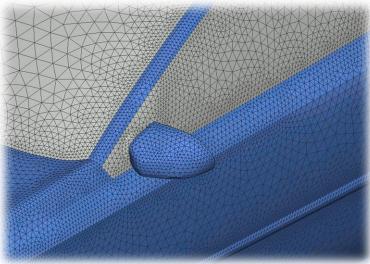
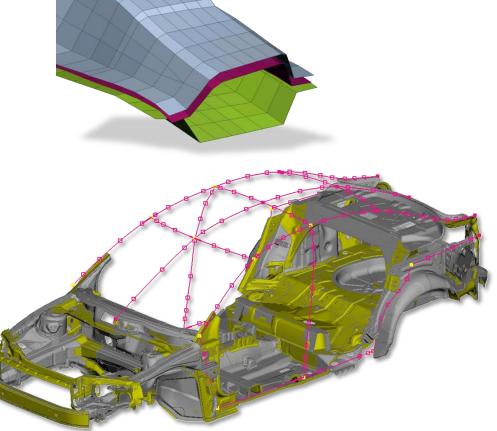


Model Parameterization in ANSA





Dirk Dreißig Mail: ansa@lasso.de

Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Types of Parameterization

• Shape modification \rightarrow Morphing



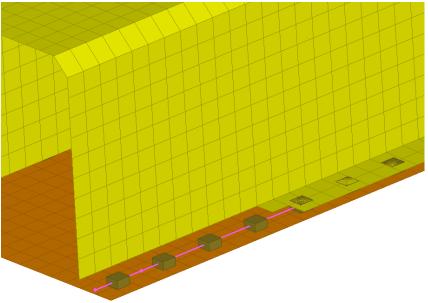
Types of Parameterization

Shape modification

\rightarrow Morphing

Modification of entity card values (e.g. property thickness, used material, connection properties)

ightarrow ANSA Parameter





Types of Parameterization

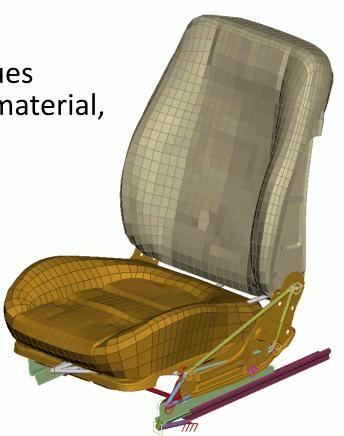
Shape modification

ightarrow Morphing

 Modification of entity card values (e.g. property thickness, used material, connection properties)

ightarrow ANSA Parameter

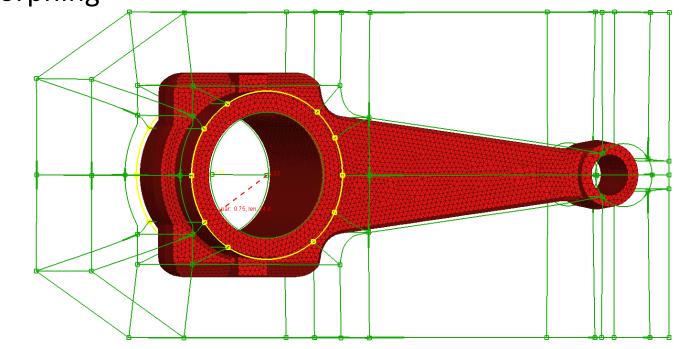
 Anything else (e.g. Mesh Studies, Kinetics)
 → Scripting





Morphing

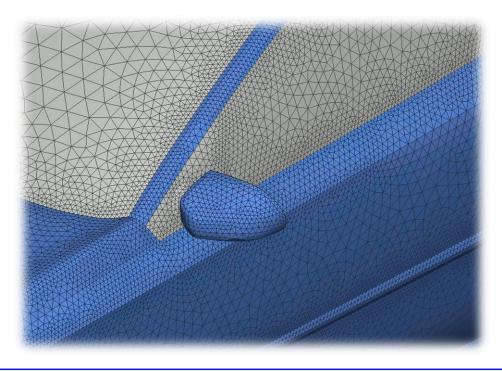
- Applicable on FE- and Geometry
- Two main methods:
 - Box Morphing





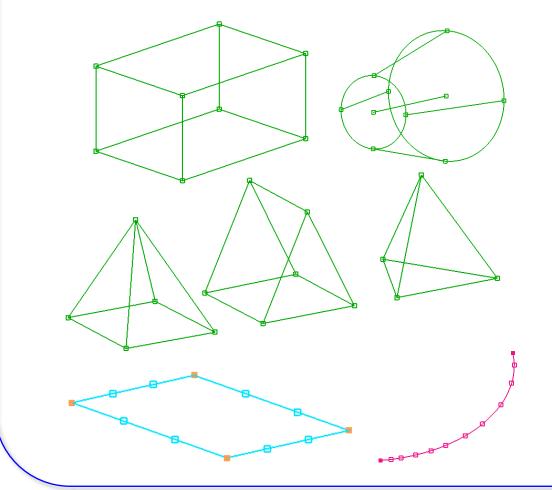
Morphing

- Applicable on FE- and Geometry
- Two main methods:
 - Box Morphing
 - Direct Morphing





Box Morphing Types of boxes

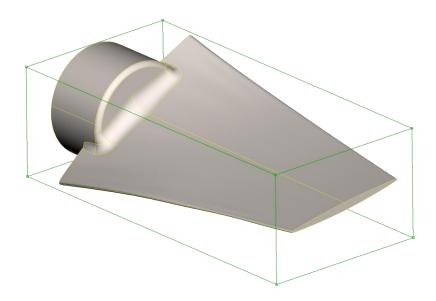


• 3D

- Hexa
- Penta
- Tetra
- Pyramid
- Cylindrical
- 2D (specific thickness)
- 1D (specific diameter)



• Around geometry / mesh





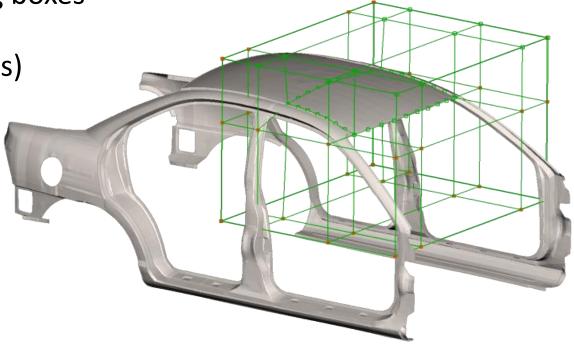
- Around geometry / mesh
- Offset on existing boxes



- Around geometry / mesh
- Offset on existing boxes

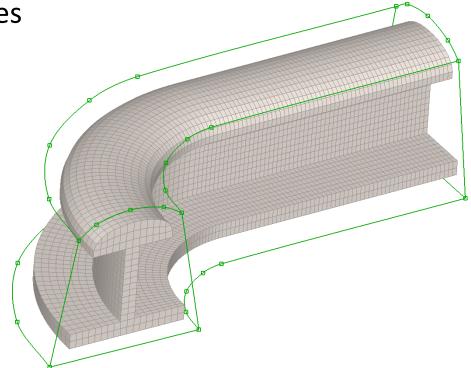


- Around geometry / mesh
- Offset on existing boxes
- Split + Fit (edges or surfaces)





- Around geometry / mesh
- Offset on existing boxes
- Split + Fit (edges or surfaces)
- Sweep / Glide



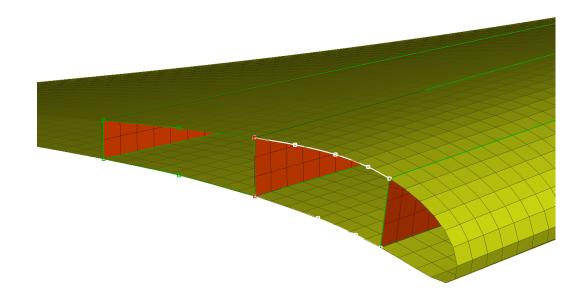


- Around geometry / mesh
- Offset on existing boxes
- Split + Fit (edges or surfaces)
- Sweep / Glide
- Wrap

COMPUTER AIDED ENGINEERING.

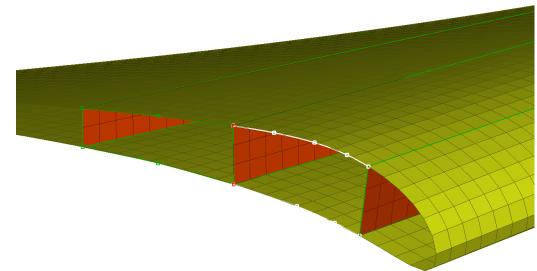


Box Morphing How to modify?



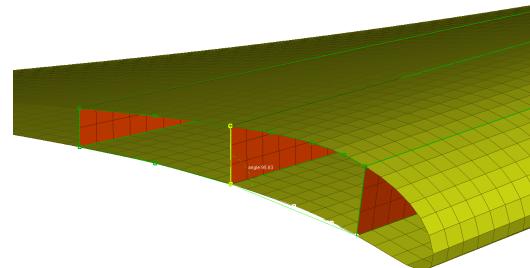


- Move (Translate, Rotate)
- Slide / Extend



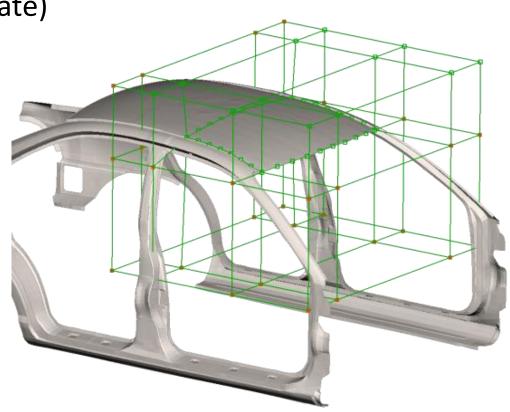


- Move (Translate, Rotate)
- Slide / Extend
- Angle



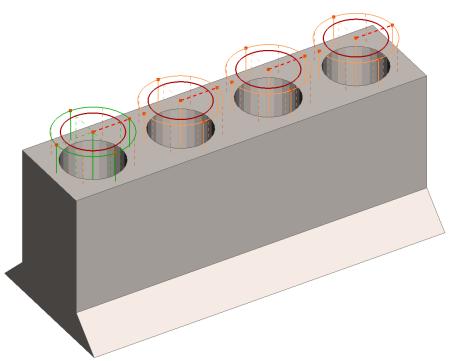


- Move (Translate, Rotate)
- Slide / Extend
- Angle
- Fit (edges, surfaces)



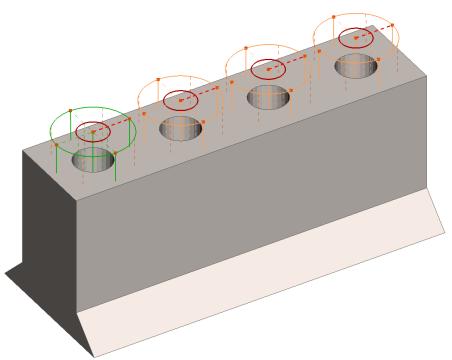


- Move (Translate, Rotate)
- Slide / Extend
- Angle
- Fit (edges, surfaces)
- Radius



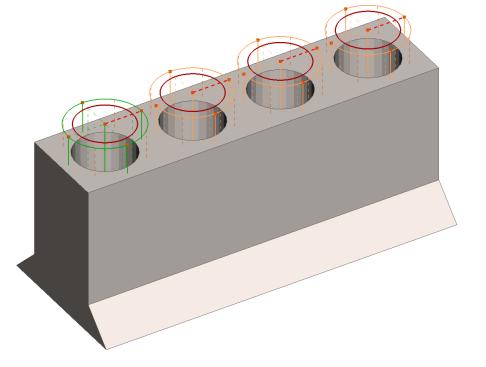


- Move (Translate, Rotate)
- Slide / Extend
- Angle
- Fit (edges, surfaces)
- Radius





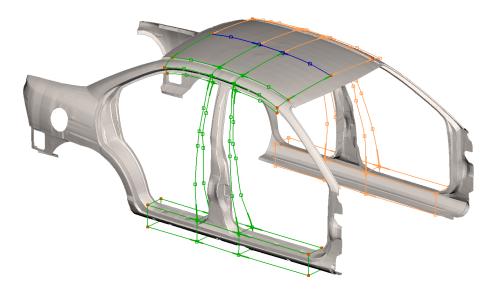
- Move (Translate, Rotate)
- Slide / Extend
- Angle
- Fit (edges, surfaces)
- Radius





Box Morphing Linked Morphing Boxes

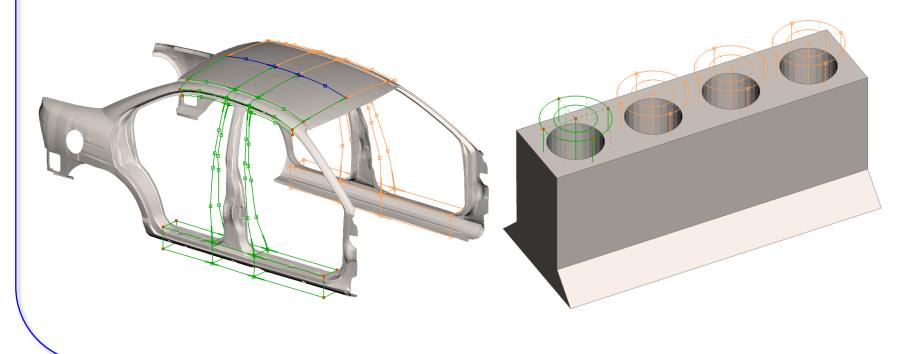
- Utilize model symmetry
- Link according symmetry-/mirror plane





Box Morphing Linked Morphing Boxes

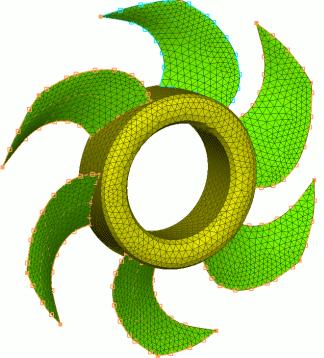
- Utilize model symmetry
- Link according symmetry-/mirror plane, translation vector





Box Morphing Linked Morphing Boxes

- Utilize model symmetry
- Link according symmetry-/mirror plane, translation vector or rotation axis





- Separate groups of boxes handle different features
- Global and local modifications without excessive splits of boxes



- Separate groups of boxes handle different features
- Global and local modifications without excessive splits of boxes

• Global: B-pillar position

Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



- Separate groups of boxes handle different features
- Global and local modifications without excessive splits of boxes



- Global: B-pillar position
- Local: cross member width



- Separate groups of boxes handle different features
- Global and local modifications without excessive splits of boxes



