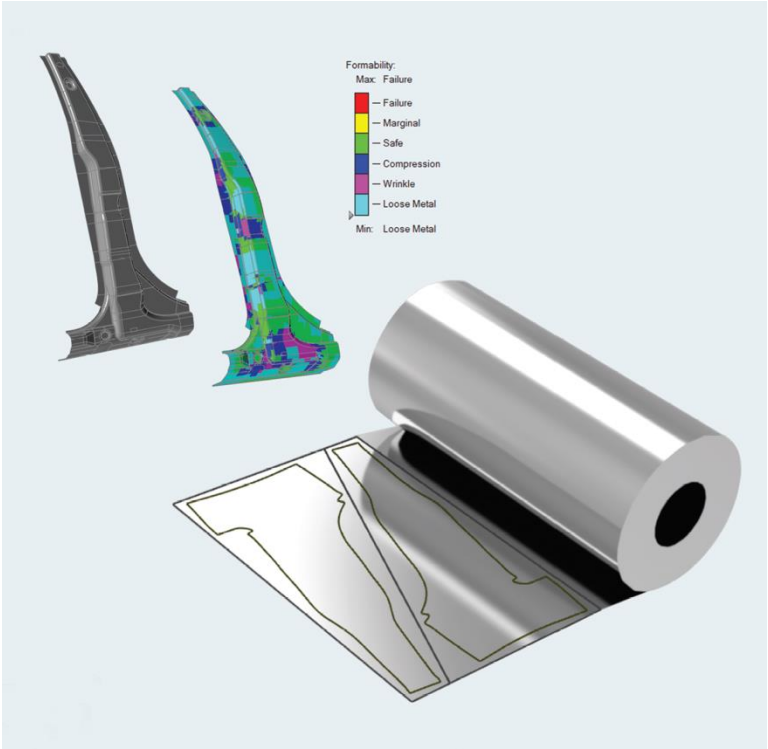
Feasibility (1-step)

1. Use part CAD – no meshing required
2. Material database with US, Japanese and European standards
3. Automatic orientation to minimize undercuts
4. Apply blank holding force and drawbeads
5. Visualize thinning, formability, strains
6. Automatic blank fit and nesting to save material cost



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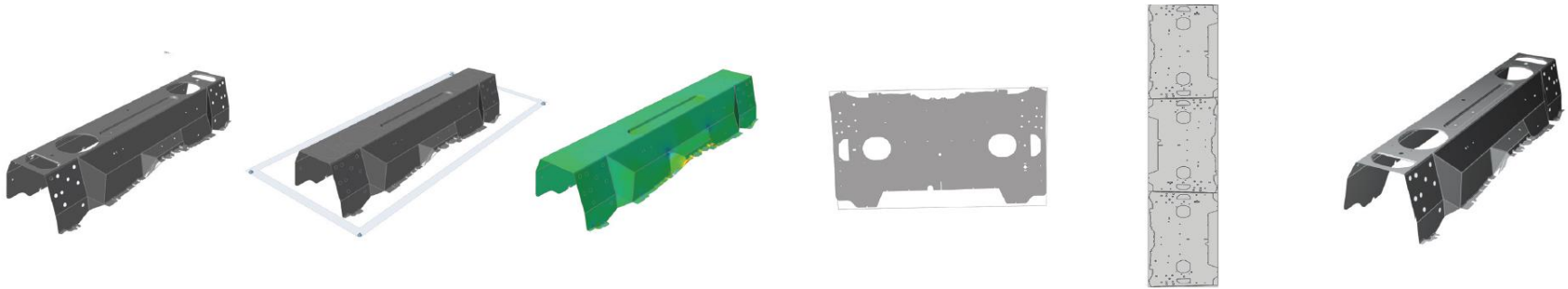
Feasibility Workflow

Quickly and reliably check the formability of the part early in the design phase by predicting potential for splits, wrinkles and loose metal.

The geometry of the flat blank can be automatically fitted inside regular shapes such as rectangle and trapezoid as well as nested on a sheet coil for maximum material utilization.



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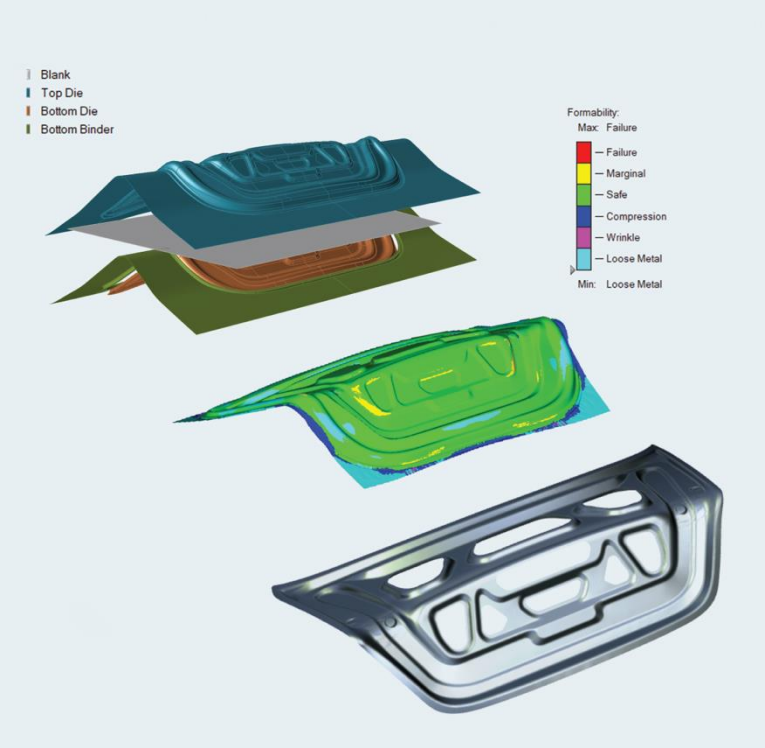
Virtual Tryout (Incremental)

1. Intuitive and efficient environment for single and multi-stage stamping simulation.
2. Highly scalable solver for accurate forming and springback analyses
3. Thinning, strain, stress, failure contours and Forming Limit Diagram
4. Plot of tool force versus stroke
5. Callouts to view results history at any location



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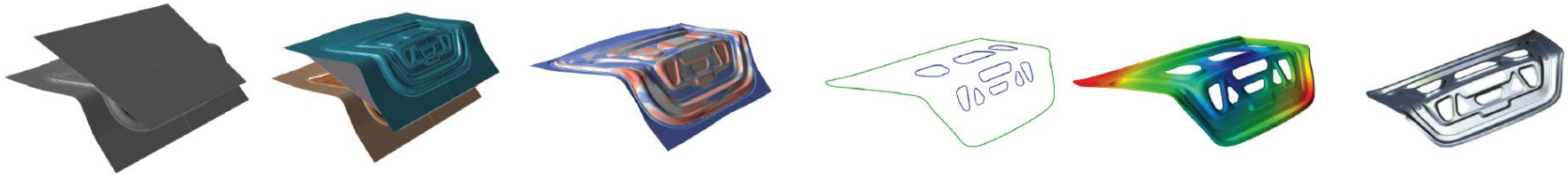
Tryout Workflow

Intuitively setup complex stamping processes including gravity, draw, redraw, flanging and springback with all tools and blanks.

