

Positioning of Car Seat Structures

06.06.2013 - S. Sinne, F. Richter

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Agenda

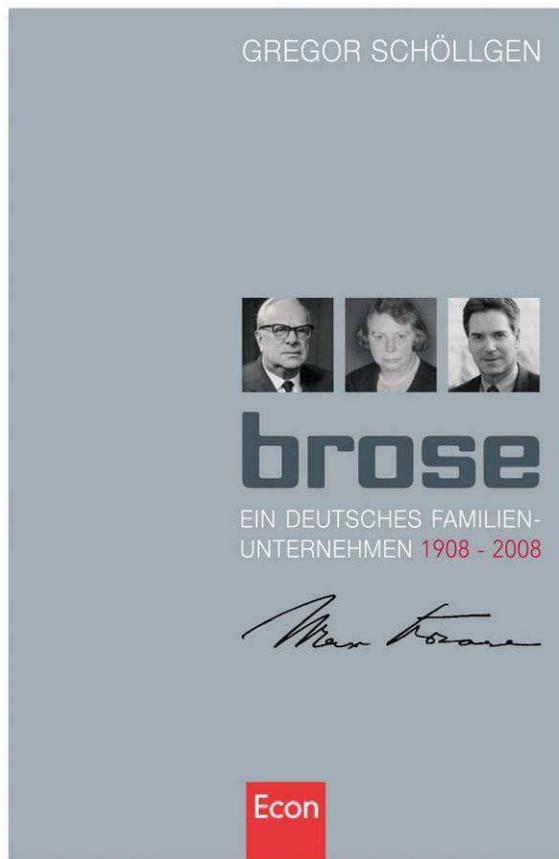
- 1 Brose – system supplier of the international automotive industry
- 2 Seat Types & Test Requirements
- 3 Seat Positioning
- 4 Summary

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- 1** Brose – system supplier of the international automotive industry
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Founding and building of a family-owned company

Three generations in 100 years



Max Brose
Gisela Brose
Michael Stoschek

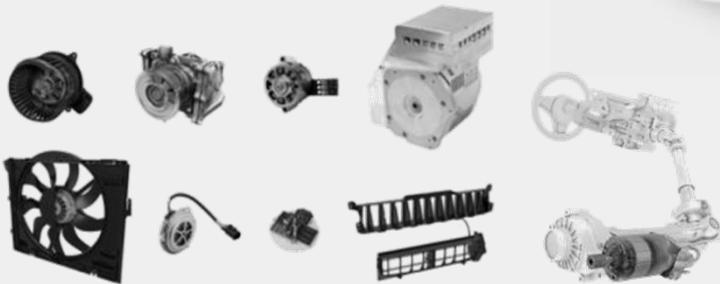
Product range

Mechatronic Systems and Drives for Automobiles

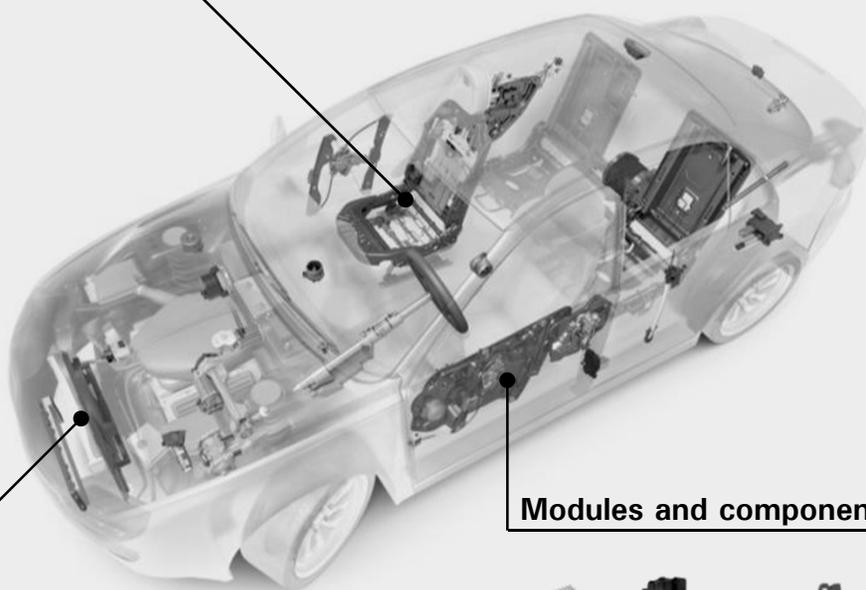
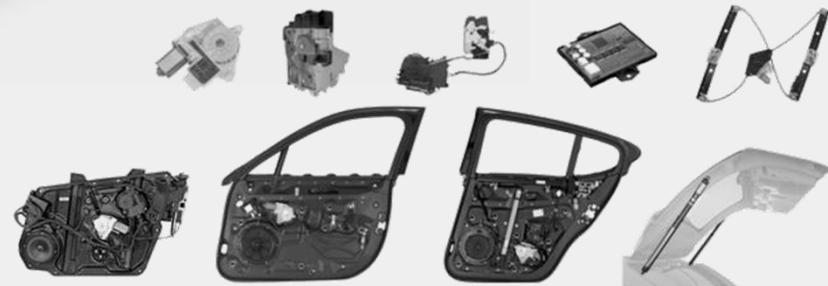
Structures and components for vehicle seats