- Separate groups of boxes handle different features
- Global and local modifications without excessive splits of boxes

Global morphing

Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



- Separate groups of boxes handle different features
- Global and local modifications without excessive splits of boxes

- Global morphing
- Local morphing

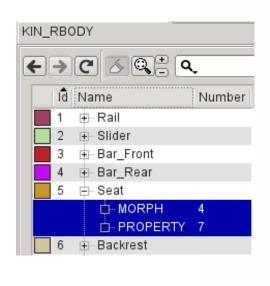
Optimization with ANSA, LS-OPT and META

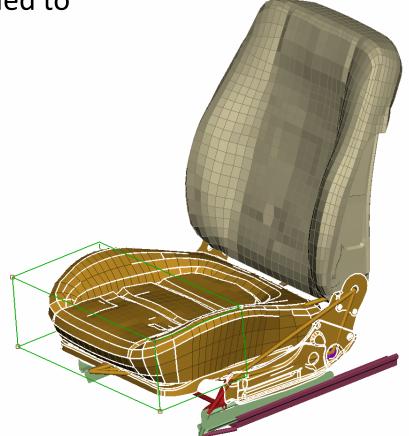
Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Box Morphing Coupled with Kinetics

 Morph Control Points added to Kinetic Rigid Bodies



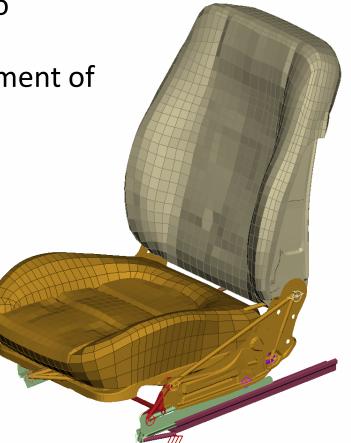




Box Morphing Coupled with Kinetics

- Morph Control Points added to Kinetic Rigid Bodies
- Morphing controlled by movement of Rigid Bodies

| Actuato | | ctuator Jo t Info | pint | (|
|---|---------|----------------------|--------------------------|------------|
| Name | : Def | at_Depth | MATIC JO | INT group |
| DOF se | electio | n —— | | |
| O Tr | aX (|) Tra Y | Tra Z | |
| OR | ot X 🤇 |) Rot Y | 🔿 Rot Z | |
| | | | | |
| | | | | |
| Step : | : | | 10. | . |
| Step : Total : | | | | • - |
| Total | | | 0. | |
| Total : DOF | | Current | | |
| Total : DOF Tra X | Low | Current 0 | 0. | |
| Total : DOF | Low | | 0. Relative | |
| Total : DOF Tra X | Low | 0 | 0. Relative 0 | |
| Total : DOF Tra X Tra Y | Low | 0 | 0. Relative 0 0 | |
| Total : DOF Tra X Tra Y Tra Z | Low | 0 0 0 | 0. Relative 0 0 | |



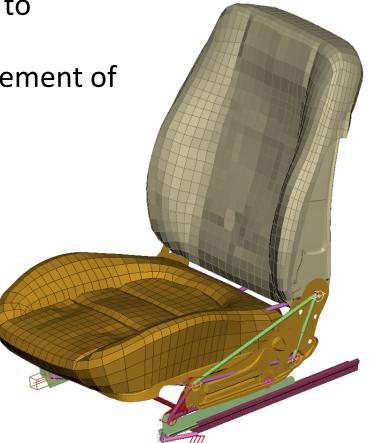
Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Box Morphing Coupled with Kinetics

- Morph Control Points added to Kinetic Rigid Bodies
- Morphing controlled by movement of Rigid Bodies

| Actuator Joir | Actuator Jo nt Info | oint | |
|---|------------------------|-----------------------------------|----|
| ID : 8 Group : De Name : Se Type : Sli | at_Depth | MATIC JOINT gr | ou |
| OOF selecti | on —— | | |
| 🔿 Tra X | 🔿 Tra Y | Tra Z | |
| ⊖ RotX | O Rot Y | 🔿 Rot Z | |
| | | | _ |
| | | | |
| Step : | | 10. 🗣 🖷 | • |
| Step : | | 10. 🗣 📼 | • |
| | | | • |
| Total : | Current | | - |
| Total : | r Current | 50. | • |
| Total : | | 50. 🔗 Relative High | • |
| Total : DOF Low Tra X | 0 | 50. Ø Relative High 0 | • |
| Total : DOF Low Tra X Tra Y | 0 | 50. Ø Relative High 0 0 | • |
| Total : DOF Low Tra X Tra Y Tra Z | 0 0 50 | 50. Ø Relative High 0 50 | • |

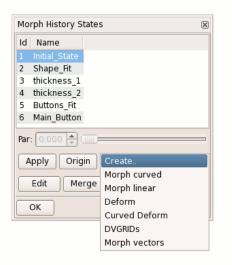


Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Box Morphing Recording History



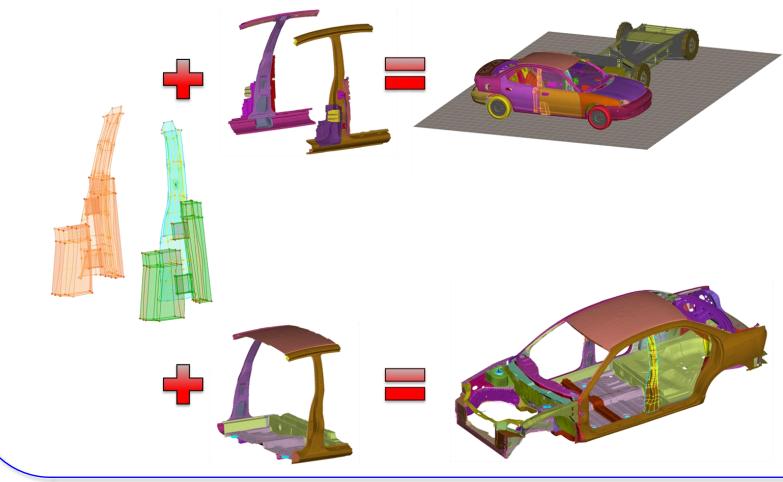


Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Box Morphing

Re-use of boxes and parameters for multiple similar models

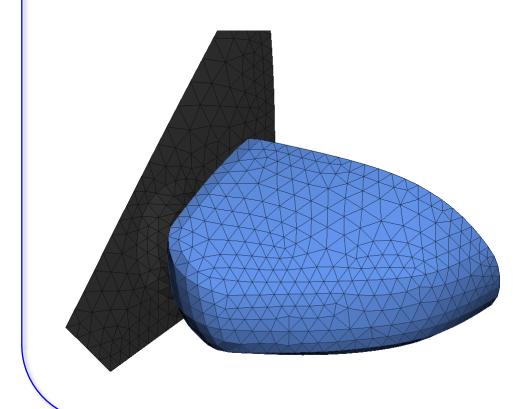


Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Direct Morphing DFM

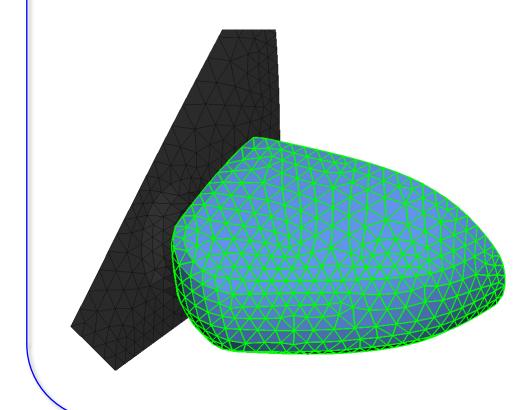
Translate, rotate or scale FE-mesh or Geometry entities





Direct Morphing DFM

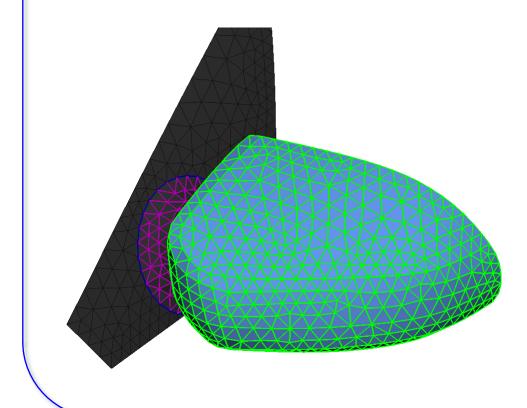
Translate, rotate or scale FE-mesh or Geometry entities



Control Entities



Translate, rotate or scale FE-mesh or Geometry entities

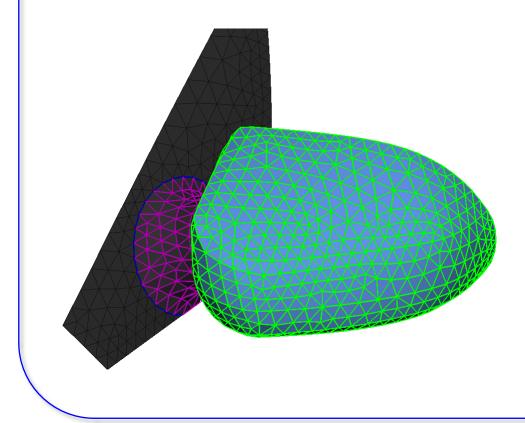


Control Entities

- Morphed Entities
- Boundary



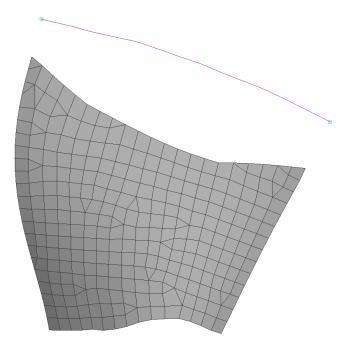
Translate, rotate or scale FE-mesh or Geometry entities



- Control Entities
- Morphed Entities
- Boundary
- Morphing

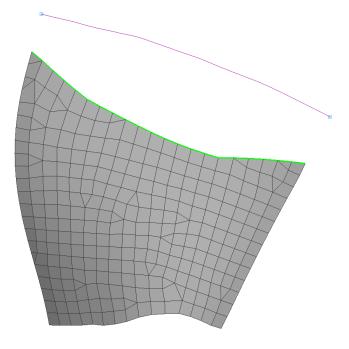


Snap <u>**FE</u>** or geometry edges to <u>**single</u>** or multiple target curves</u></u>





Snap <u>**FE</u>** or geometry edges to <u>**single</u>** or multiple target curves</u></u>

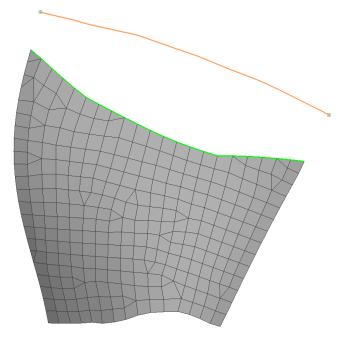


Origin

Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



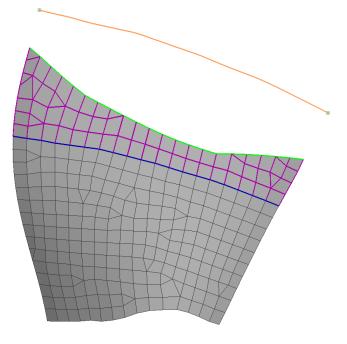
Snap <u>**FE</u>** or geometry edges to <u>**single</u>** or multiple target curves</u></u>



- Origin
- Target



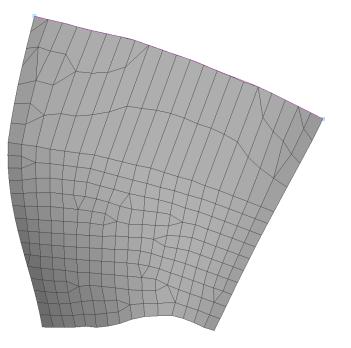
Snap <u>**FE</u>** or geometry edges to <u>single</u> or multiple target curves</u>



- Origin
- Target
- Morphed Entities
- Boundary



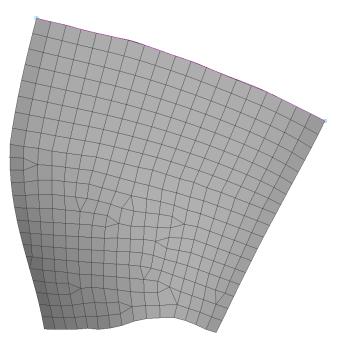
Snap <u>**FE</u>** or geometry edges to <u>**single</u>** or multiple target curves</u></u>



- Origin
- Target
- Morphed Entities
- Boundary
- Morphing



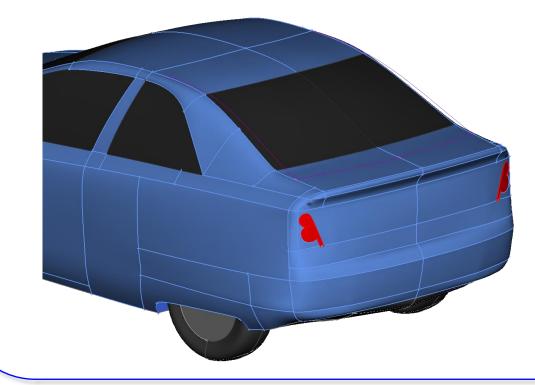
Snap <u>**FE</u>** or geometry edges to <u>**single</u>** or multiple target curves</u></u>



- Origin
- Target
- Morphed Entities
- Boundary
- Morphing
- Reconstruct of morphed area



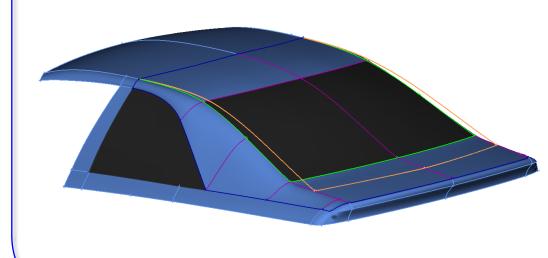
Snap FE or **geometry** edges to single or **multiple** target curves



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



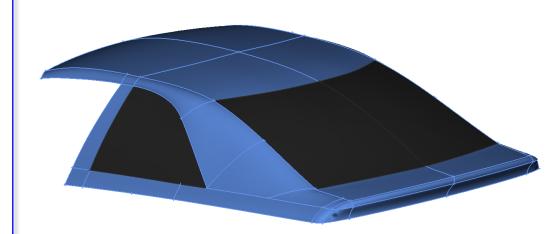
Snap FE or **geometry** edges to single or **multiple** target curves