Iterate on blank holder force and drawbead location and force to improve part quality.



Import Model | Set Up Drawing | Analyze Drawing | Set Up Trimming & Springback | Analyze Springback | Form

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Inspire Form Feasibility

Model.iform - Altair Inspire Form 2019.1

File Edit View Geometry Feasibility Tryout

Files Measure Move — Home

Extract Face Defeature Mirror Cut — Prepare

Materials Orient Constrain — Setup

Analyze — Run

Report

Fit Nest — Blank Layout

MPA (mm t N s)

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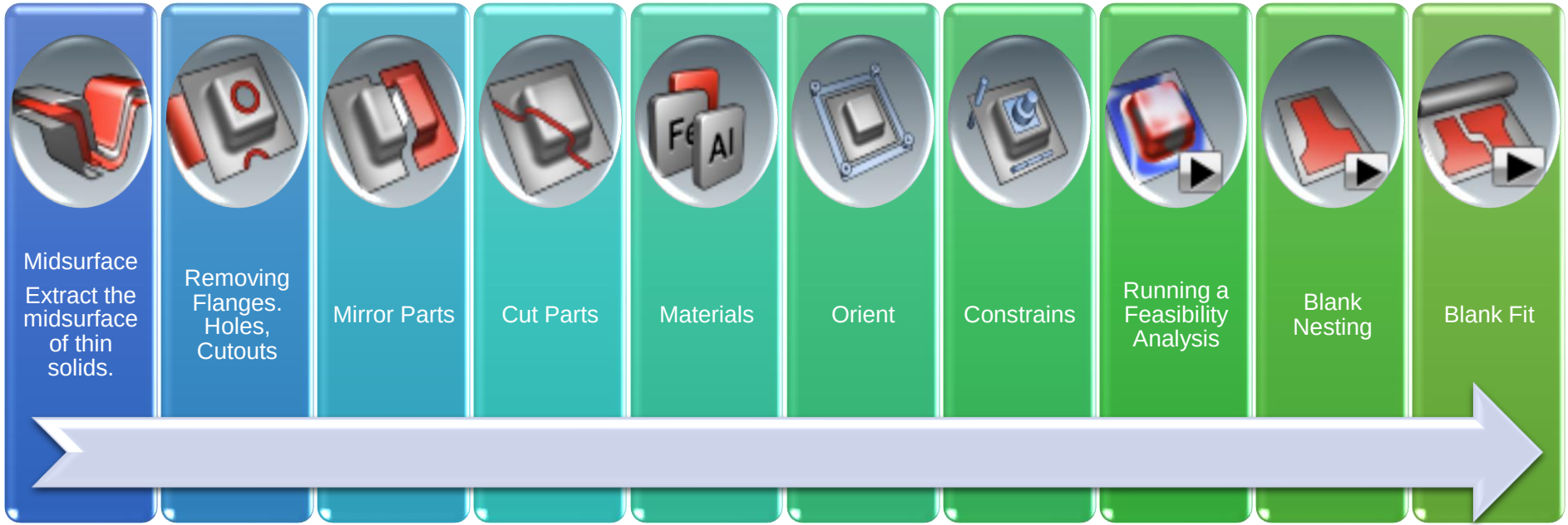
Complete Workflow For Feasibility Analysis



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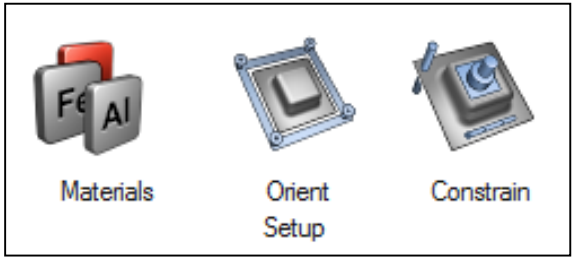
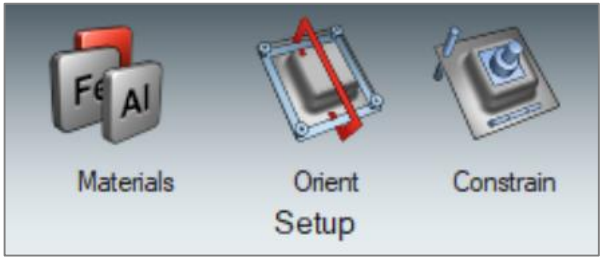
Feasibility setup - Toolbar

- **Feasibility Setup** toolbar - Perform feasibility analyses to identify thinning, splitting and wrinkling problems during the forming process.
  - **Materials -** Create a material that is based on an existing predefined material in the System Library.
  - **Orient -** Use the Orient tool to orient the stamping direction for a part.
  - **Constrain -** Use the Constrain tool to create pin, drawbead, and blankholder constraints for analysis.



- Inspire Form 2019



- Inspire Form 2019.1

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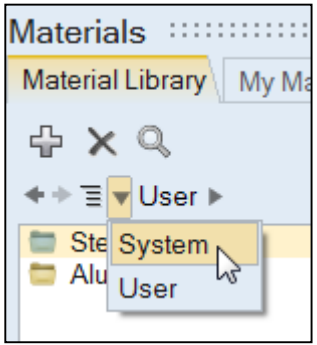
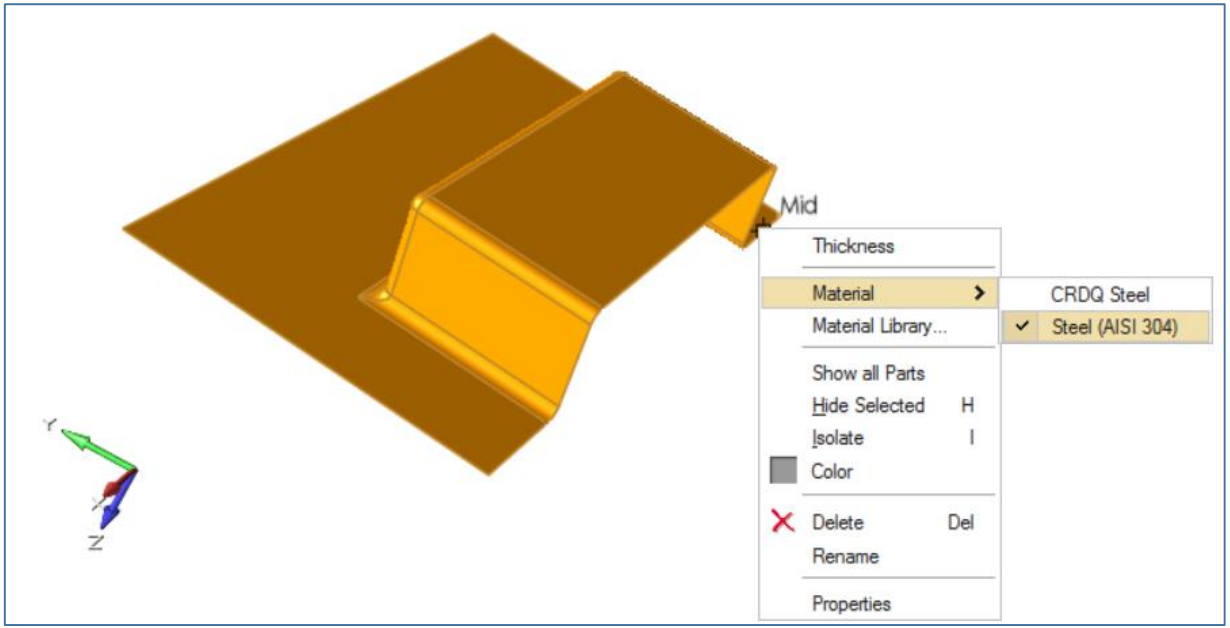
Create and edit materials