Systems for engine cooling,
electric motors and drives



Modules and components for vehicle doors



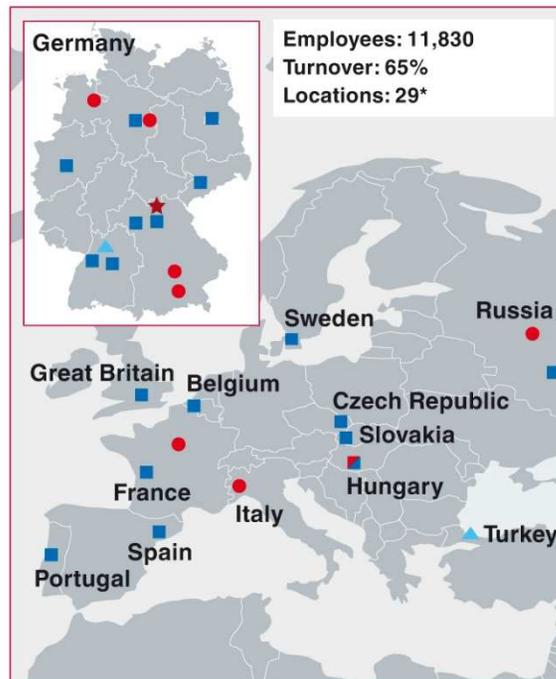
Global presence

53 locations in 23 countries

America



Europe



Asia



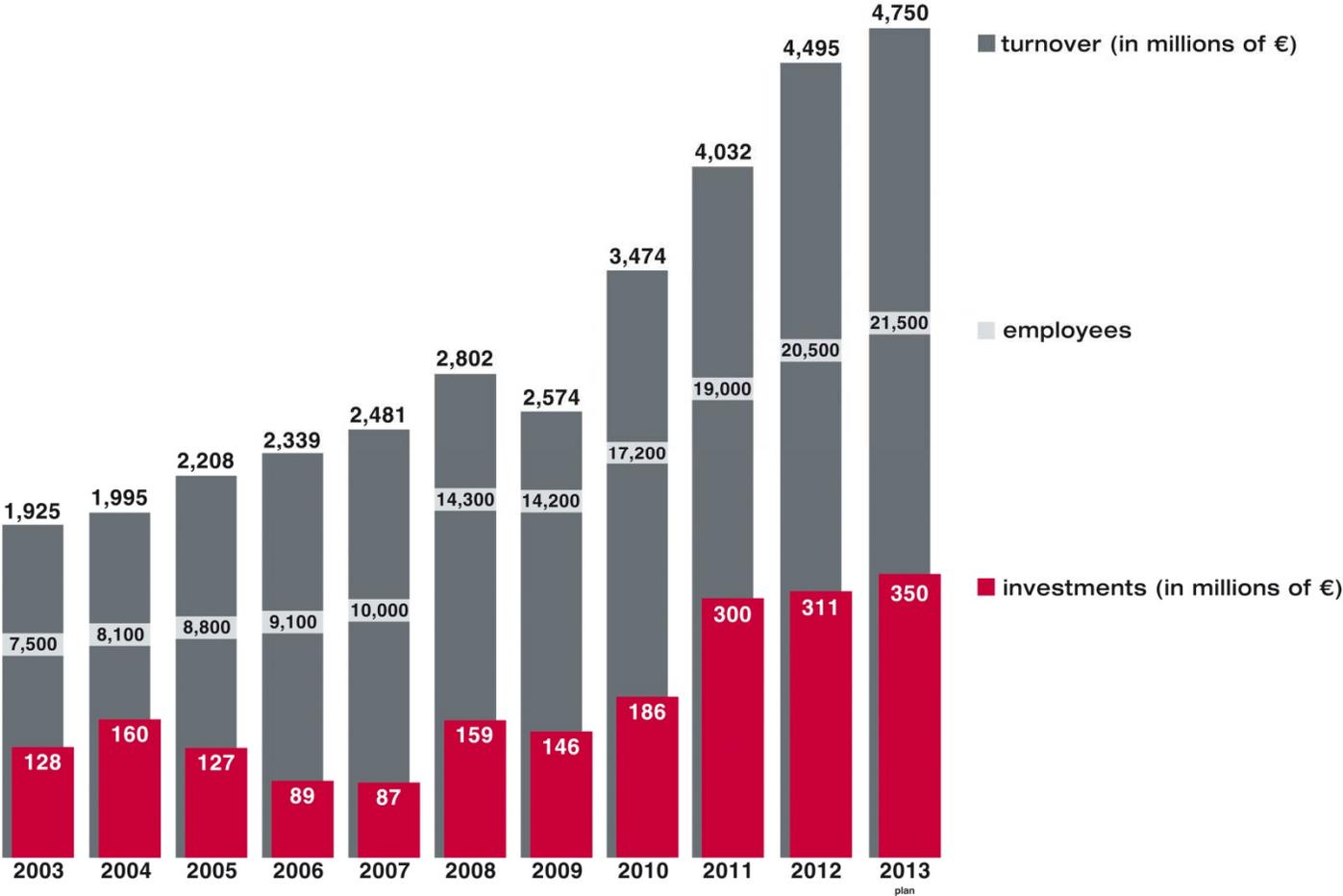
★ Headquarters ● Engineering/Sales ■ Production/Plants ■ Set-up/expansion stage ▲ Joint venture/Affiliated company *incl. South Africa