- Origin
- Target
- Morphed Entities
- Boundary



Snap FE or **geometry** edges to single or **multiple** target curves

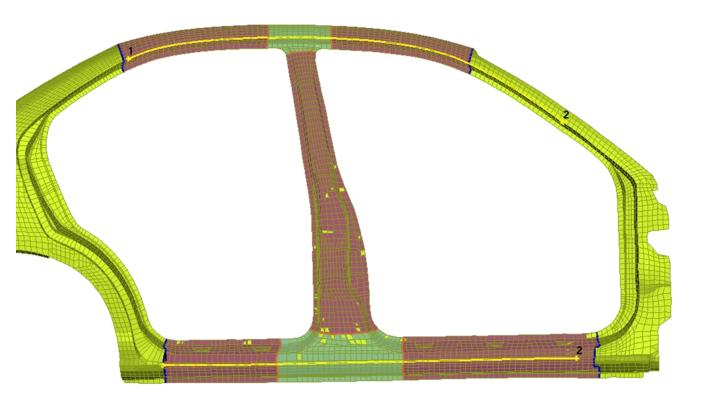


- Origin
- Target
- Morphed Entities
- Boundary
- Morphing

Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



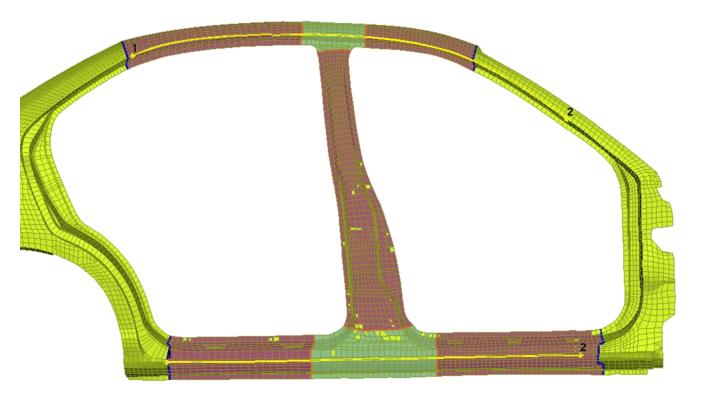
Sweep / Glide along pre-defined curves



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved

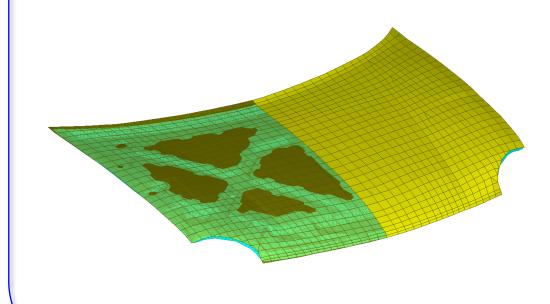


Sweep / Glide along pre-defined curves





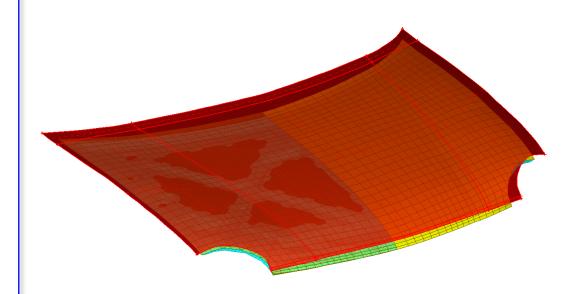
Surface Fit of *initial FE* or geometry onto *target* FE or *geometry*



 Initial FE-surface (with additional underlying parts)



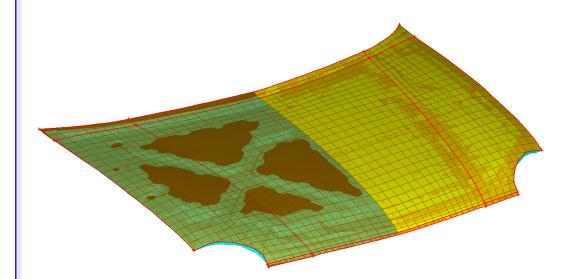
Surface Fit of *initial FE* or geometry onto *target* FE or *geometry*



- Initial FE-surface (with additional underlying parts)
- Target CAD-surface



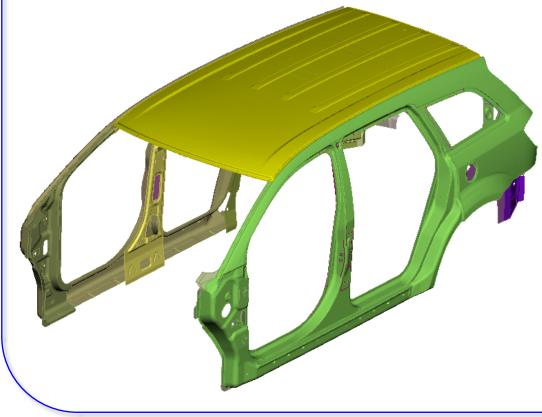
Surface Fit of *initial FE* or geometry onto *target* FE or *geometry*



- Initial FE-surface (with additional underlying parts)
- Target CAD-surface
- Morphing



Surface Fit of *initial FE* or geometry onto *target FE* or geometry

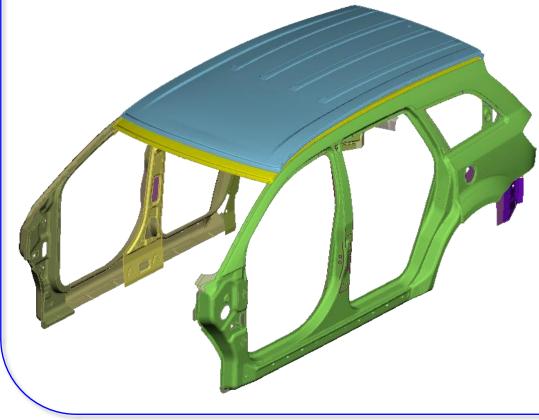


• Initial FE-surface

Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Surface Fit of *initial FE* or geometry onto *target FE* or geometry

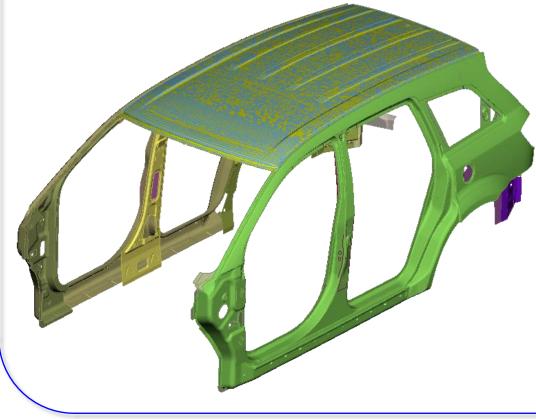


Initial FE-surface

• Target FE-surface



Surface Fit of *initial FE* or geometry onto *target FE* or geometry



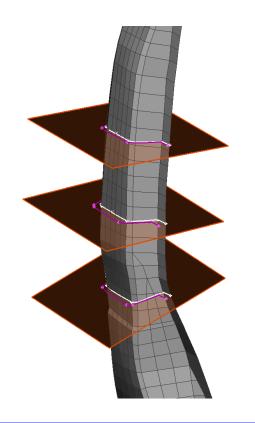
Initial FE-surface

- Target FE-surface
- Morphing



Direct Morphing Cross Sections

Fit cross sections (applicable on FE-mesh and geometry)



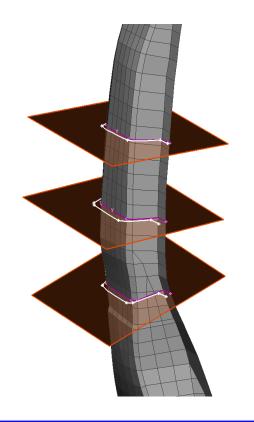
• Original cross section

Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Direct Morphing Cross Sections

Fit cross sections (applicable on FE-mesh and geometry)

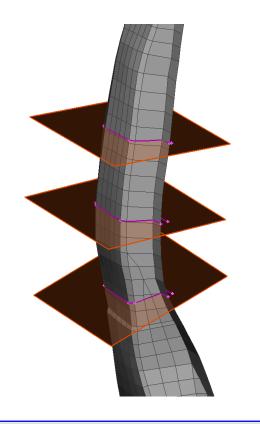


- Original cross section
- Target cross section



Direct Morphing Cross Sections

Fit cross sections (applicable on FE-mesh and geometry)

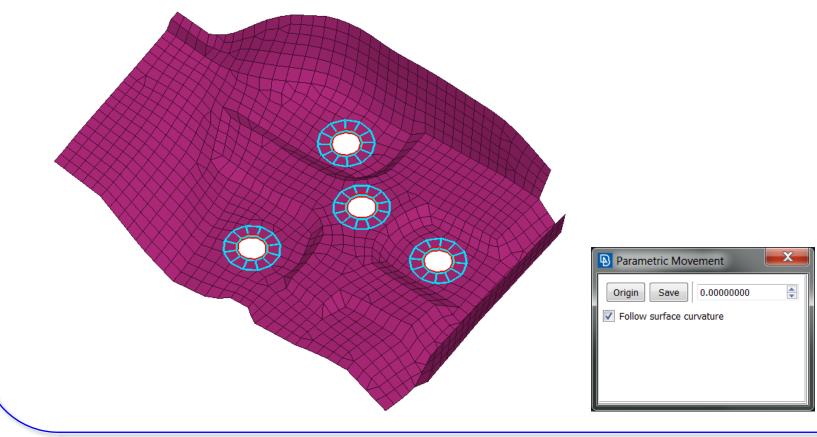


- Original cross section
- Target cross section
- Morphing

Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved

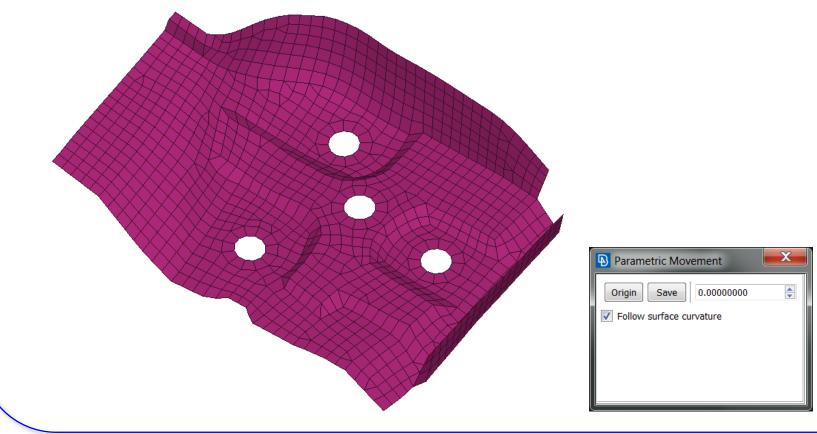


Manipulate diameter of **2D Holes**



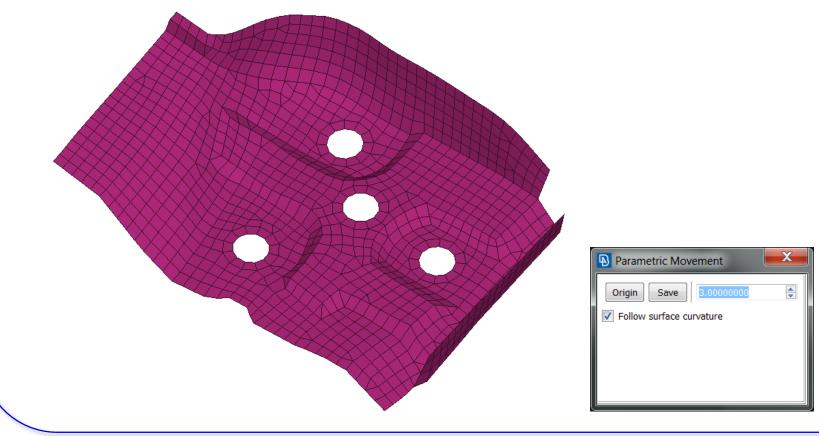


Manipulate diameter of **2D Holes**



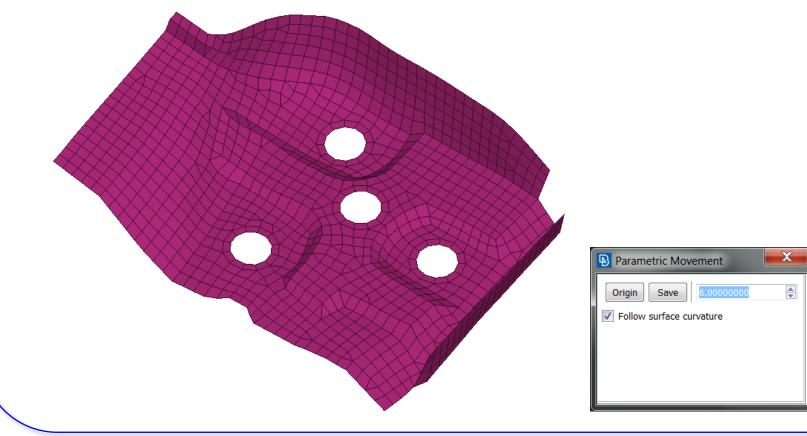


Manipulate diameter of **<u>2D Holes</u>**



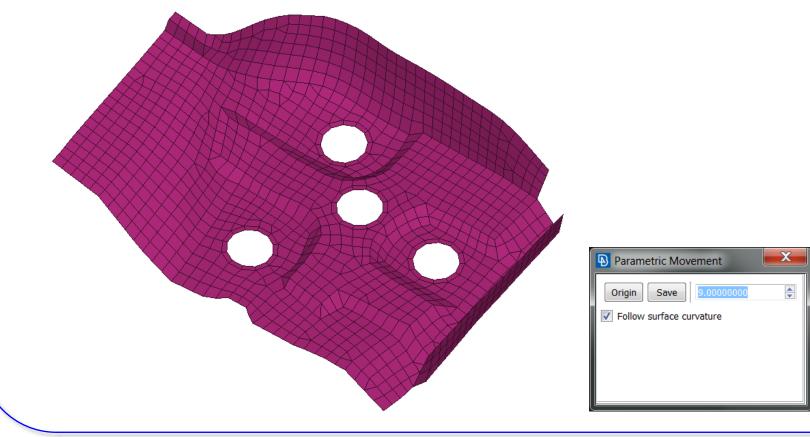


Manipulate diameter of **<u>2D Holes</u>**





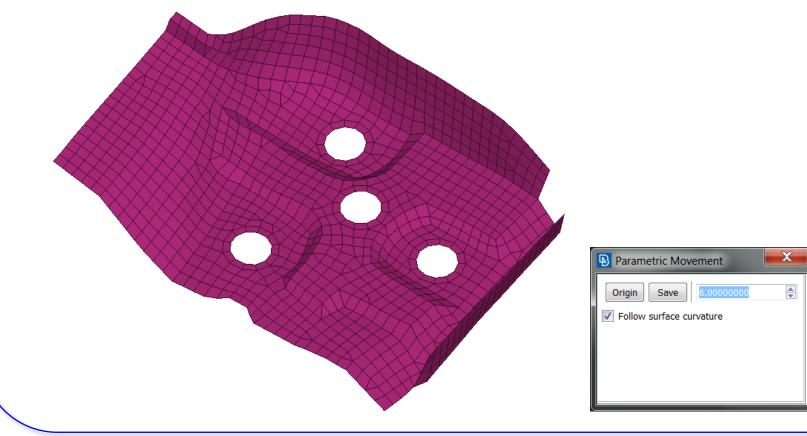
Manipulate diameter of **<u>2D Holes</u>**