- **Create and Edit Materials Based on the System Library**
  - Create a material that is based on an existing predefined material in the System Library.





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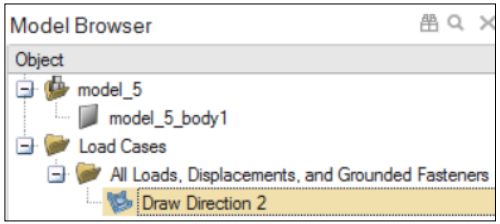
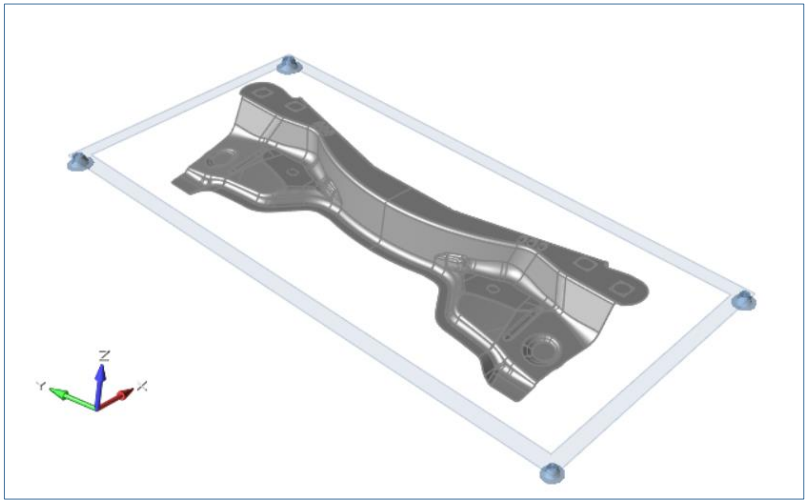
Orient the stamping direction

- **Orient the Stamping Direction**
- Use the **Orient tool** to orient the stamping direction for a part.
- **Feasibility Ribbon > Setup Tool > Orient**



- Left-click on a surface to use its normal as the stamping direction.
- Use the tools available in the micro dialog to orient the stamping direction.
  - Align the stamping direction to the global X, Y, or Z axis.
  - Align the stamping direction to the part
  - Align the stamping direction to an arbitrary direction by clicking in the micro dialog
  - Define an arbitrary direction by clicking and specifying X, Y, and Z values.



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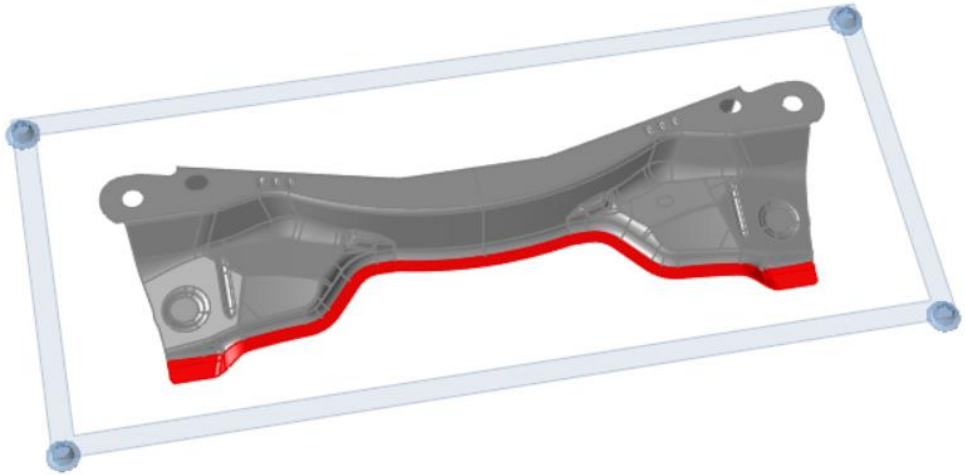
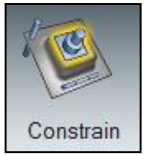
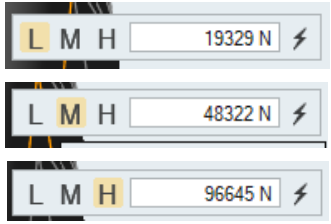
Create constraints – Blank Holder

- **Create Constraints**
- Use the **Constrain** tool to create **Pin**, **Drawbead**, and **Blankholder** constraints for analysis.
- From the **Feasibility ribbon > Setup tools > Constrain tool group**

•**Blankholder surfaces** are pre-grouped and highlighted based on cursor location. If individually selected surfaces share an edge, they will be grouped together







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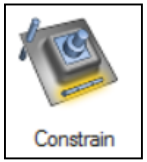
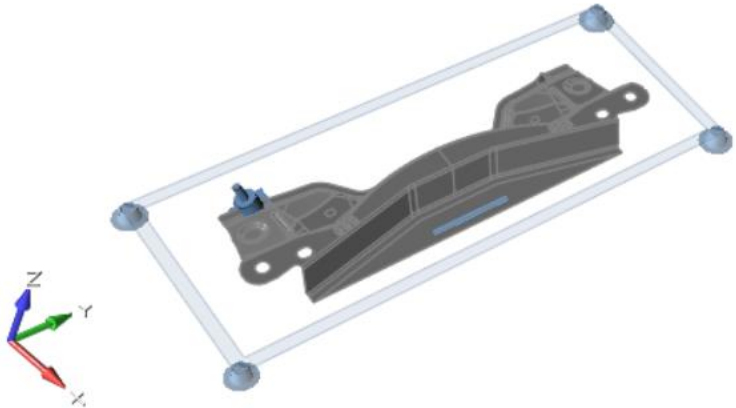
Create constraints – Draw Bead

- **Create Constraints**
- **Drawbead -** Use the Drawbead tool to create drawbead constraints.
- Select individual surfaces by holding **Ctrl** while left-clicking
- Append surfaces to your selection by holding **Ctrl** while left-clicking.
- Selected surfaces are highlighted red
- Click on Create **drawbead**
- In the micro dialog, define the drawbead force
- Drawbeads are created with a force value corresponding to low
- Set the force to low, medium, or high
- Enter a force