Customers worldwide

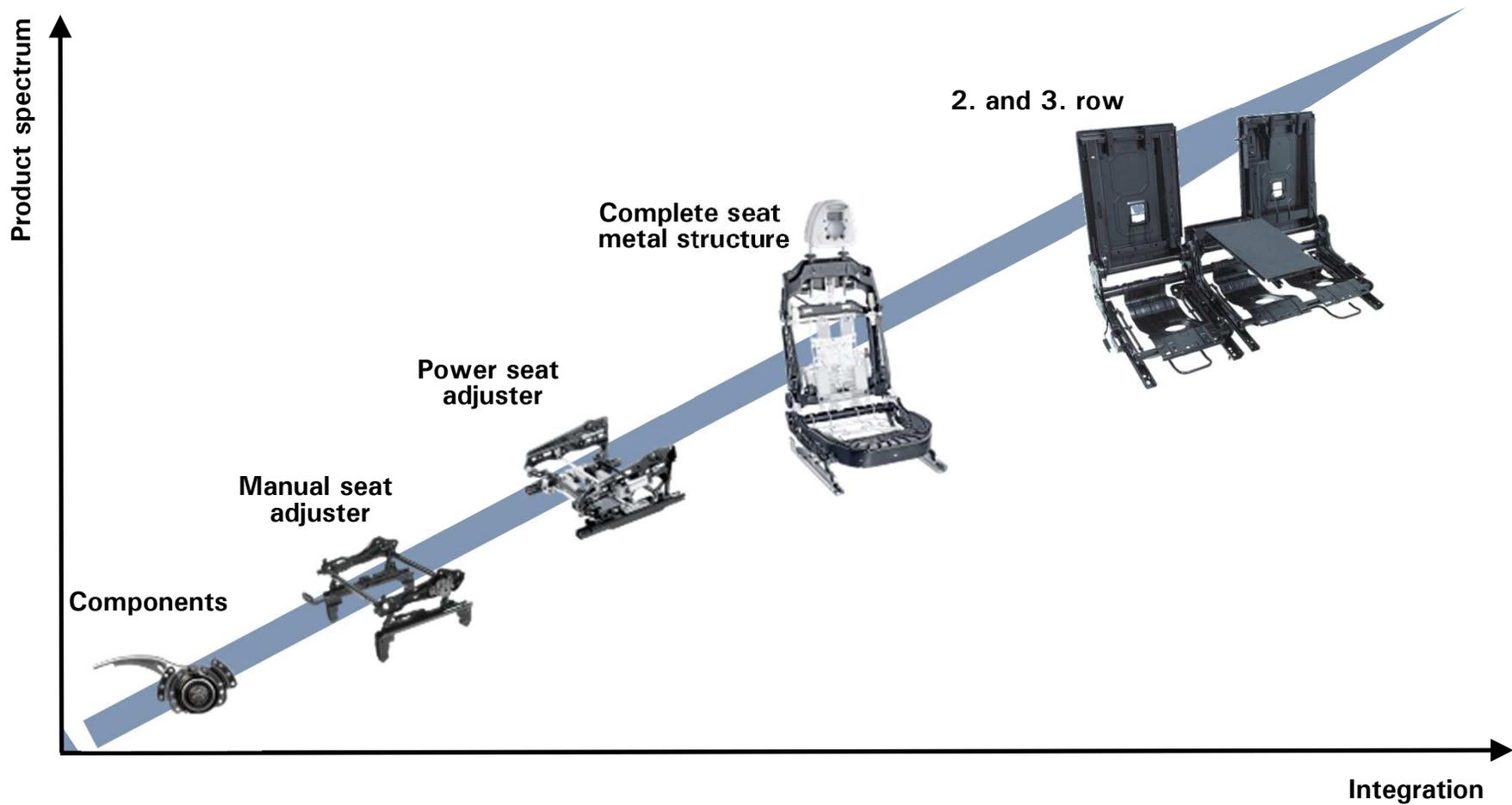


Business development

Continuous self-generated growth



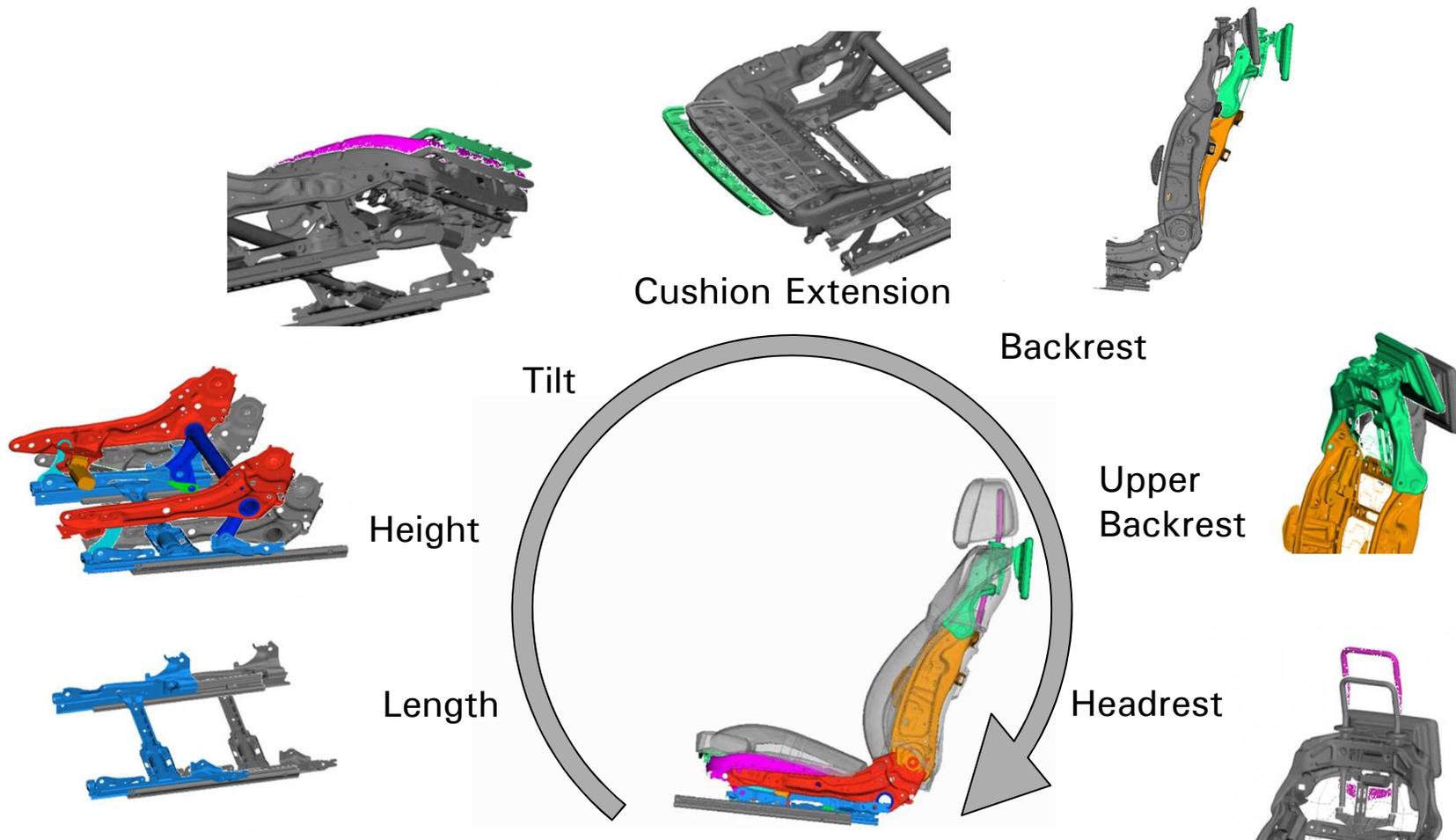
System expertise vehicle seat



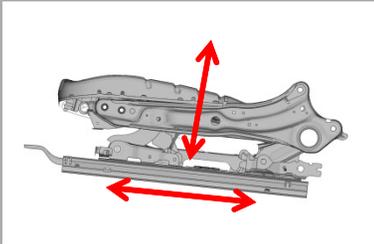
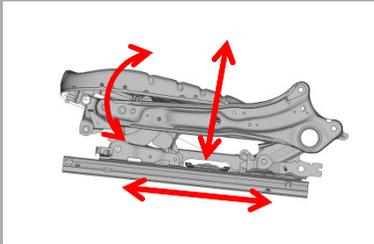
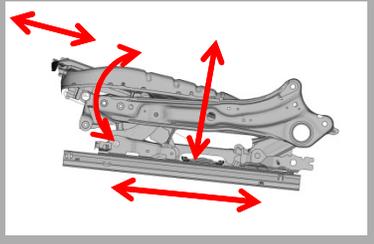
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Seat Positioning Overview