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved

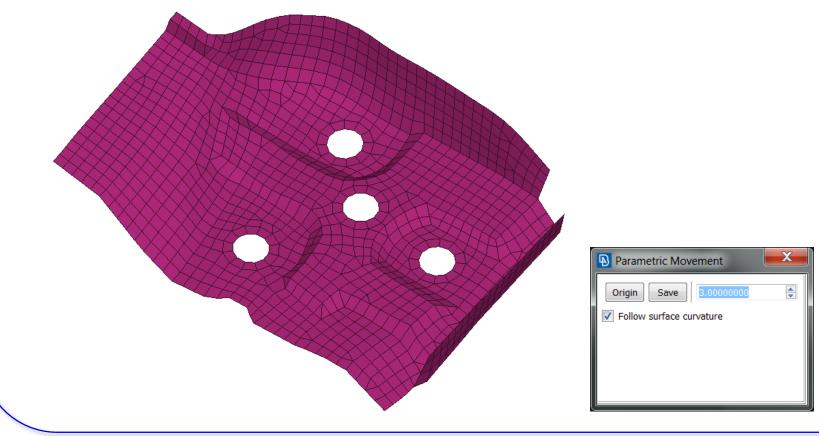


Manipulate diameter of **<u>2D Holes</u>**



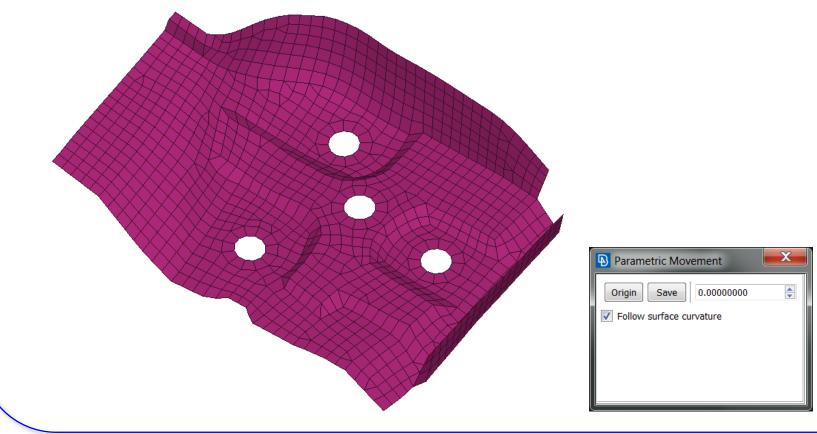


Manipulate diameter of **<u>2D Holes</u>**



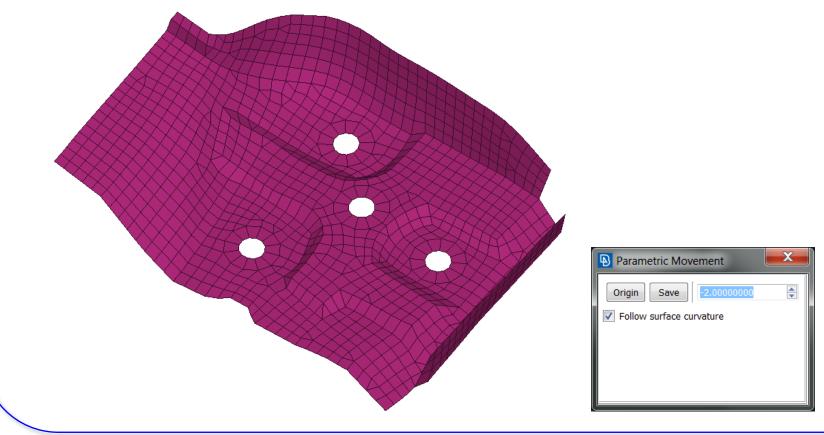


Manipulate diameter of **2D Holes**



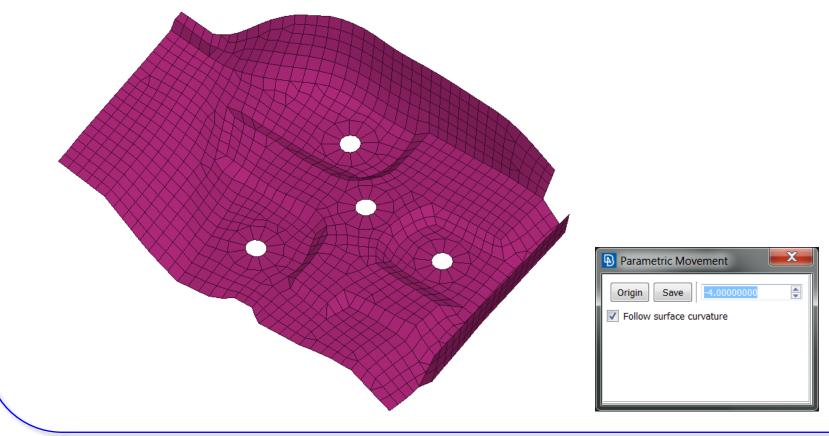


Manipulate diameter of **2D Holes**



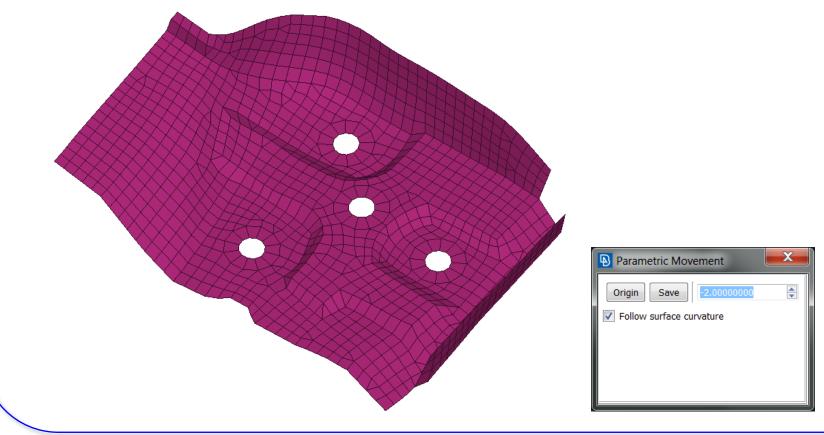


Manipulate diameter of **2D Holes**



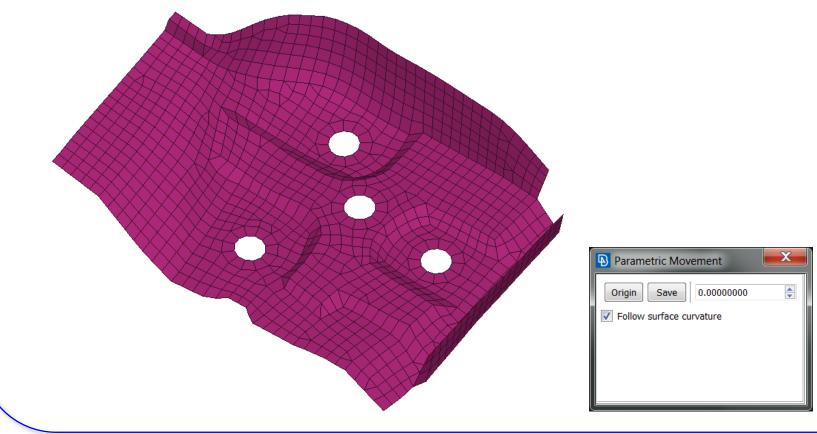


Manipulate diameter of **2D Holes**



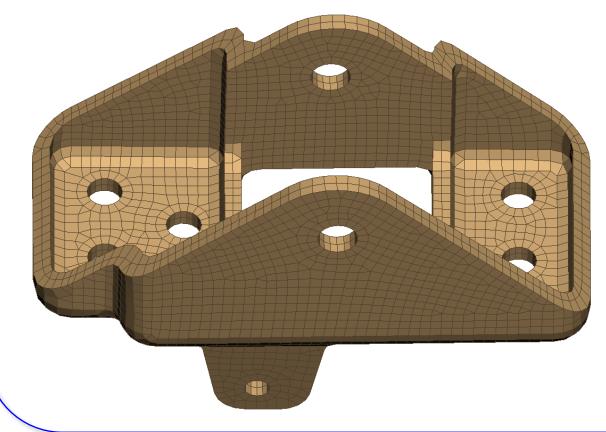


Manipulate diameter of **2D Holes**





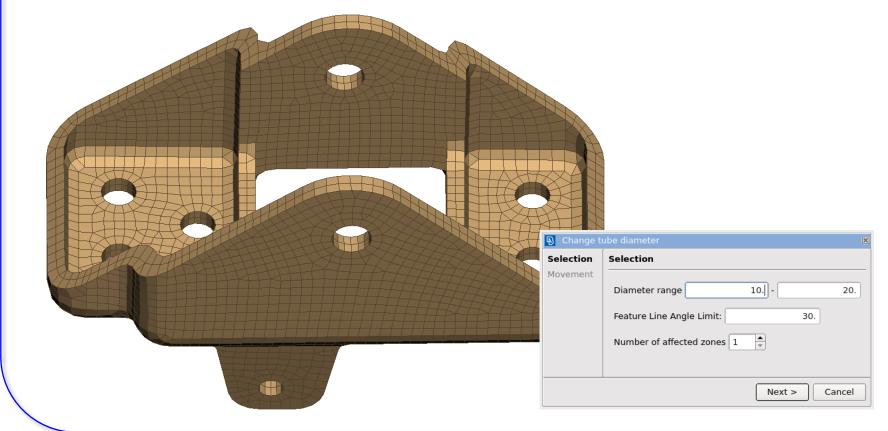
Manipulate diameter of **<u>3D Holes</u>**



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



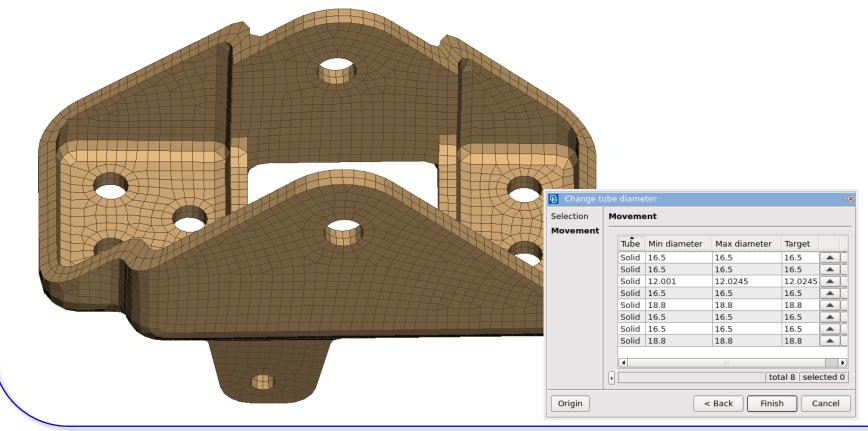
Manipulate diameter of **3D Holes**



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



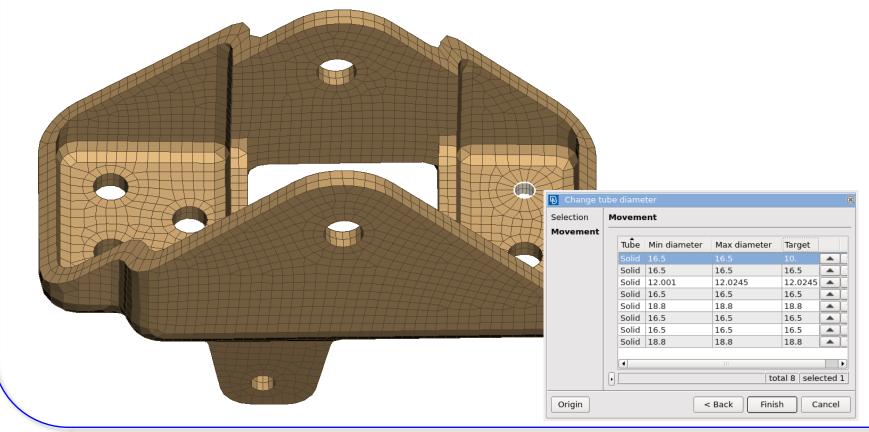
Manipulate diameter of **3D Holes**



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



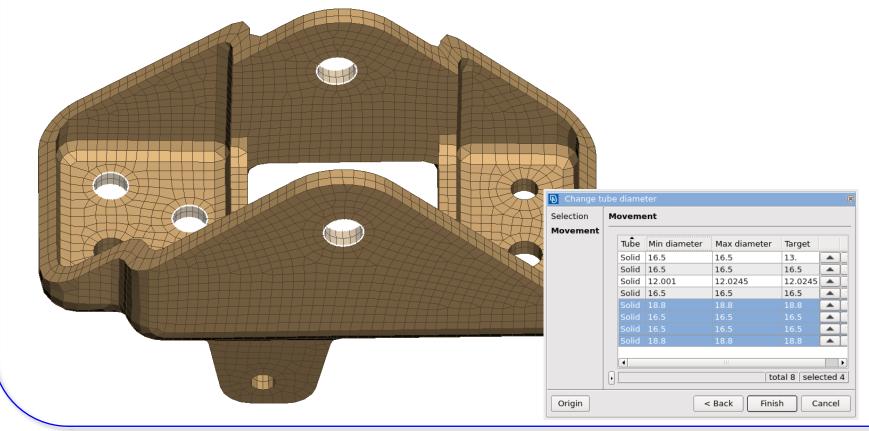
Manipulate diameter of **3D Holes**



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



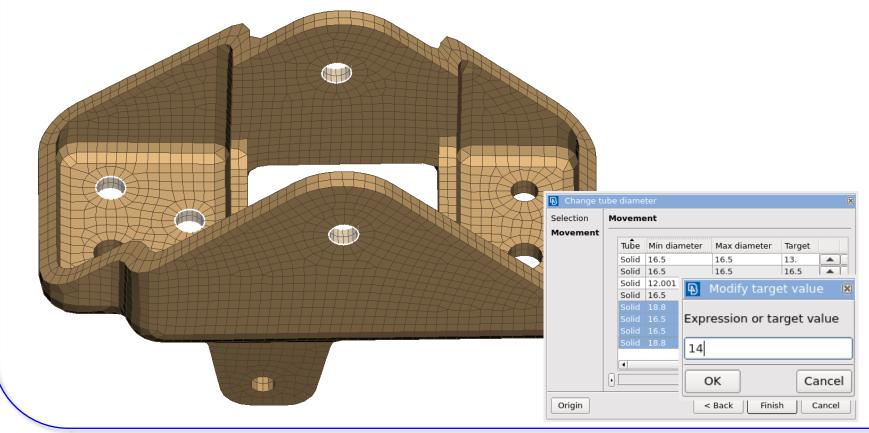
Manipulate diameter of **3D Holes**



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Manipulate diameter of **3D Holes**