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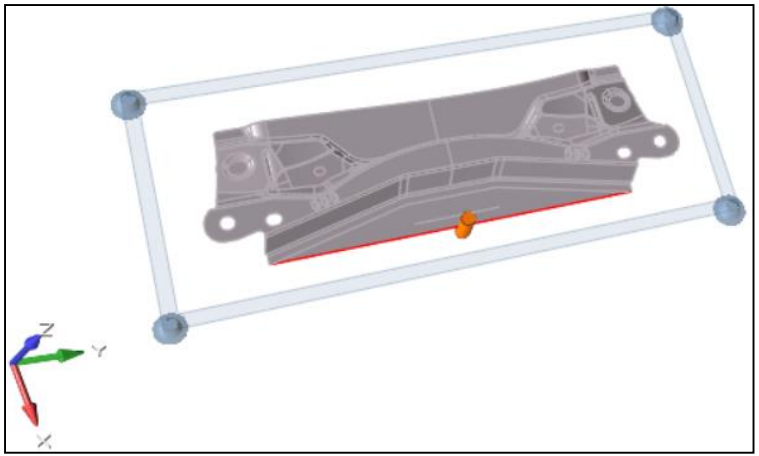
Creating constraints – Pin

- **Creating Constraints**
  - **Pin -** Use the Pin tool to apply pin constraints to the points and edges of a part
  - **Left-click** on a point or edge of a part to place a pin constraint
  - Apply a pin constraint to multiple edges by holding **Ctrl** while **left-clicking**.
  - Once you have selected all necessary edges, left-click to place the pin constraint



Select a point or edge to create a pin constraint.

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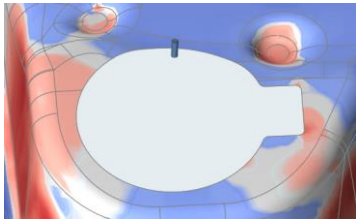
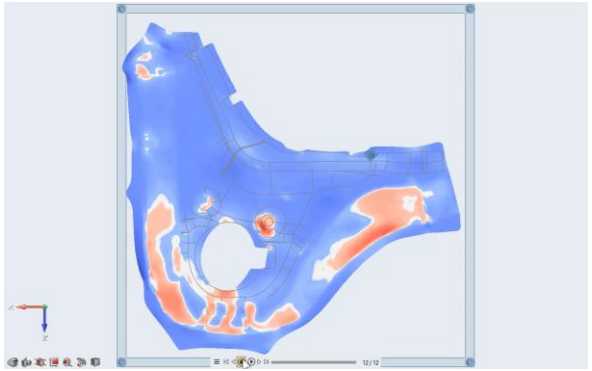
Creating constraints – Pin

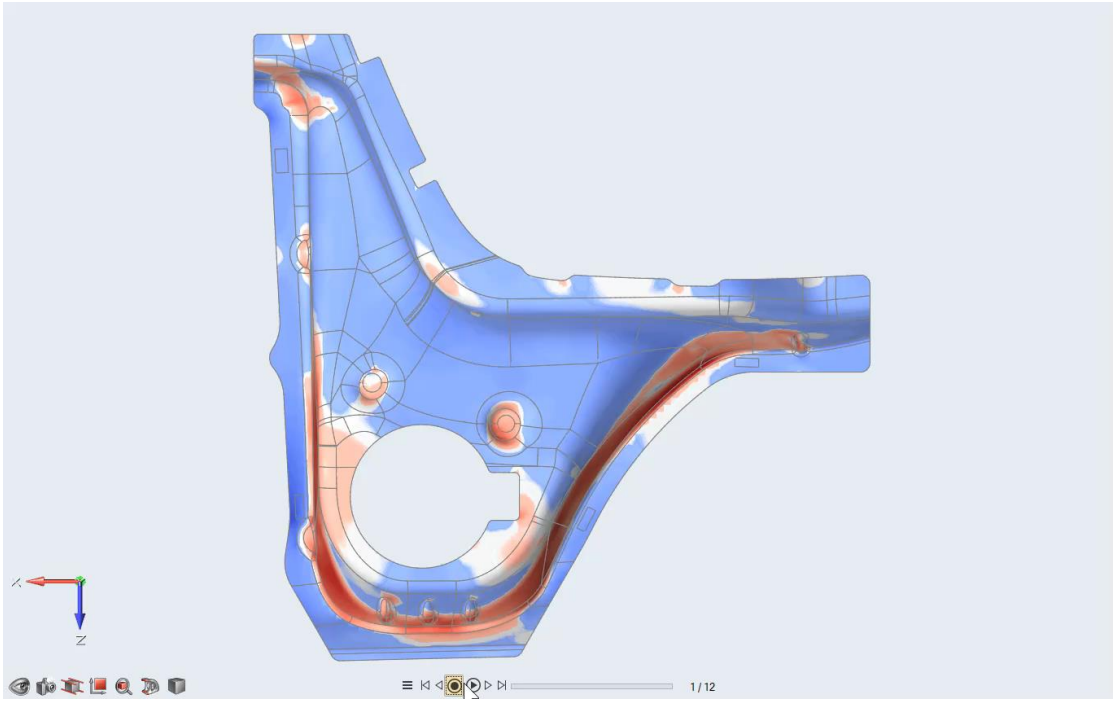
✓ Pin 적용 위치



✓ Pin 미적용



✓ Pin 적용



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Analyzing a feasibility analysis

- **Result Type > Formability -** Each color indicates a unique deformation mode/zone

Failure: Indicates a high potential for failure due to splitting that results from excessive deformation during stamping

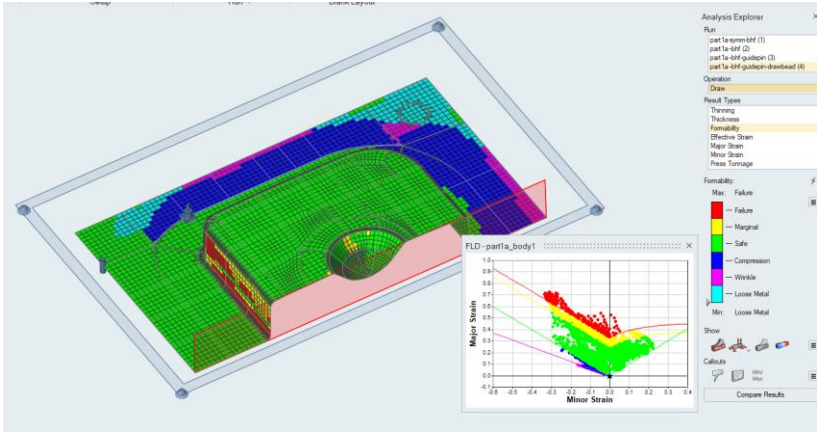
Marginal: Marginal zone indicates some potential for failure during stamping

Safe: Safe zone indicates no potential for failure during stamping

Compression: Compression zone indicates that material is compressed during stamping

Wrinkle: Wrinkle zone indicates that the potential for failure is high due to wrinkling during stamping

Loose Metal: Loose metal zone indicates that material is not sufficiently deformed during stamping.