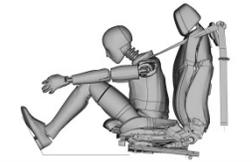
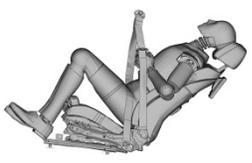
Seat Types

		4 - way		6 - way		8 - way	
		man	pow	man	pow	man	pow
Adjuster	Backrest						
		man	pow	man	pow	man	pow
Basic	man	●		●		●	
	pow	●	●	●	●	●	●
Comfort	man			●			
	pow				●		

12
Seat
Types

Test Requirements

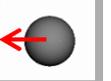
Crash

	w/o Dummy			5%-ile 			50%-ile 			95%-ile 		
	P1	P2	P3	P1	P2	P3	P1	P2	P3	P1	P2	P3
Frontal Impact 		●		●	●		●	●			●	●
Rear Impact 				●			●	●			●	●
Cargo Load 			●						●			

14
Loadcases
CRASH

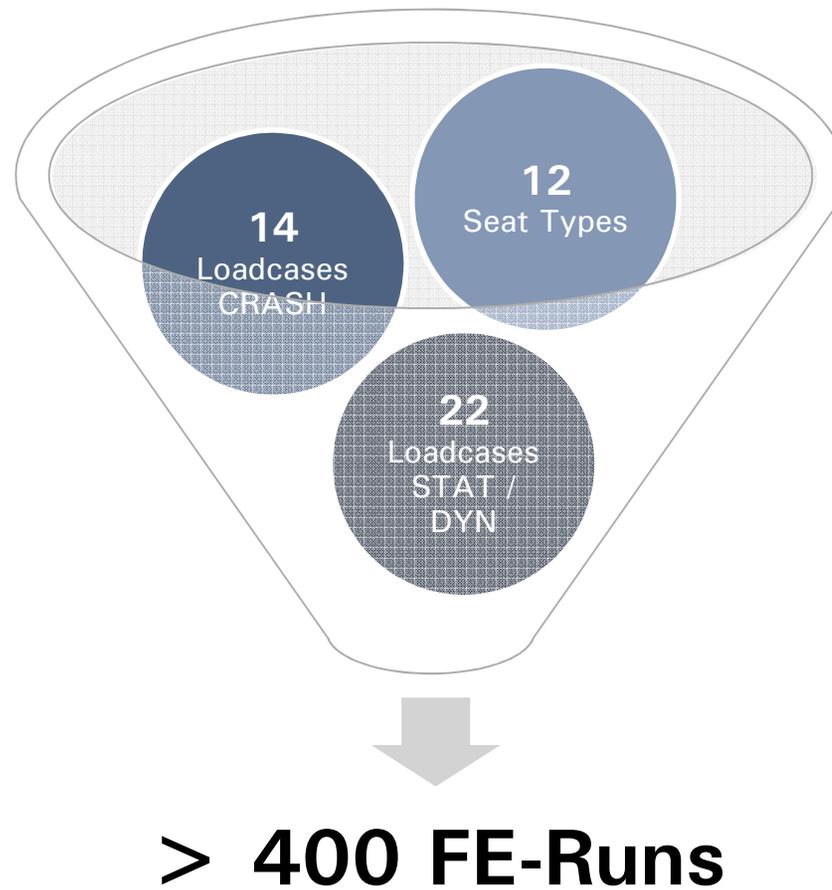
Test Requirements

static / dynamic

	Belt Anchorage Test	ISOFIX			Moment H-Point	Headrest Test		
								
		right	straight	left		static	dyn. front	dyn. rear
Position 1	●	●	●	●		●	●	●
Position 2	●	●	●	●	●	●	●	●
Position 3	●	●	●	●		●		

22
Loadcases
STAT /
DYN

Validation Matrix

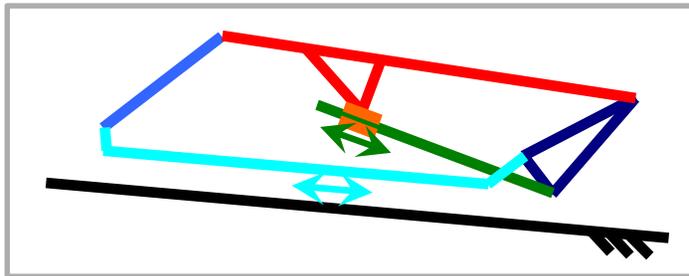


Agenda

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ANSA Kinematic

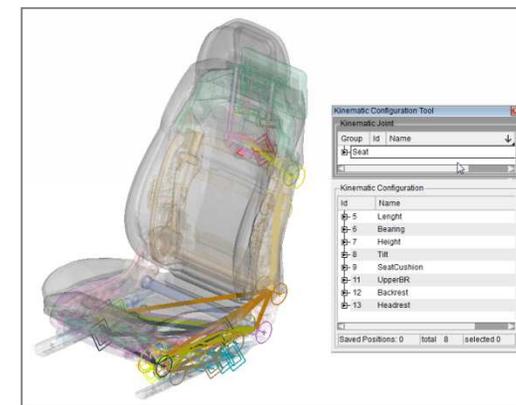
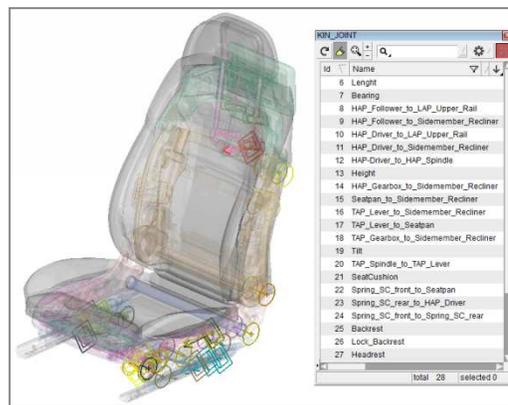
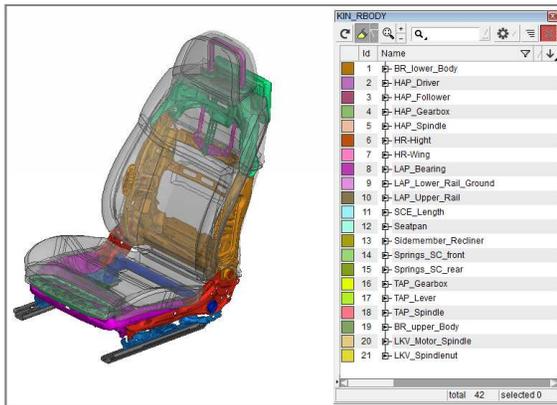
Model built up