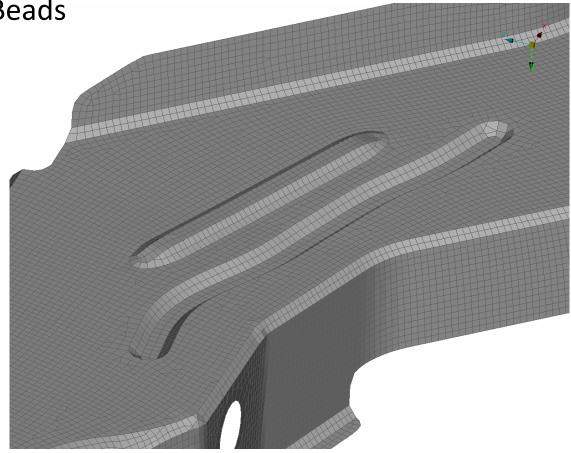
Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Direct Morphing Generation & modification of beads and embosses

• Curved & Rounded Beads

| ameters | Parameters | | |
|---------|------------------------------|---|--------------|
| | Feature type: Bead | | \$ |
| | Curved rounded 🖨 | Width (W) | 16 |
| | 1 | Height (H) | 4 |
| | | Angle (A) | 40 |
| | | Radius (R1) | 0.05 |
| | Top view Flat bottom H | Radius (R2) Path selection Curves Points | 0.05 |
| | Section view | Mesh | |
| | | Length | 8.1549 |
| | Invert direction | Distor. dist. | 15% |
| | | Distor. angle | 0. |
| | | < Back Ne | ext > Cancel |



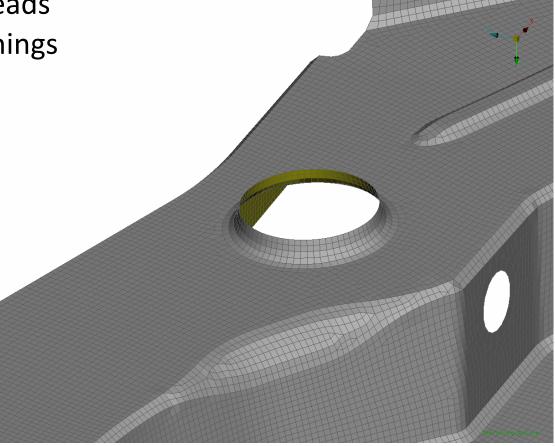
Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Direct Morphing Generation & modification of beads and embosses

- Curved & Rounded Beads
- Circular Flanged Openings

| ature creating | y tool | | (|
|----------------|-----------------------|---------------|--------|
| arameters | Parameters | | |
| | Feature type: Flanged | opening | \$ |
| | Circular 🗘 | Diameter (D) | 60. |
| | | Height (H) | 9. |
| | | Angle (A) | 75. |
| | | Radius (R1) | 6. |
| | Top view | | |
| | H Section view | | |
| | | Mesh | |
| | | Length | 3. |
| | Invert direction | Distor. dist. | 15% |
| | | Distor. angle | 0. |
| | | < Back Next > | Cancel |



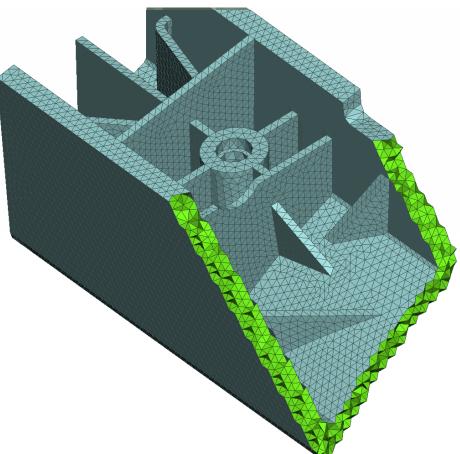
Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Direct Morphing Generation & modification of beads and embosses

- Curved & Rounded Beads
- Circular Flanged Openings
- Shell or Solid Ribs

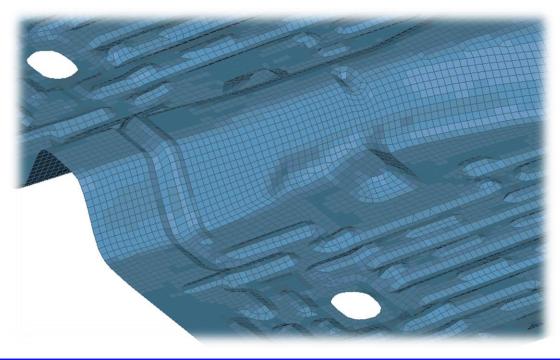
| rameters | Parameters | | |
|----------|-------------------|-----------------|--------|
| | Feature type: Rib | | |
| | 3D Rib 🖨 | Length (L) | 10 |
| | L | Width (W) | 1 |
| | | Angle (A) | 0 |
| | | Top chamfer (🖨 | 0 |
| | Top view | Bottom cham \$ | 0 |
| | Section view | 3 | |
| | | Mesh | |
| | | Length | 0.9954 |
| | | Distor. dist. | 15% |
| | | | |





Direct Morphing Design Change: Feature Slide/Copy

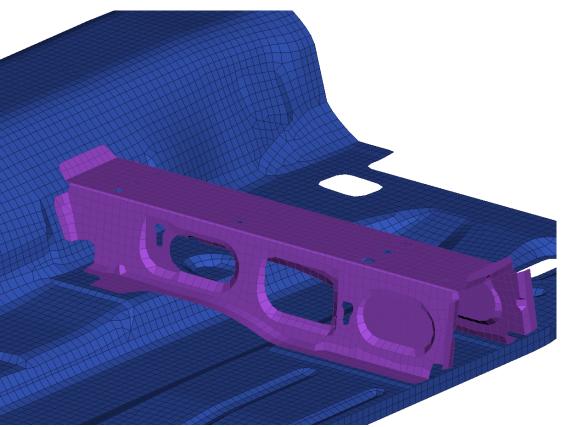
- Features of any shape (e.g. holes, beads, ribs) can be moved or copied on underlying surface
- Mesh of origin and target areas is reconstructed





Direct Morphing Design Change: Position

- Movement of members on their underlying surface
- Flanges and sidewalls are adapted on target position

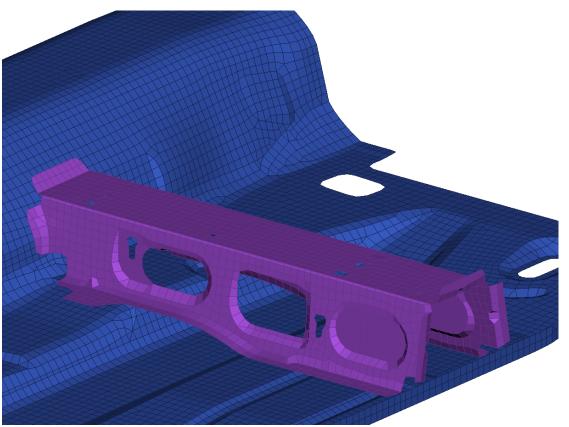


Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Direct Morphing Design Change: Position

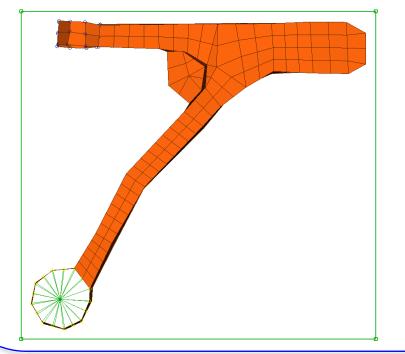
- Movement of members on their underlying surface
- Flanges and sidewalls are adapted on target position

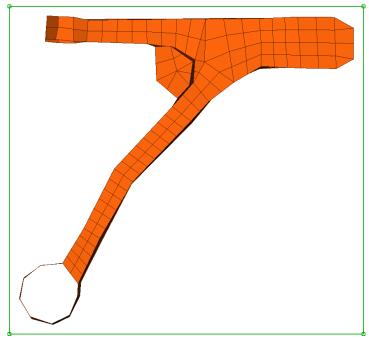


Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



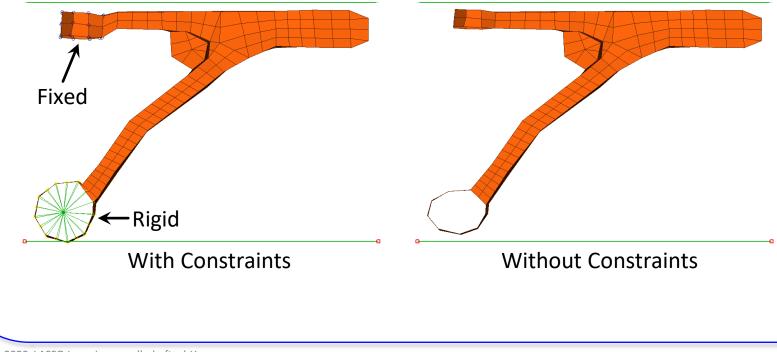
- Nested Elements for Box and Direct Morphing
- DFM Constraints (e.g. Planar, Rigid, Flange, Path Follower)
- Freeze, rigidize, constrain feature-movement during morphing





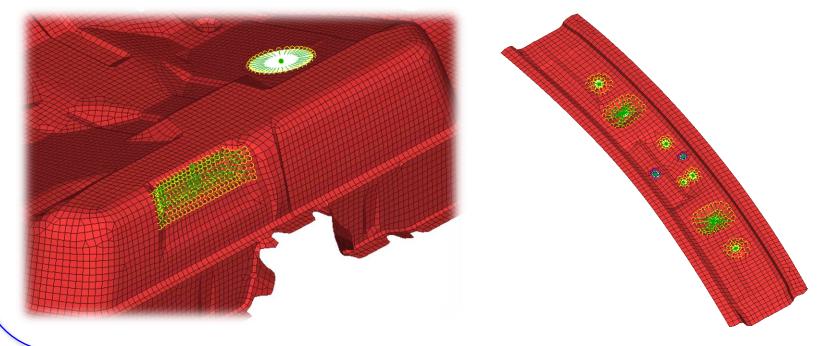


- Nested Elements for Box and Direct Morphing
- DFM Constraints (e.g. Planar, Rigid, Flange, Path Follower)
- Freeze, rigidize, constrain feature-movement during morphing



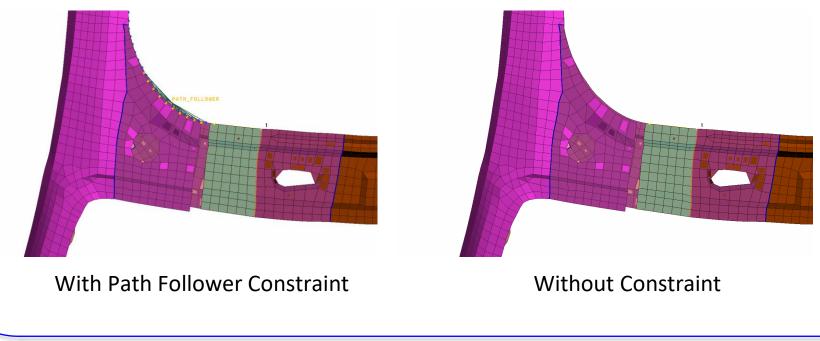


- Nested Elements for Box and Direct Morphing
- DFM Constraints (e.g. Planar, Rigid, Flange, Path Follower)
- Freeze, rigidize, constrain feature-movement during morphing



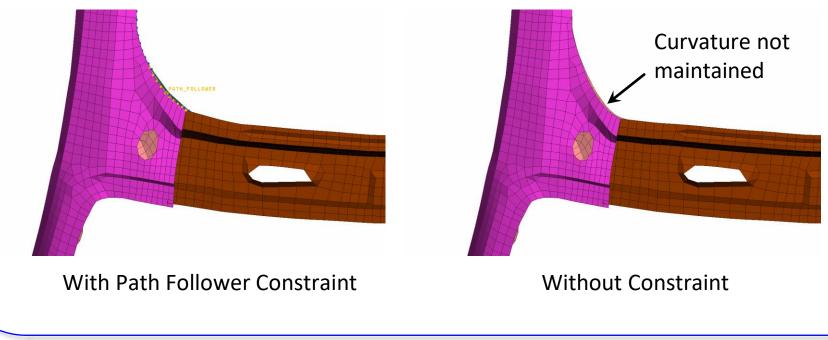


- Nested Elements for Box and Direct Morphing
- DFM Constraints (e.g. Planar, Rigid, Flange, Path Follower)
- Freeze, rigidize, constrain feature-movement during morphing





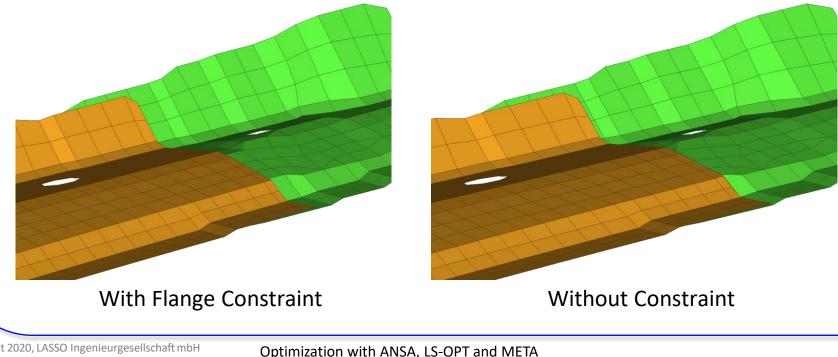
- Nested Elements for Box and Direct Morphing
- DFM Constraints (e.g. Planar, Rigid, Flange, Path Follower)
- Freeze, rigidize, constrain feature-movement during morphing



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



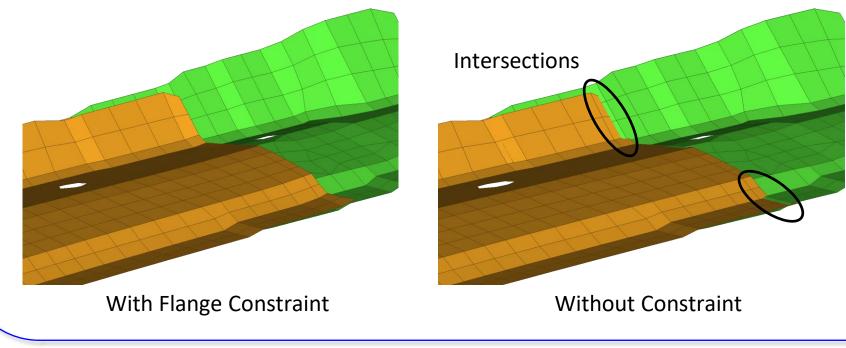
- Nested Elements for Box and Direct Morphing
- DFM Constraints (e.g. Planar, Rigid, Flange, Path Follower)
- Freeze, rigidize, constrain feature-movement during morphing



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



- Nested Elements for Box and Direct Morphing
- DFM Constraints (e.g. Planar, Rigid, Flange, Path Follower)
- Freeze, rigidize, constrain feature-movement during morphing



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Morphing Parameters

• For Box and Direct Morphing PARAMETERS ۹ 🔂 🔍 🔍 - Ö. Ψ ld Name 1 cross_memeber_move 2 cross_member_height_1 3 cross_member_height_2 4 cross_member_taper_an... 5 side_member_width 7 roof_member_width 8 roof member height 9 roof_member_move slide_b_pillar 11 side_member_height total 10 selected 0

COMPUTER AIDED ENGINEERING.