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Toolbar의 경계 조건 적용에 따른 해석 결과

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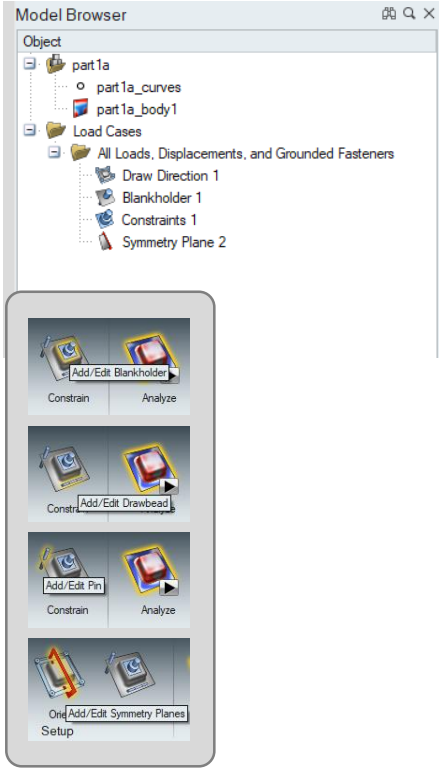
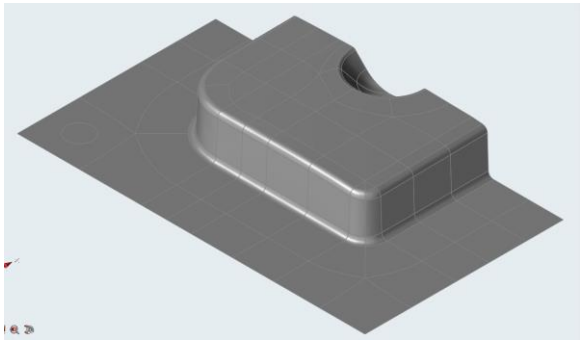
Toolbar의 경계 조건 적용에 따른 해석 결과

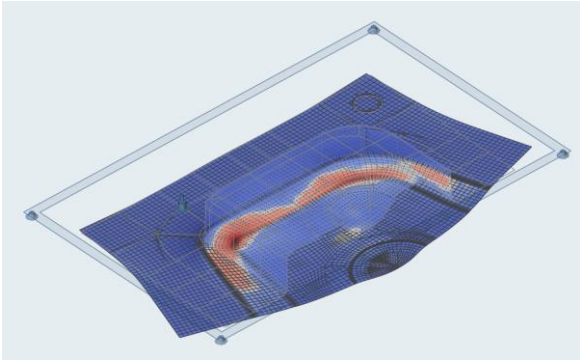
✓ Model Browser



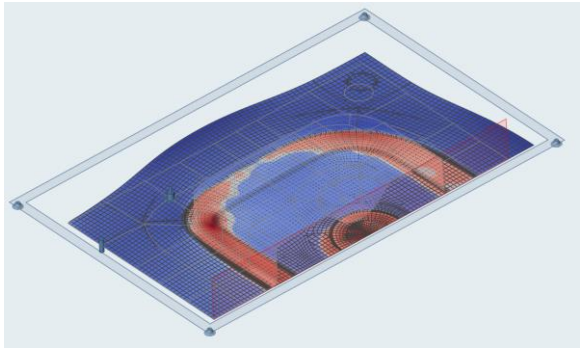
✓ Inspire Form 모델



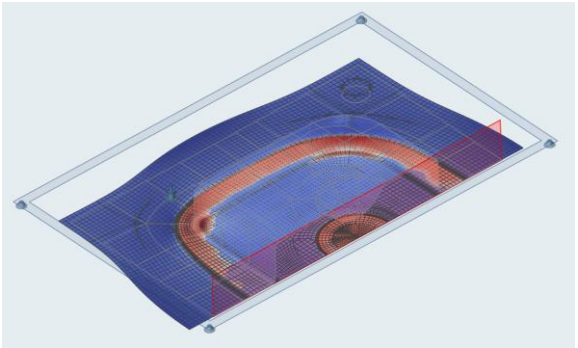
✓ Symmetry Plane 無



✓ Symmetry Plane 有, Guide Pin有



✓ Symmetry Plane 有



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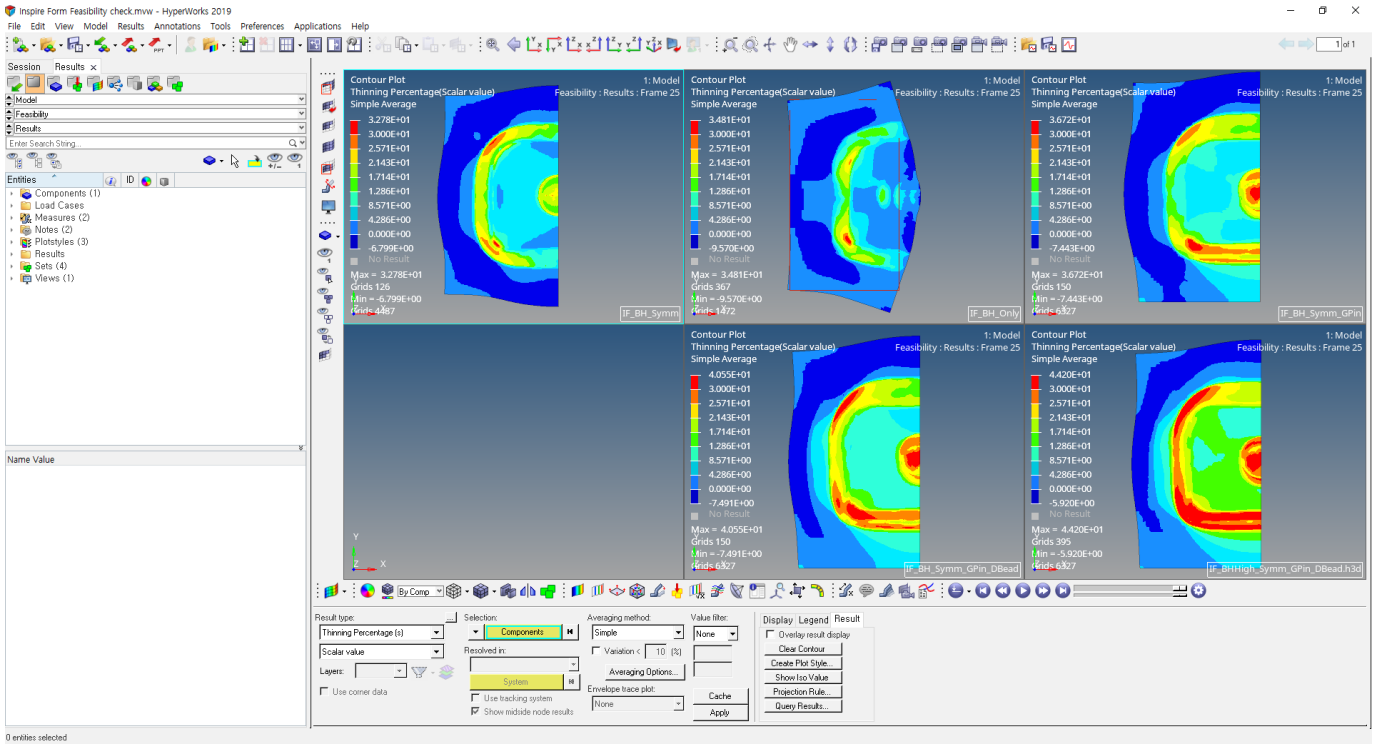
해석 결과 비교