**Kinematic
Body**

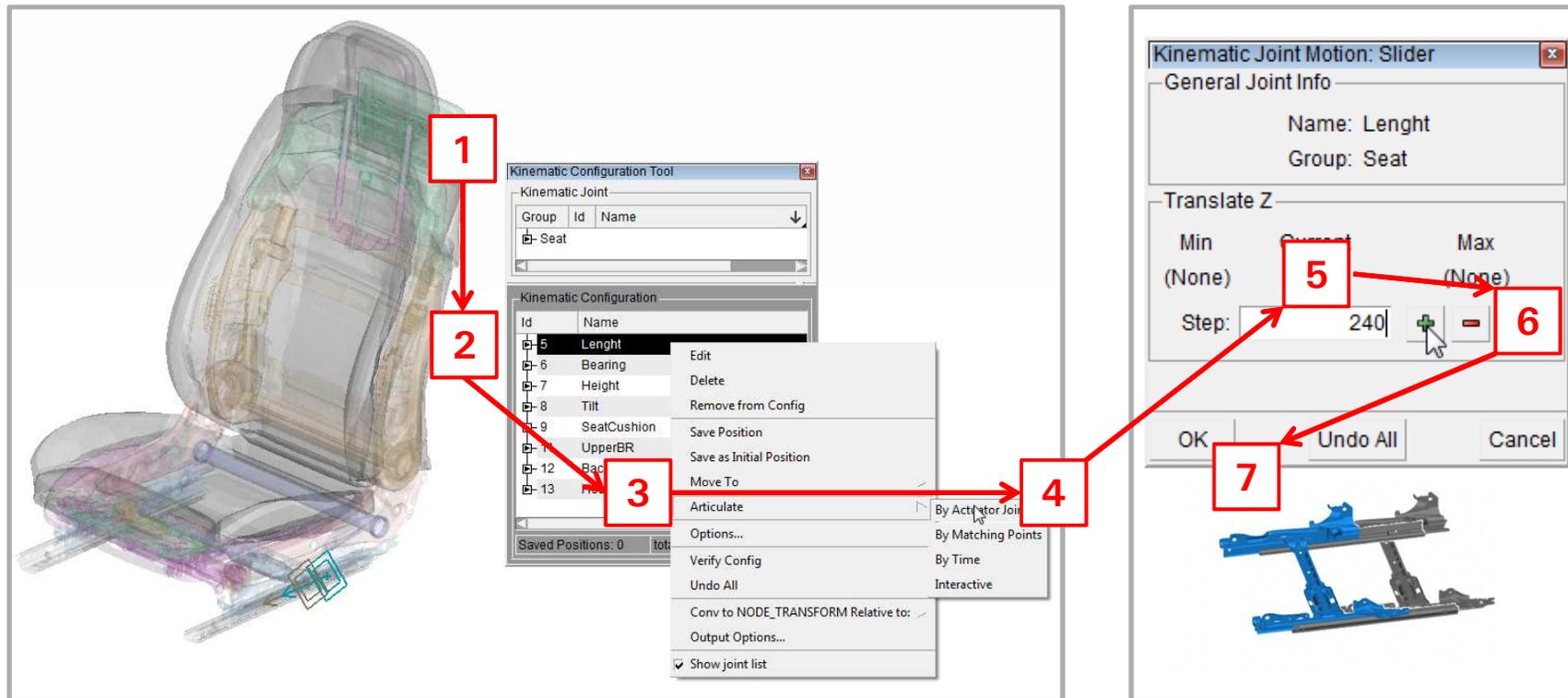
**Kinematic
Joint**

**Kinematic
Configuration**



User interactive kinematic articulation

Example: Length adjustment

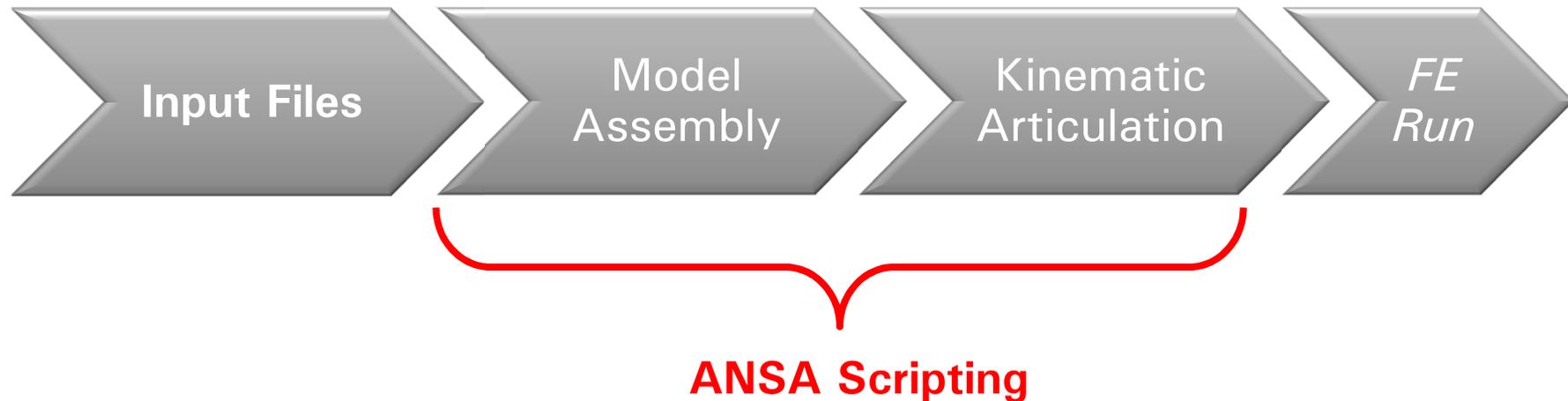


➡ 7 Clicks per Adjustment x 8 Configurations = 56 User Interactions

➡ Time consuming and error-prone model adjustment in case of many loadcases !