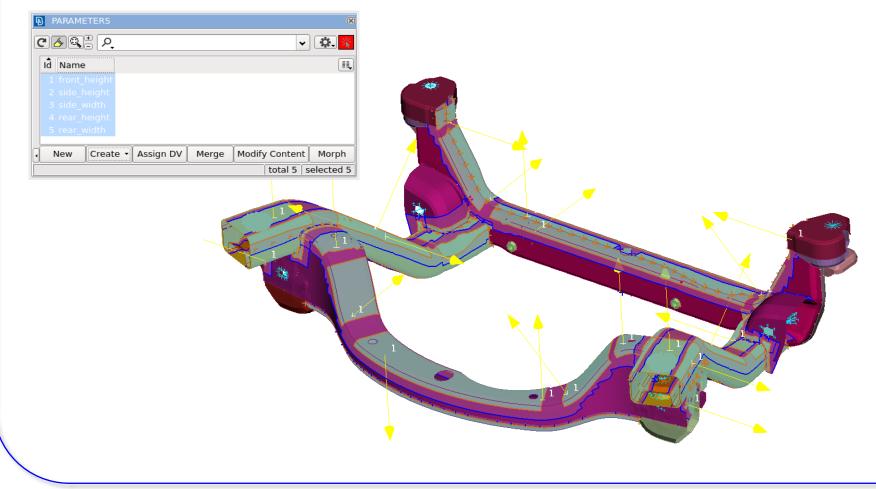


Morphing Parameters Video Recording



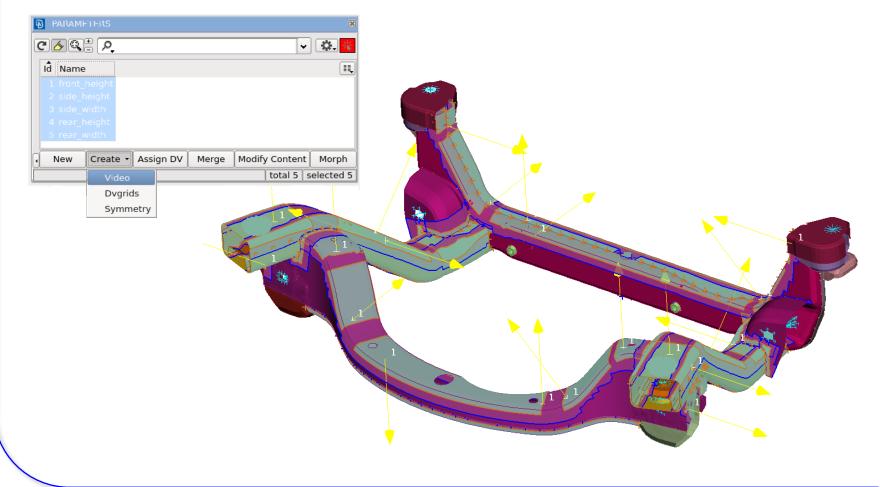
Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



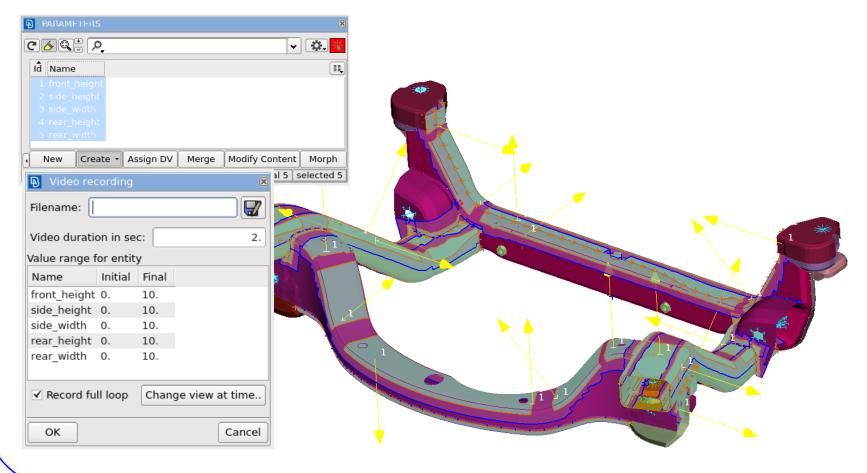


Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved

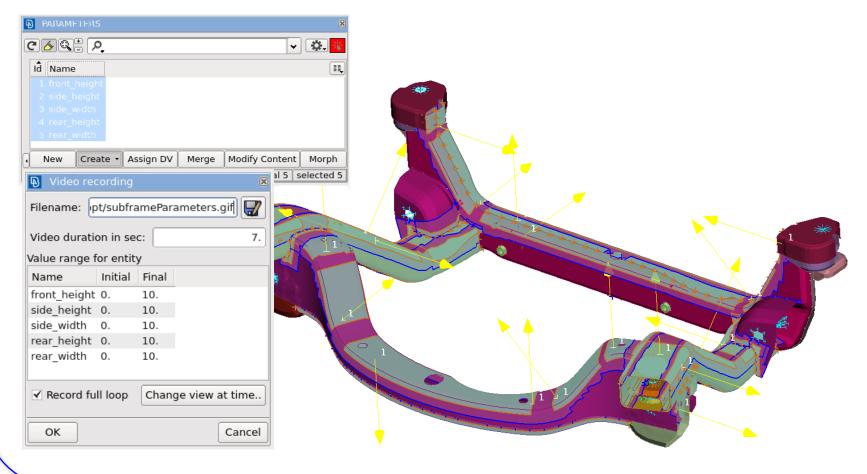




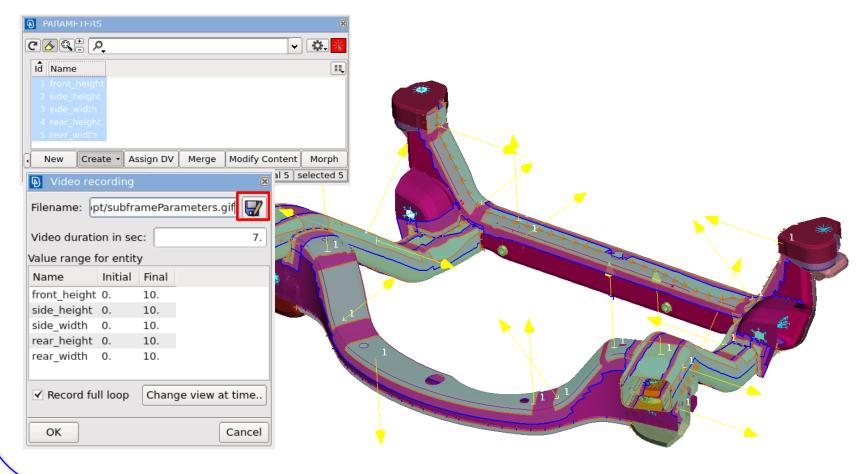












Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



| C | PARAMFIERS | |
|-----------------------|--|--|
| | Save | |
| V V f s s | Name ♥●II Name ♥●III Image: Computer Name ♥●III | |
| r | File name: subframeParameters Save | |
| | v File type: *.gif \$ Cance Settings: *.avi *.m2v *.mpg *.mpeg | |
| | | |

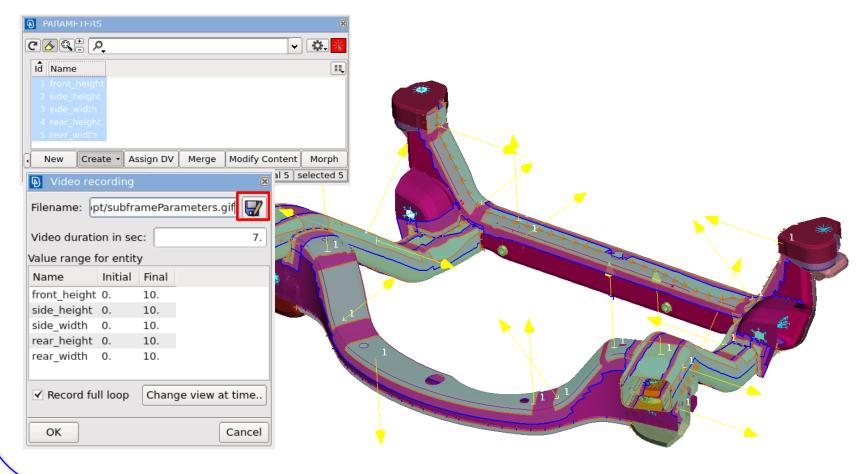
Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



| C | | |
|---|---|---|
| | Id Name 1 front_height 2 side_height 3 side_width 4 rear_height | |
| | Save 🛛 | |
| | U ←→↑C ☆ ▼ ■ ktop/ppt/ ☆ ▼ ■ ▼ ☆ □ | |
| F | Name Image: Arrow of the second places | |
| V | V Bookmarks | * |
| | Va 🖻 🖳 Computer | |
| | N In Setwork place | |
| s | si | |
| | si total 1 visible 0 | |
| r | ré File name: subframeParameters Save | |
| | File type: *.gif Cancel | |
| | Settings: *.gif *.avi | |
| L | *.m2v *.mpg *.mpg | |
| | | |

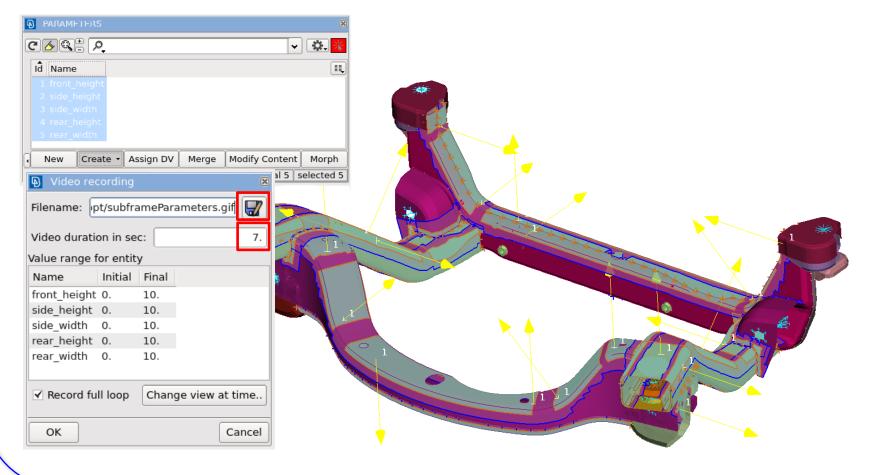
Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



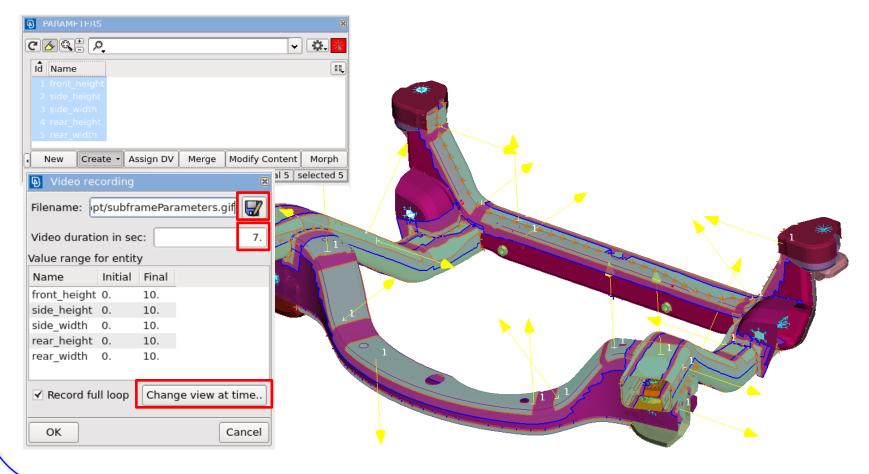


Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved

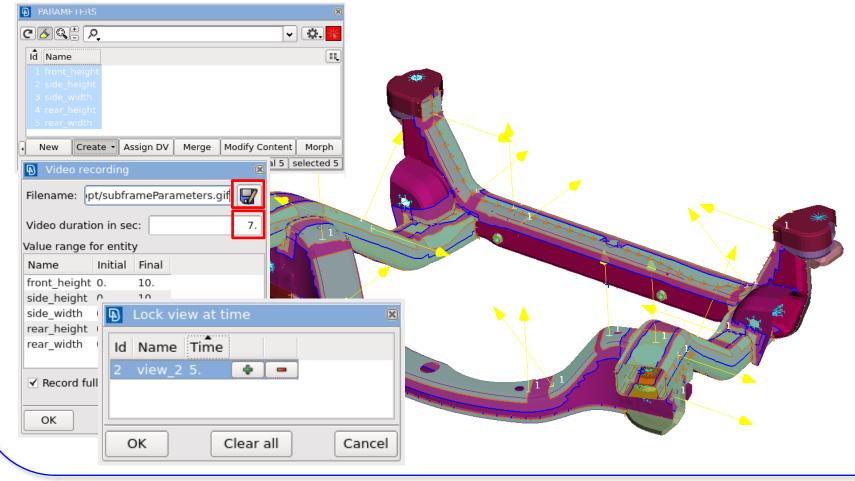












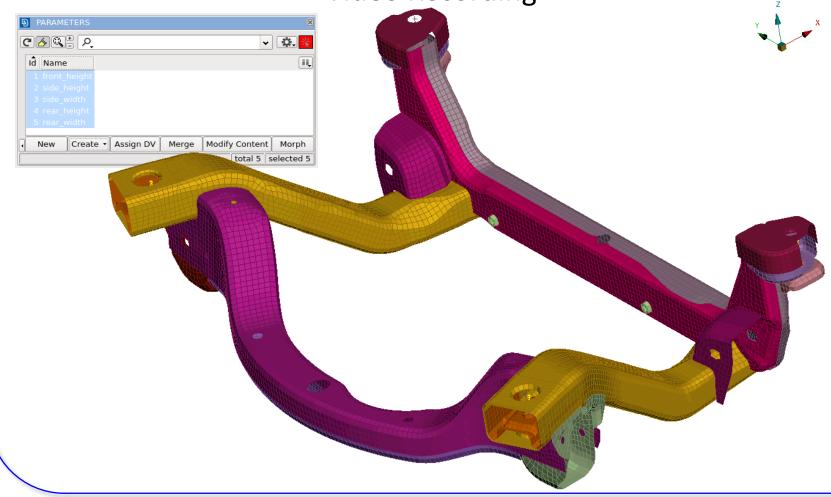
Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved

COMPUTER AIDED ENGINEERING.