✓ HyperView에서 결과 확인



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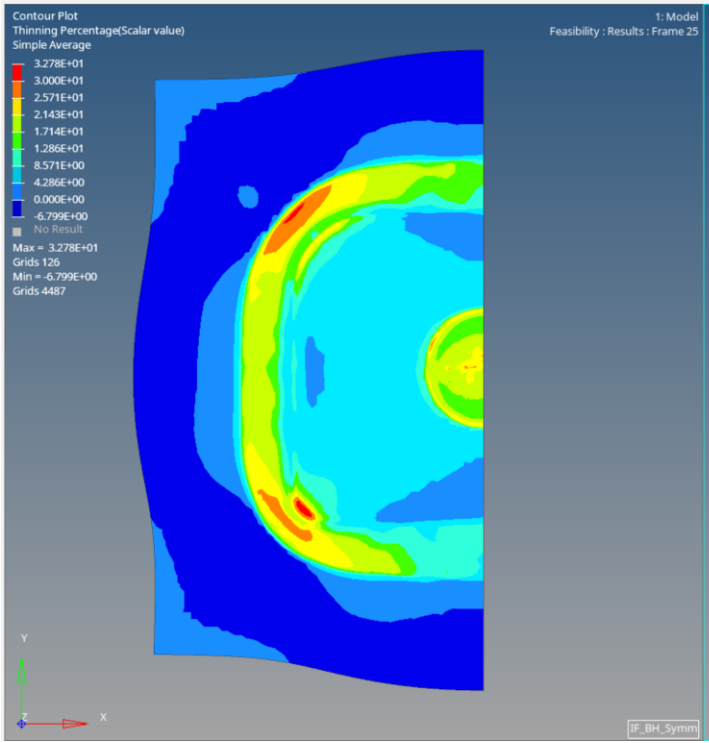
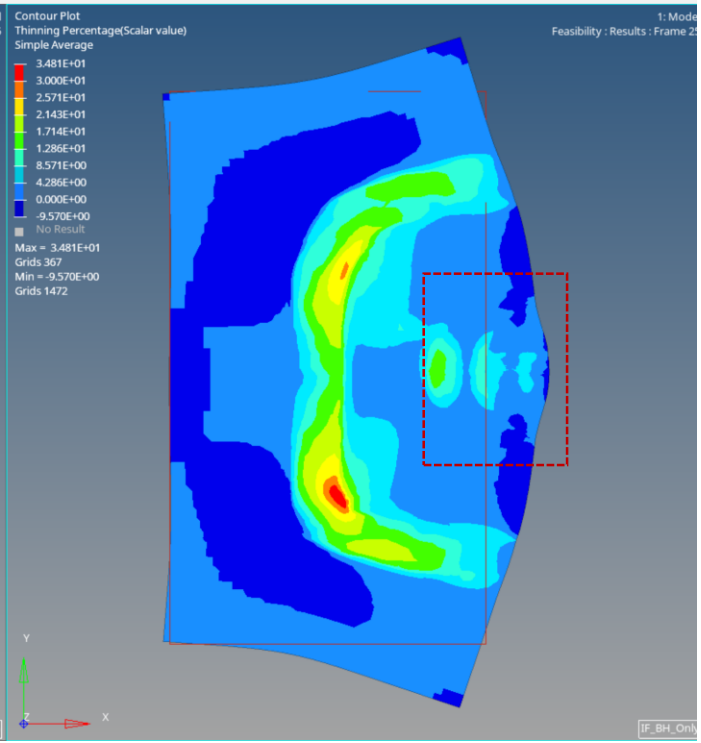
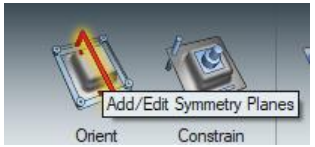
Check 01 – Symmetry

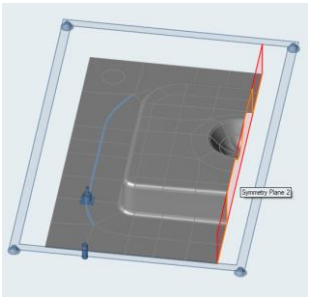
✓ Symmetry Plane 有



✓ Symmetry Plane 무







Press Tonnage: 44.3ton

Press Tonnage: 26.8ton

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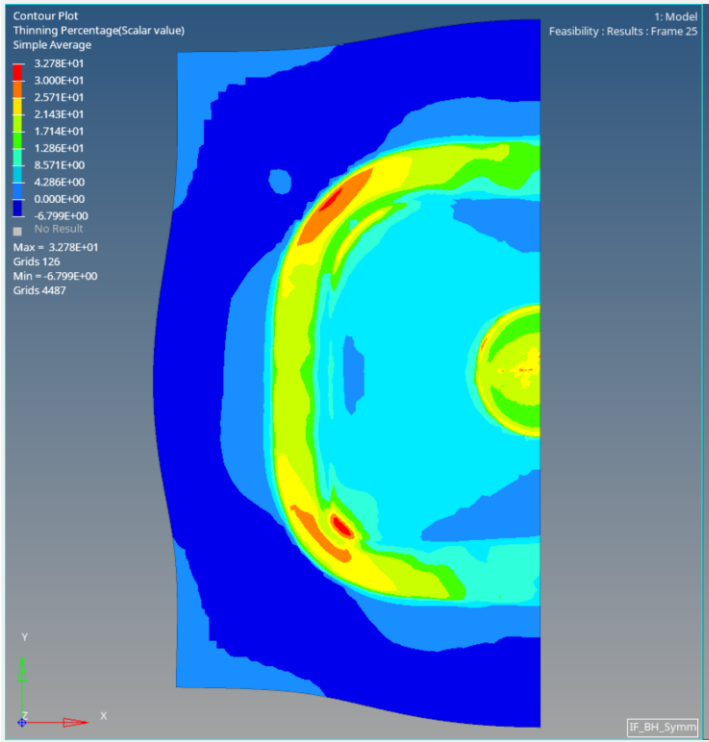
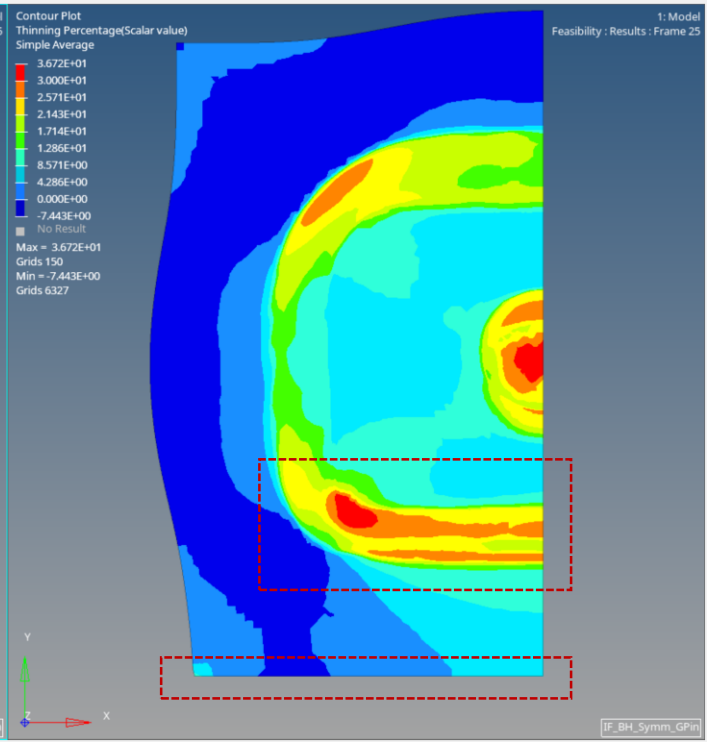
Check 02 – Guide Plate(Symmetry 동일 조건)