Automation approach

Overview



Requirements:

- Error free model handling
- Speed up model assembly
- Speed up seat positioning
- Reproducibility of setting up FE-runs

Kinematic automation approach

Input Files

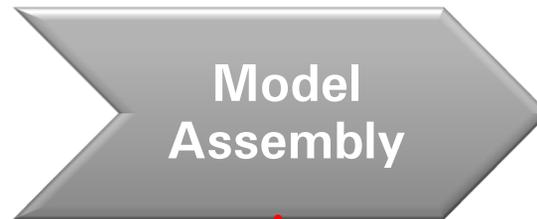


Routing File

<pre>*KEYWORD \$ *PROJECT_NAME 5th ANSA & pETA International Conference \$ \$Ansa_Includefile *ANSA_INCLUDE_FILE C:\Conference\ansa2013_include.k \$</pre>	LS-Dyna Include File
<pre>\$Ansa_Kinematic *ANSA_KINEMATICS_FILE C:\Conference\ansa2013_kinematics.ansa \$</pre>	ANSA Kinematics File
<pre>\$ANSA Seatadjustment *ANSA_KINEMATICS_POSITION \$K_CONFIG , min, max, value, direction Lenght , , , 240, TRANSLATE Z Height , , , 100, TRANSLATE Z Tilt , , , 40, TRANSLATE Z SeatCushion , , , 60, TRANSLATE Z UpperBackrest , , , 13, TRANSLATE Z Headrest , , , 80, TRANSLATE Z \$ *END</pre>	Kinematics Parameter