Morphing Parameters

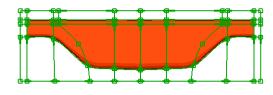
Video Recording



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



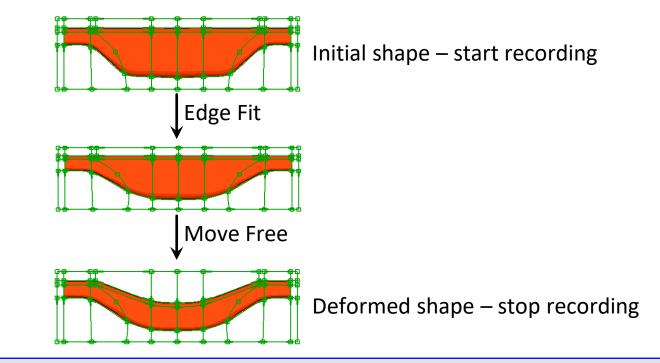
- Records any Box or Direct Morphing action
- Get any interpolation / extrapolation between undeformed and deformed shape with a single parameter



Initial shape – start recording



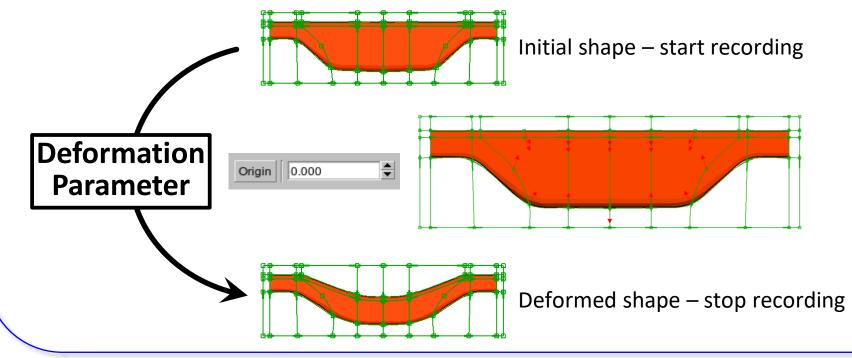
- Records any Box or Direct Morphing action
- Get any interpolation / extrapolation between undeformed and deformed shape with a single parameter



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



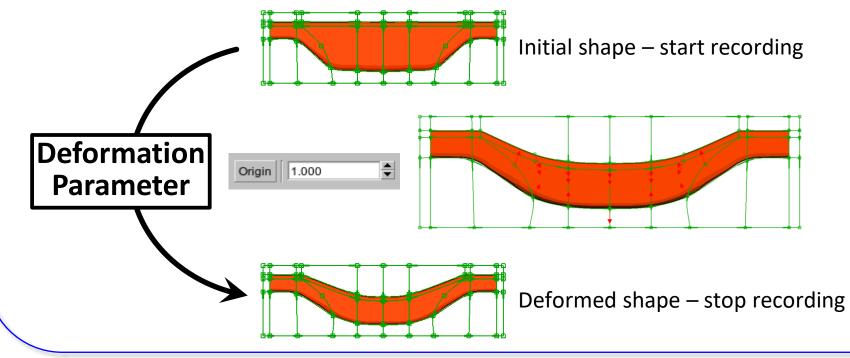
- Records any Box or Direct Morphing action
- Get any interpolation / extrapolation between undeformed and deformed shape with a single parameter



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



- Records any Box or Direct Morphing action
- Get any interpolation / extrapolation between undeformed and deformed shape with a single parameter

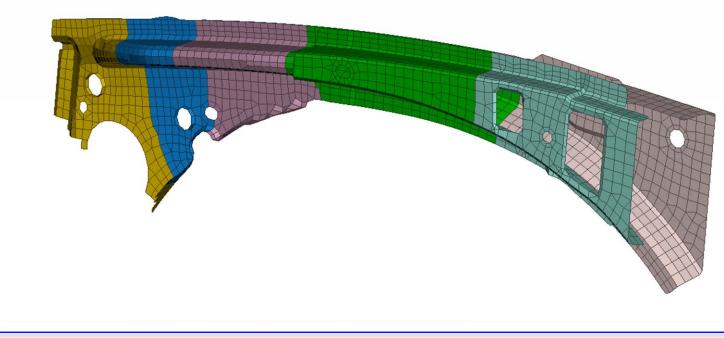


Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Taylor Welded Blanks Parameter

Parameterization and Optimization of Taylor Blanks

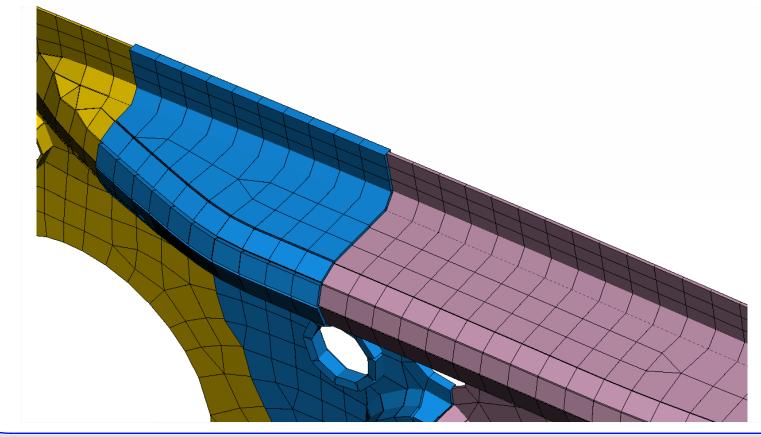


Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Taylor Welded Blanks Parameter

Parameterization and Optimization of Taylor Blanks



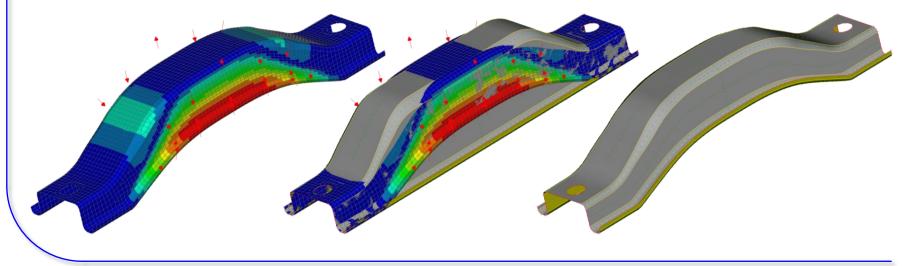
Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Mapping of Deformations

- Morph according existing deformation field from:
 - Deformation Parameter

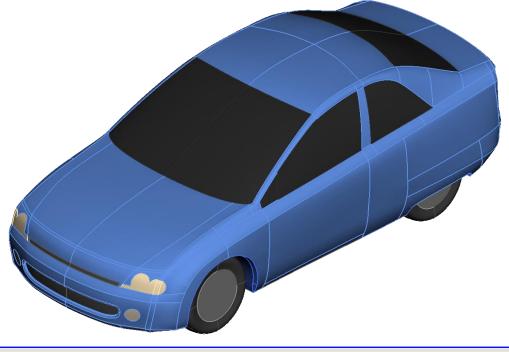
 - History States
 DESVAR of Nastran SOL 200
 - Text file
- E.g. Modify geometry according optimized FE-model





Functionalities assisting Morphing 3D Points and Curves

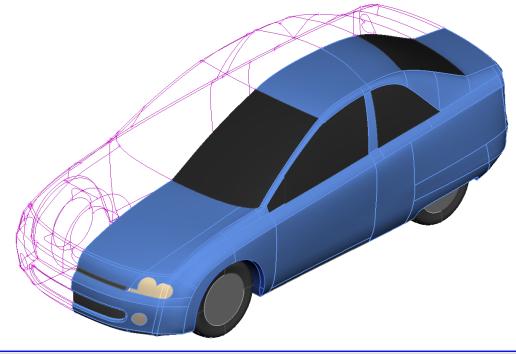
- Act as initial or target positions for fittings
- Suitable for Box and Direct Morphing
- Obtained from FE mesh or CAD geometry





Functionalities assisting Morphing 3D Points and Curves

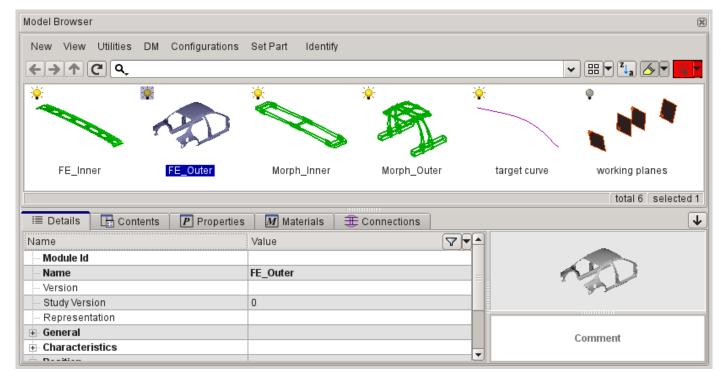
- Act as initial or target positions for fittings
- Suitable for Box and Direct Morphing
- Obtained from FE mesh or CAD geometry





Functionalities assisting Morphing Model Browser

- Useful for Box Morphing (esp. complex configurations)
- To organize morph contents

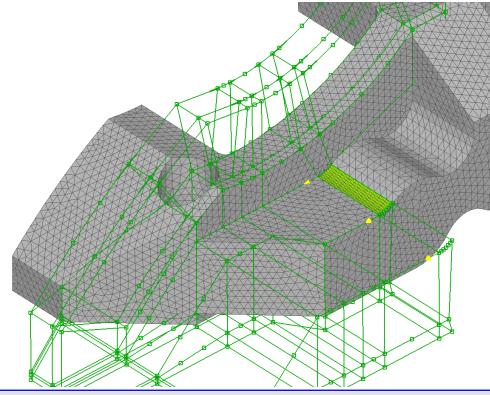


Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Functionalities assisting Morphing Reconstruct / Smooth morphed mesh

- Suitable for Box and Direct Morphing
- Improve mesh after morphing with large deformations

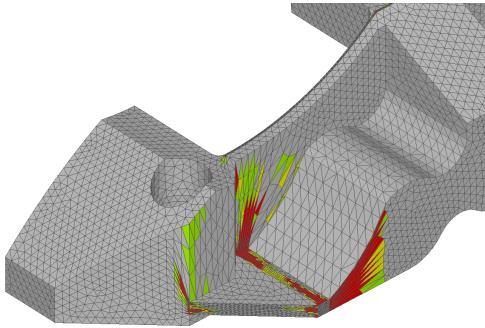


Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Functionalities assisting Morphing Reconstruct / Smooth morphed mesh

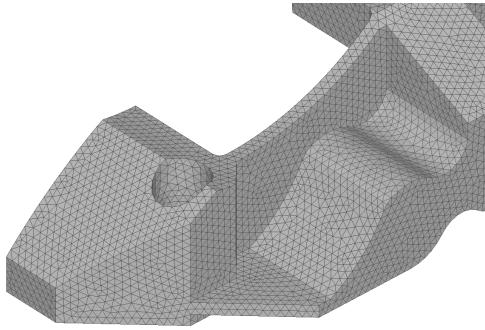
- Suitable for Box and Direct Morphing
- Improve mesh after morphing with large deformations





Functionalities assisting Morphing Reconstruct / Smooth morphed mesh

- Suitable for Box and Direct Morphing
- Improve mesh after morphing with large deformations





Functionalities assisting Morphing Visualize Morphing Deviations

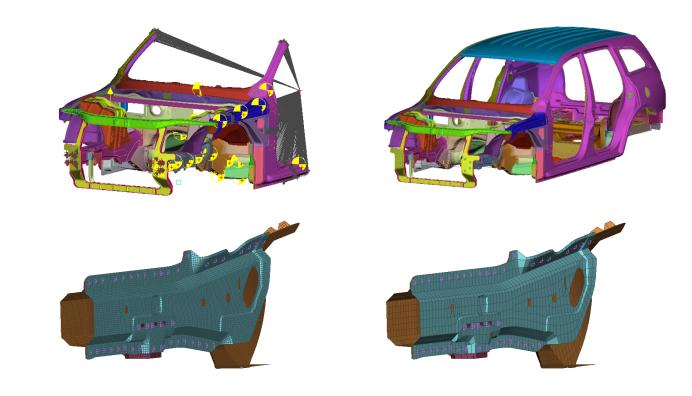
- Suitable for Box and Direct Morphing
- Measurement Tool
- Fringe Plot of deformed shape





Functionalities assisting Morphing DFM Migration

Re-application of DFM parameters on different models

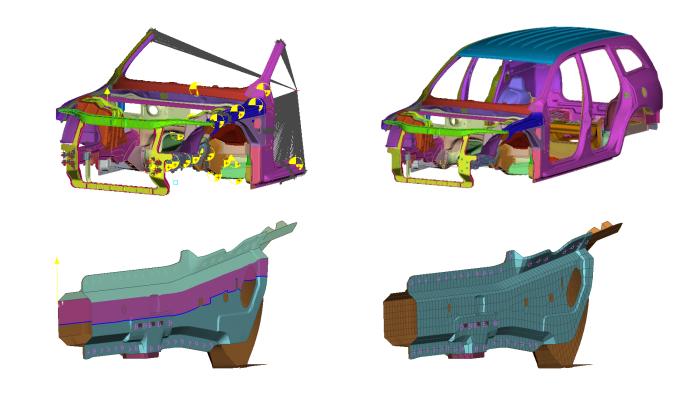


Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Functionalities assisting Morphing DFM Migration