✓ Guide Pin 無

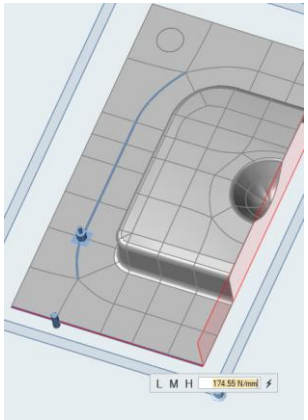


Press Tonnage: 44.3ton

✓ Guide Pin 有



Press Tonnage: 45.1ton



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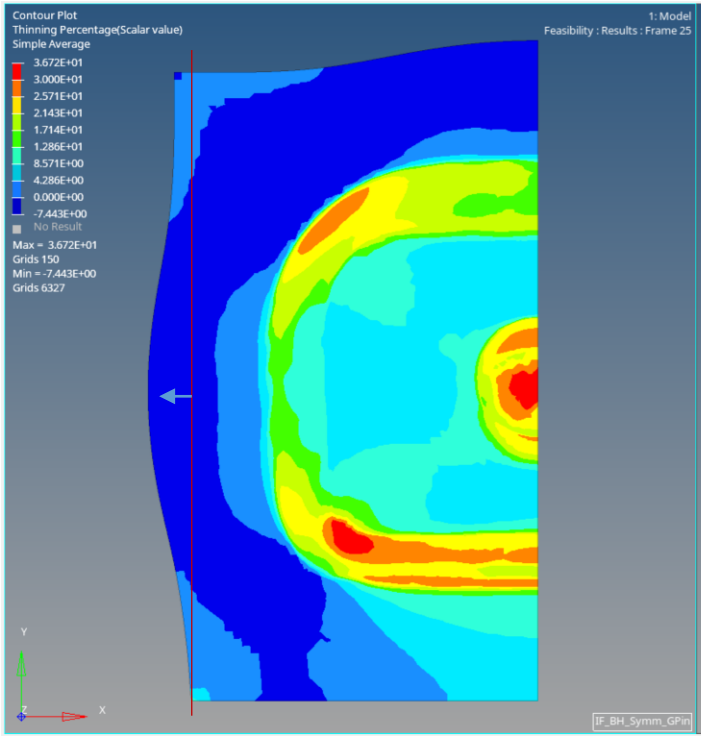
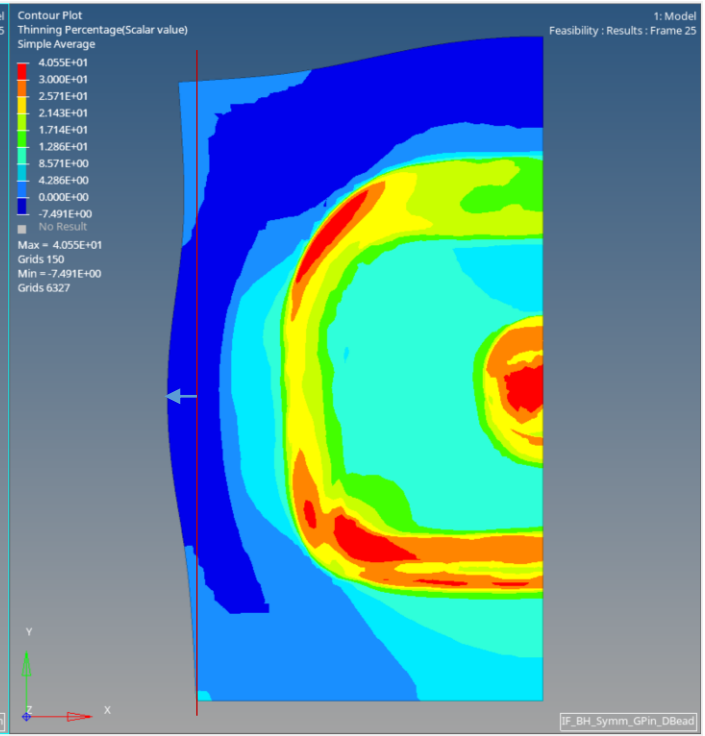
Check 03 – Draw Bead(Plate(Symmetry, Guide Pin 동일 조건)