Kinematic automation approach

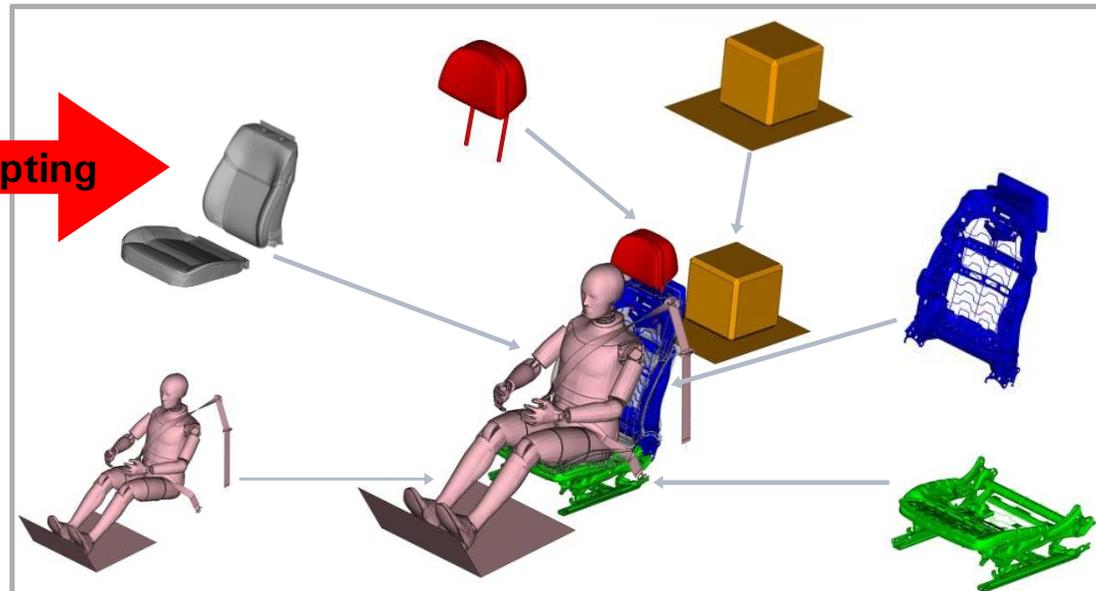
Model Assembly



Routing File

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$
*PROJECT_NAME
5th ANSA & µETA International Conference
$
$Ansa_Includefile
*ANSA_INCLUDE_FILE
C:\Conference\ansa2013_include.k
$
$Ansa_Kinematic
*ANSA_KINEMATICS_FILE
C:\Conference\ansa2013_kinematics.ansa
$
$ANSA_Seatadjustment
*ANSA_KINEMATICS_POSITION
$K_CONFIG      , min, max, value,  direction
Lenght         , , , 240, TRANSLATE Z
Height         , , , 100, TRANSLATE Z
Tilt           , , , 40, TRANSLATE Z
SeatCushion    , , , 60, TRANSLATE Z
UpperBackrest , , , 13, TRANSLATE Z
Headrest       , , , 80, TRANSLATE Z
$
*END
```

ANSA Scripting



Kinematic automation approach

Assignment of sets



LS-Dyna Include Files

ANSA Kinematics File

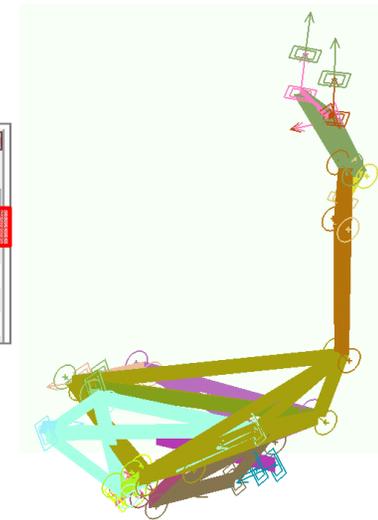
Pre defined sets

Id	Name	Include	DEFINED
150001	[-.trans_p BR_lower_Body -BCU		
320013	[-.trans_p BR_lower_Body -B		
420001	[-.trans_p BR_lower_Body -B	2	✓
520001	[-.trans_p BR_lower_Body -BR_Reinforceme...	2	✓
720015	[-.trans_p BR_lower_Body -BR_Sidemember	2	✓

ANSA Scripting

Kinematic Bodies

Id	Name
1	[- BR_lower_Body
2	[- HAP_Driver
3	[- HAP_Follower
4	[- HAP_Gearbox
5	[- HAP_Spindle



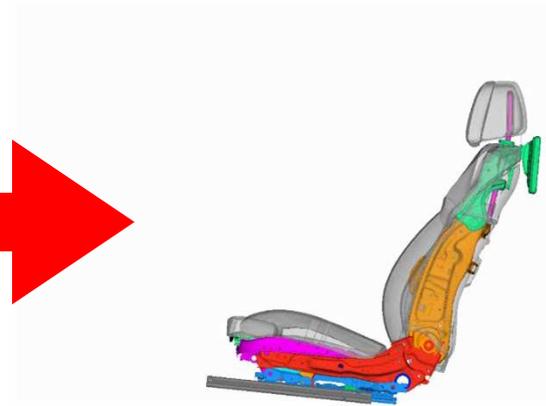
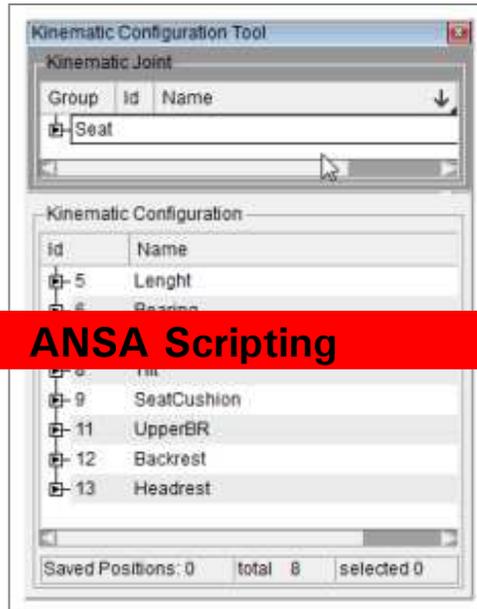
Kinematic automation approach

Kinematic Articulation



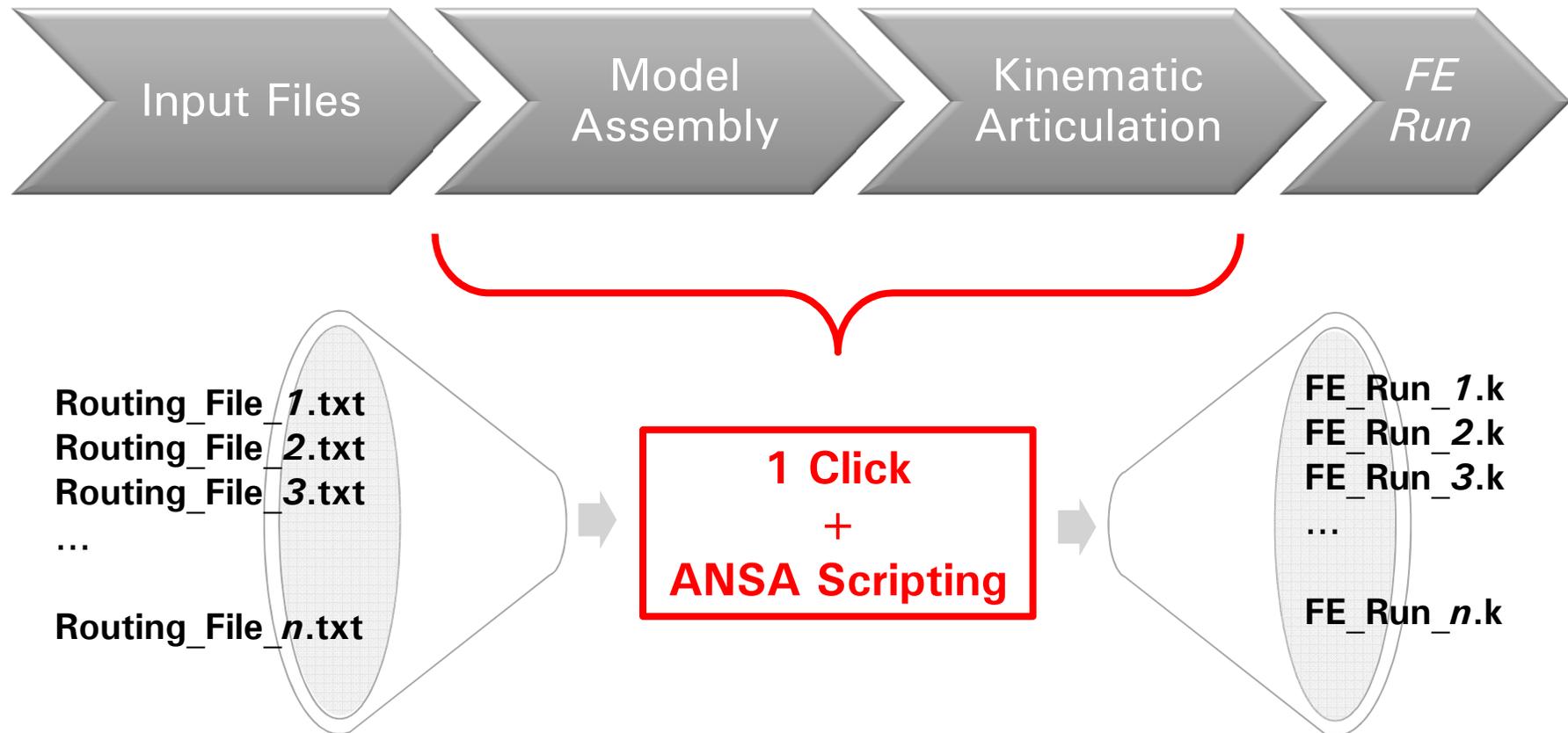
Routing File

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*PROJECT_NAME
5th ANSA & pETA International Conference
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$Ansa_Includefile
*ANSA_INCLUDE_FILE
C:\Conference\ansa2013_include.k
$
$Ansa_Kinematic
*ANSA_KINEMATICS_FILE
C:\Conference\ansa2013_kinematic
$
$ANSA_Seatadjustment
*ANSA_KINEMATICS_POSITION
$K_CONFIG      , min, max, value, direction
Lenght         , , , 240, TRANSLATE Z
Height         , , , 100, TRANSLATE Z
Tilt           , , , 40, TRANSLATE Z
SeatCushion    , , , 60, TRANSLATE Z
UpperBackrest , , , 13, TRANSLATE Z
Headrest       , , , 80, TRANSLATE Z
$
*END
```