Re-application of DFM parameters on different models

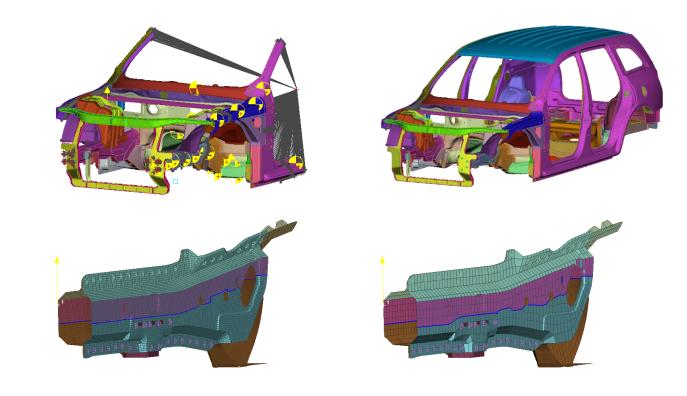


Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



Functionalities assisting Morphing DFM Migration

Re-application of DFM parameters on different models



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



• For parameterization of solver card entries

| *DLOAD [DLOAD] | | | | | X |
|----------------|-------|-----------|--------|--------------|-------|
| Name 📃 | | | | | |
| FROZEN_DEL | .ETE | | | | |
| NO | • | | | | |
| STEP | OP | AMPLITUDE | STEADY | STATE LOADIN | IG 🔺 |
| 1 | NEW - | • | | | = |
| by | ELSET | LOAD TY | /PE | magn(EID) | _ |
| set | - 3 | P | • | | |
| Comment | | | | | • |
| | | | | | |
| ОК | | | | С | ancel |

Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



- For parameterization of solver card entries
- Different types; Expressions

| FROZEN_DE | LETE | | | | |
|-----------|-------|-----------|--------|-------------|-------|
| NO | • | | | | |
| STEP | OP | AMPLITUDE | STEADY | STATE LOADI | NG |
| 1 | NEW · | • | | | |
| by | ELSET | LOAD TY | /PE | magn(EID) | |
| set | ▼ 3 | P | • | | |
| Comment | | | | |) |
| | | | | | |
| | | | | | |

| Ą | _PA | RAM | IETER | | | | × |
|---|-----|-----|----------|-------|--------------|------|---------------------------|
| ٩ | 2) | 6 | ٩ | | | • | \$. <mark>*</mark> |
| | ld | ¥ | Name | Value | Expression | Туре | ▼▼↓ |
| | | 1 | ignite | 10. | | Real | |
| | | 2 | ignite1 | 5. | ignite * 0.5 | Real | |
| F | | 3 | friction | 0.15 | | Real | |
| Ē | | | | | total 3 | sel | ected 0 |

Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



- For parameterization of solver card entries
- Different types; Expressions

| *DLOAD [DLOAD] | × | | | | | | | | |
|------------------------------|---|----|-----|----------|-------------------|----------|------------|------|------------------|
| Name | | | | | | | | | |
| FROZEN_DELETE | | A | PAF | RAM | ETER | | | | X |
| NO | • | C | | <u>s</u> | ٩ | | | • | 🌣 <mark>*</mark> |
| | _ | | Id | ¥ | Name | Value | Expression | Туре | ▼▼↓ |
| by ELSET LOAD TYPE magn(EID) | | | _ | | ignite ignite1 | 10. 5 | | Real | |
| set • 3 P • Fignite1 + | | L. | | | friction | | | Real | |
| Comment | • | | | | | | total 3 | se | lected 1 |
| =ignite1 | | | | | | | | | |
| OK | | | | | | | | | |
| <u> </u> | | 1 | | | | | | | |

Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



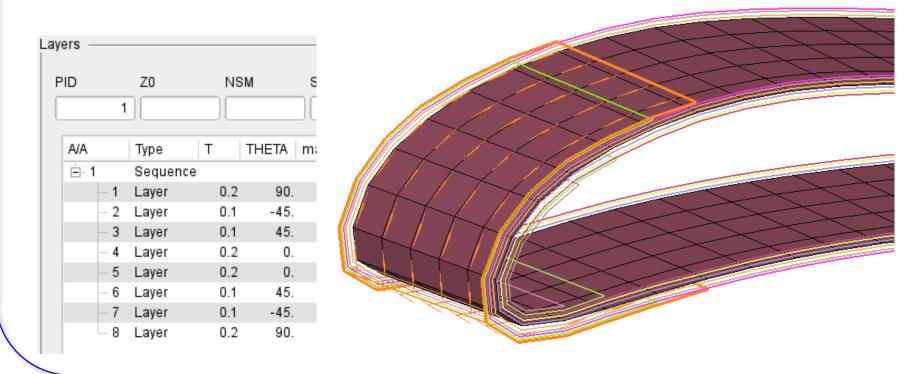
- For parameterization of solver card entries
- Different types; Expressions
- Import from / Export to *PARAMETER

| | A_PARAMETER | × |
|---|---|--------------------------|
| *DLOAD [DLOAD] | د م. ۲ | ¢. <mark>*</mark> |
| Name FROZEN_DELETE | Id ✓ Name Value Expression Type 1 ignite 10. Real 2 ignite1 5. ignite * 0.5 Real 3 friction 0.15 Real | ╯♥↓ |
| STEP OP AMPLITUDE STEADY STATE LOADING NEW | <pre>total 3 select total 3 select ignite = 10.0 ignite1 = ignite * 0.5</pre> | ied 1 |
| <pre>ignite1</pre> OK Cancel | <pre>friction = 0.15 ** ** *DSLOAD, 0P=NEW S_zkd_zuenden_zy6, P, <ignit <ignite="" p,="" s_brennraum_zy6,=""></ignit></pre> | - |

Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



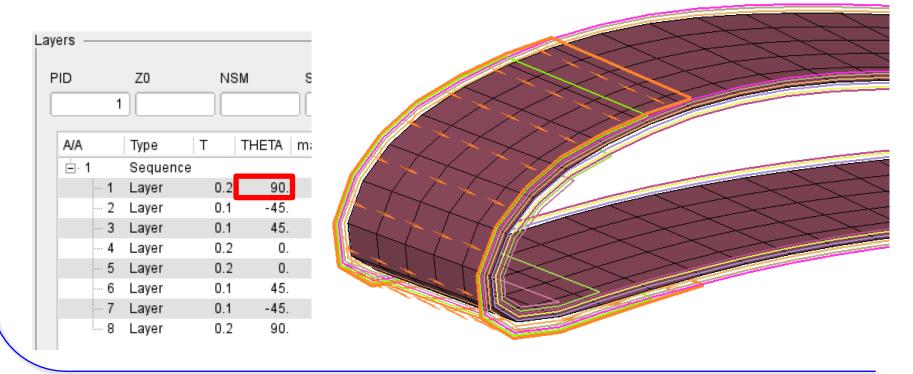
• For parameterization of composite properties, e.g.:



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



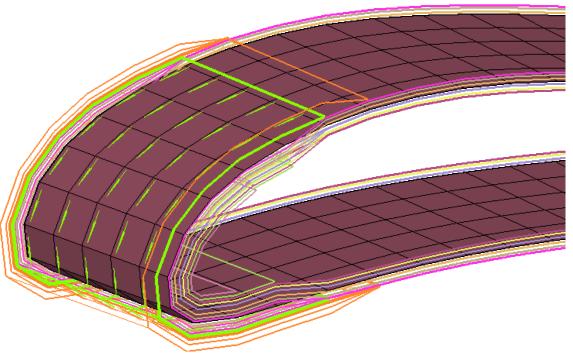
- For parameterization of composite properties, e.g.:
 - fabric orientation





- For parameterization of composite properties, e.g.:
 - fabric orientation
 - layer thickness

| ayers - | | | | | |
|---------|-----|--------|-----|-------|----|
| PID | | Z0 | NS | M | S |
| | 1 | | | |][|
| A/A | | Туре | T | THETA | m |
| ÷ | 1 | Sequen | ce | | |
| | - 1 | Layer | 0.2 | 90. | |
| | 2 | Layer | 0.1 | -45. | |
| | 3 | Layer | 0.1 | 45. | |
| | 4 | Layer | 0.2 | 0. | |
| | 5 | Layer | 0.2 | 0. | |
| | 6 | Layer | 0.1 | 45. | |
| | 7 | Layer | 0.1 | -45. | |
| | - 8 | Layer | 0.2 | 90. | |



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



• For parameterization of connection properties, e.g.:

| Connection Manager Spotweld Lines Connectivity ANSAId Name Status 1000 -5 2000 -4 Part_1 2000 -4 Part_2 Image: Connectivity ANSAId Name Status Image: Connect To Mesh Ima | | | | | |
|--|----------------|------------|----------|--------------------------|-------------------|
| Connectivity ANSAId 1000 -5 -5 Part_1 2000 -4 -4 Part_2 total 2 selected 0 Search Dist Use Thickness t Connect To Mesh Interface Contact Contact Contact Contact D S M P1 P2 Error Class V V Time Property Property Property Property Property Property | onnection Mar | nager | | | |
| Connectivity ANSA Id Name Status ▼ TiD 1000 -5 Part_1 Part_2 Pa | Spotweld Line | s | | | |
| 1000 -5 Part_1 2000 -4 Part_2 ID V ID ID V ID ID S M 100001 6.0 50.0 10.0 100002 6.0 50.0 10.0 ID V ID S M P1 P2 Error Class V ID Single Contact Dowool 6.0 50.0 10.0 2000 V ID Property ID ID Property ID D Solution ID D Solution ID D Property ID D D ID D <td< td=""><td>C 🖉</td><td>÷ Q,</td><td></td><td>✓ ✿, ※</td><td>FE Rep. Settings:</td></td<> | C 🖉 | ÷ Q, | | ✓ ✿, ※ | FE Rep. Settings: |
| 2000 -4 Part_2 . total 2 selected 0 Search Dist Use Thickness t Connect To Mesh Interface 10 D S M P1 P2 Error Class Image: | Connectivity | ANSAId Nam | e Status | ◪▾↓ | TID |
| ID S M P1 P2 Error Class Image: Contact ID Single Contact 100001 6.0 50.0 10.0 2000 1000 DYNA SPOT WELD 100002 6.0 50.0 10.0 2000 1000 DYNA SPOT WELD 1 Image: Contact ID Single Contact Single Contact Body Property Property Property | | | | | |
| total 2 selected 0 ID S M P1 P2 Error Class Image: Contact ID 100001 6.0 50.0 10.0 2000 1000 DYNA SPOT WELD Single Contact 100002 6.0 50.0 10.0 2000 1000 DYNA SPOT WELD Image: Ima | 2000 | -4 Part_ | 2 | | |
| ID S M P1 P2 Error Class Image: Contact 100001 6.0 50.0 10.0 2000 1000 DYNA SPOT WELD 100002 6.0 50.0 10.0 2000 1000 DYNA SPOT WELD Image: Contact ID Single Contact Body Image: Contact ID Property Property Image: Contact ID Discrete Contact Discrete Contact Image: Contact ID | <u> </u> | | | total 2 selected 0 | |
| ID ✓ D S M P1 P2 Error Class ▼ ↓ 100001 6.0 50.0 10.0 2000 1000 DYNA SPOT WELD Single Contact 100002 6.0 50.0 10.0 2000 1000 DYNA SPOT WELD Single Contact Image: Contact in the image of the | | | | | Connect To Mesh |
| ID ▼ D S M P1 P2 Error Class ▼ ↓ 100001 6.0 50.0 10.0 2000 1000 DYNA SPOT WELD Single Contact 100002 6.0 50.0 10.0 2000 1000 DYNA SPOT WELD Single Contact Image: Contact in the image of the | <u>a q</u> e c | λ, | | | Interface |
| 100002 6.0 50.0 10.0 2000 1000 DYNA SPOT WELD | ID 👻 D | S M | P1 F | 2 Error Class 🖓 🔻 🗸 | |
| Property Deculo ID | | | | | |
| | 100002 6.0 | 50.0 10.0 | 2000 1 | 000 DYNASPOT WELD | |
| Image: total 2 selected 0 Realize | • | | | • | |
| | | | | total 2 selected 0 | Realize |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved



- For parameterization of connection properties, e.g.:
 - distance between weld spots

| Connection Manager | |
|--|--|
| Spotweld Lines | |
| | |
| C 6 € € FE Rep. Settings: | |
| Connectivity ANRAId Name Status | |
| | |
| 1000 -5 Part_1 FE Rep Type | |
| 2000 -4 Part_2 General | |
| Search Dist | |
| total 2 selected 0 Use Thickness t | |
| Connect To Mesh | |
| S Q ⇒ Q interface | |
| ID ∨ D S M P1 P2 Error Class ♥ Contact | |
| 100001 6.0 50.0 10.0 2000 1000 DYNA SPOT WELD Single Contact | |
| 100002 6.0 50.0 10.0 2000 1000 DYNASI OT WELD Body | |
| Property | |
| | |
| Dealing | |
| total 2 selected 0 Realize | |
| | |
| | |
| | |
| | |
| | |
| | |



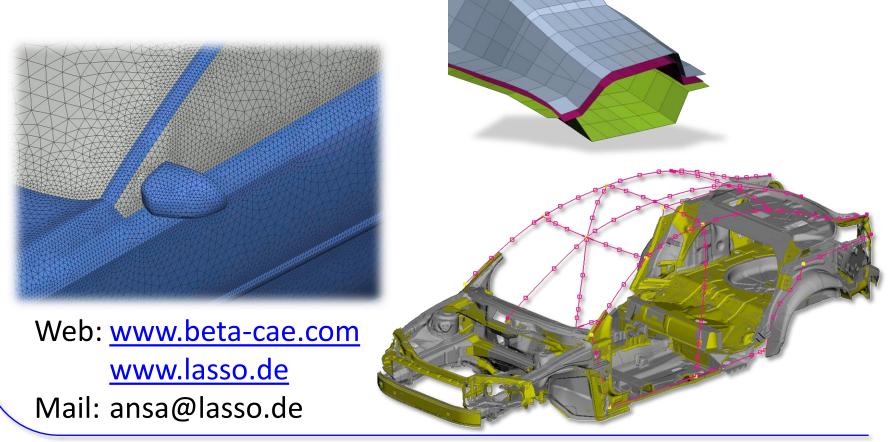
- For parameterization of connection properties, e.g.:
 - distance between weld spots
 - diameter of weld spots

| nection Manager potweld Lines | |
|---|--|
| potweld Lines | |
| | |
| | |
| ₽ 🖉 💭 🗣 🔍 🗸 FE Rep. Settings: | |
| | |
| | |
| 1000 -5 Part_1 FE Rep Type | |
| 2000 -4 Part_2 General | |
| Search Dist | |
| total 2 selected 0 Use Thickness t | |
| | |
| V 🖳 🗮 🗽 Interface | |
| D ▼ D S M P1 P2 Error Class V ↓ Contact | |
| | |
| | |
| 00001 6.0 50.0 10.0 2000 1000 DYNA SPOT WELD Body Property | |
| | |
| | |
| total 2 selected 0 Realize | |





Ευχαριστώ πολύ



Copyright 2020, LASSO Ingenieurgesellschaft mbH All rights reserved