✓ Draw Bead 無



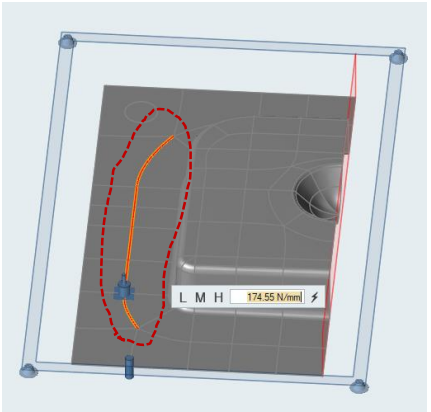
Press Tonnage: 45.1ton

✓ Draw Bead 有



Press Tonnage: 48.9ton

✓ Draw Bead 위치



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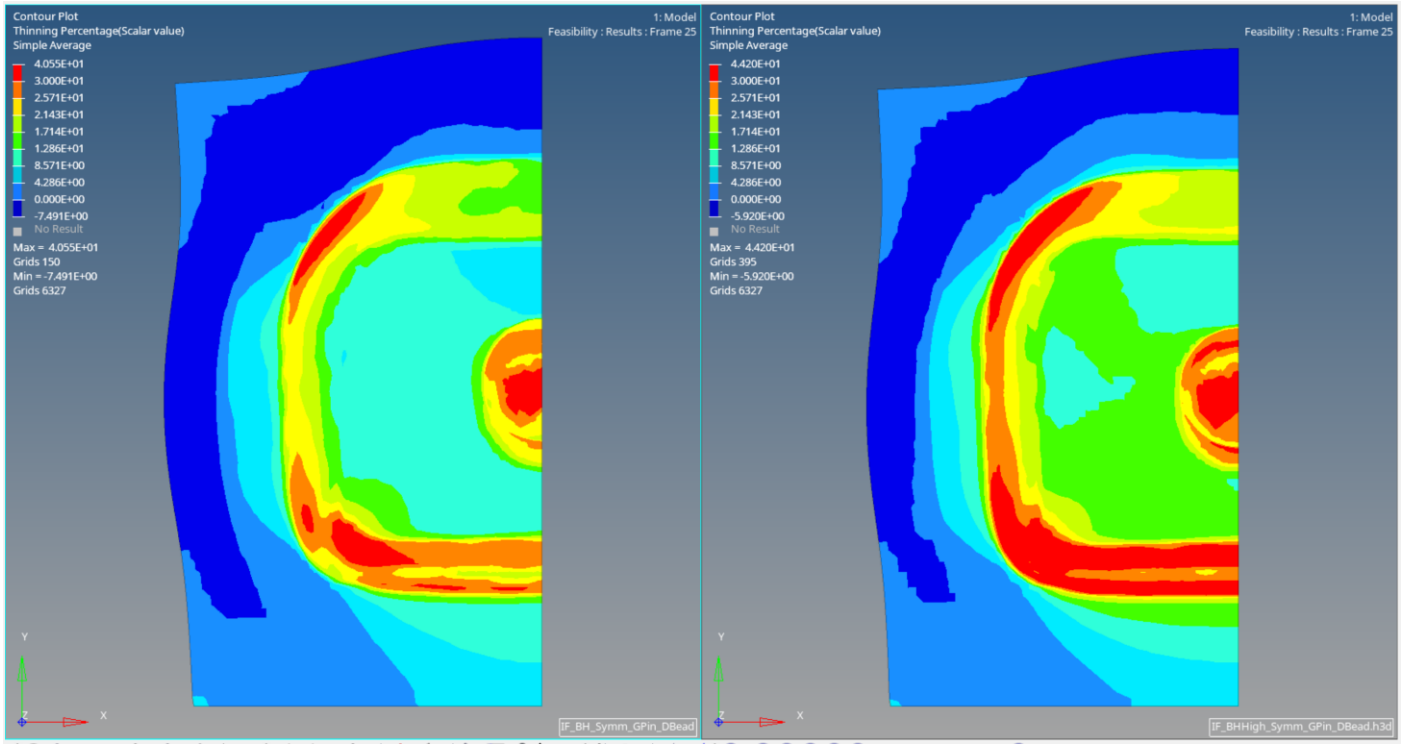
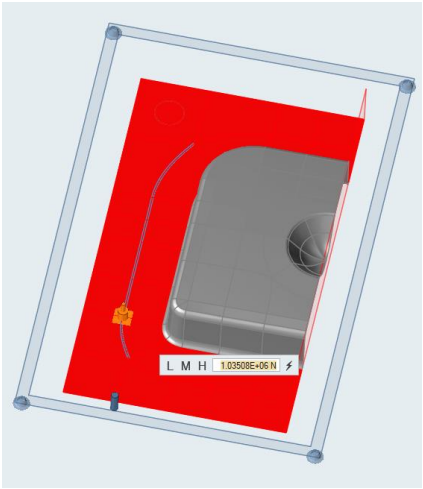
Check 04 – Guide Plate(Symmetry, Guide Pin, Draw Bead 동일 조건)

✓ Blank Holding Force: Medium

✓ Blank Holding Force: High





Press Tonnage: 48.5ton

Press Tonnage: 55.2ton

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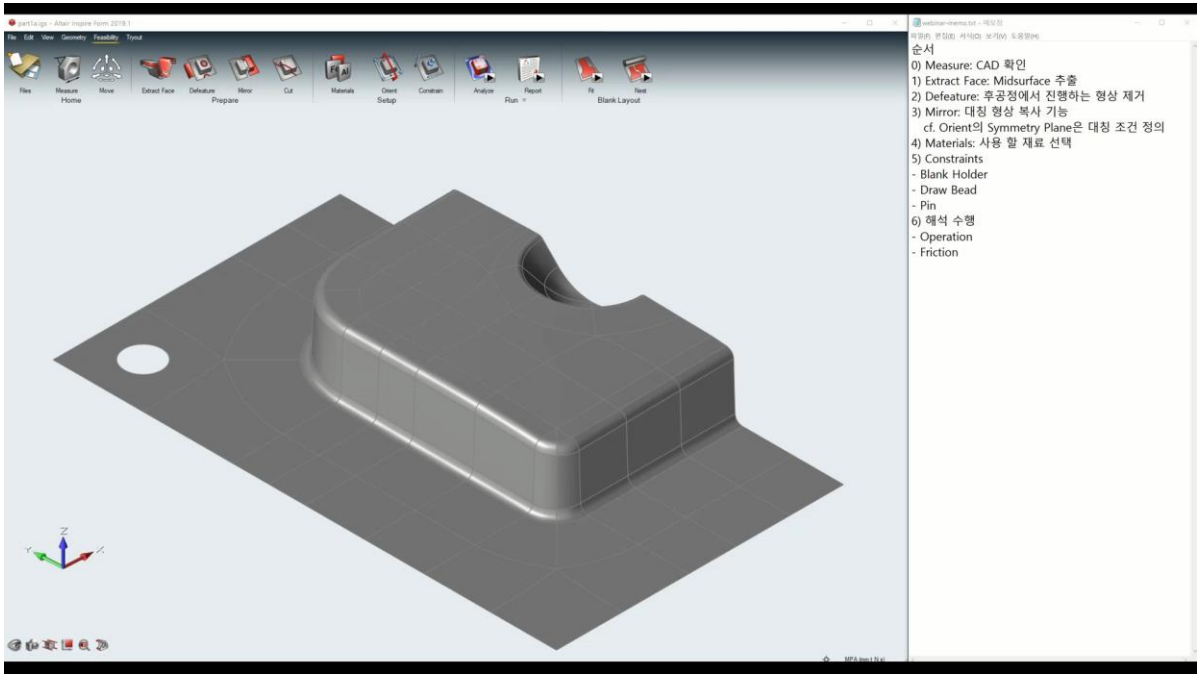
Demo



▸ 재생시간: 2분 59초

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Webinar Schedule

- Day 1: Inspire Form 실전 (1) Feasibility(one step)
- Day 2: Inspire Form 실전 (2) Scrap Estimation
- Day 3: Inspire Form 실전 (3) Material Definition
- Day 4: Inspire Form 실전 (4) Tryout(incremental)

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QUESTIONS & ANSWERS