Kinematic automation approach

From Input to FE-Run



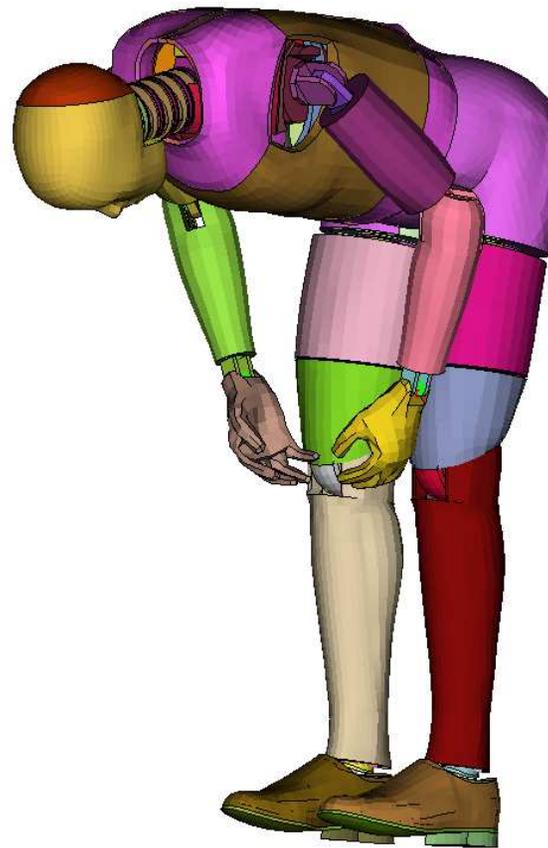
Agenda

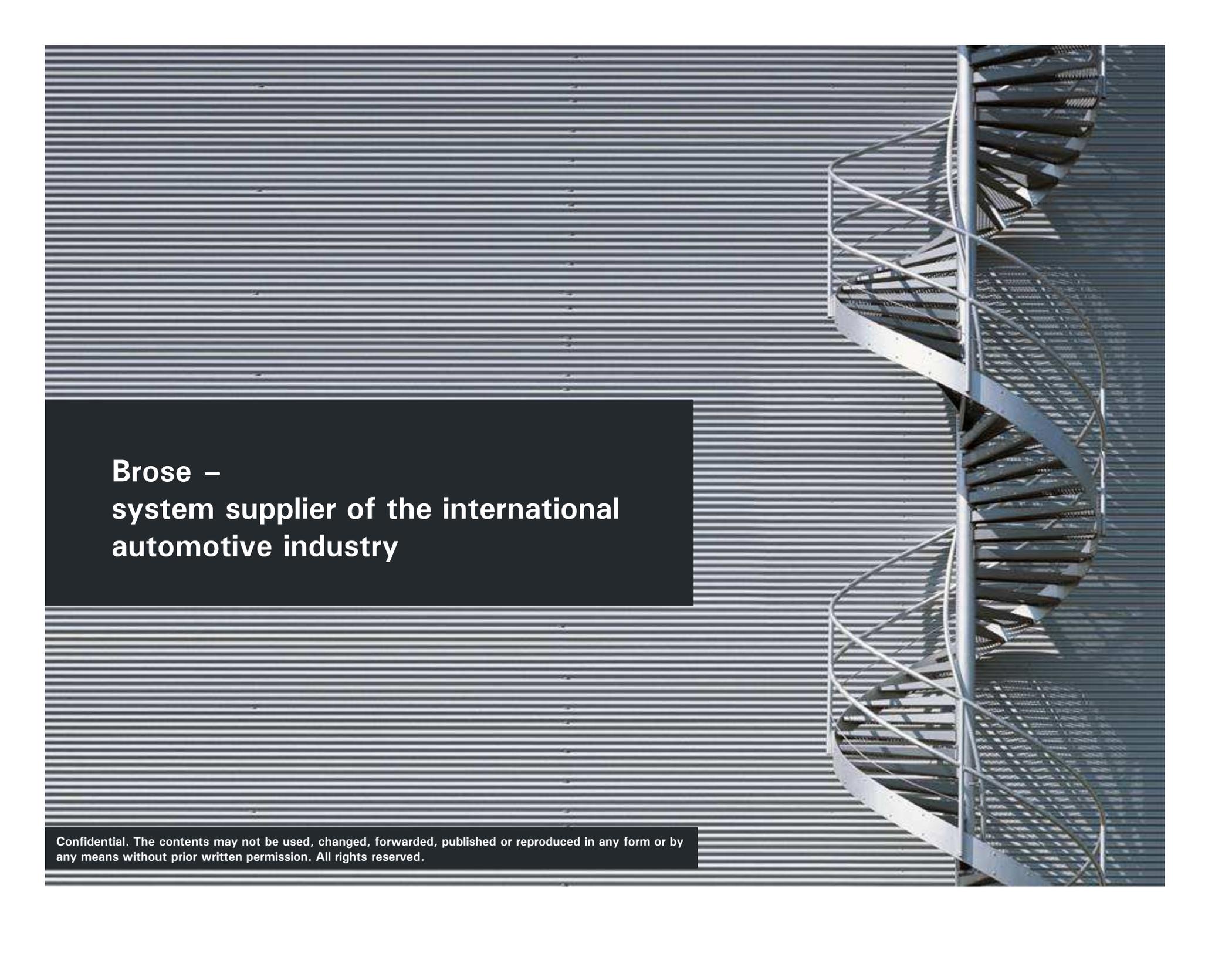
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Summary

- The needed standardization for the automation leads to consistent model build up
 - Process automation is successfully realized
 - Error free model assembly and seat positioning
 - Time to set up FE-runs is enormously reduced
- ➔ **Efficient handling of various seat types
in combination with many load cases**

Thanks' for your attention!





**Brose –
system supplier of the international
automotive industry**

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