

COMAT

COMPOSITE MATERIALS GMBH

Thermoplastic pressure vessels for automotive applications

SPE Conference 12.-14. September 2005

Ralph Funck

Marie-Curie-Str. 11

D- 67661 Kaiserslautern

Germany

Tel. +49- 63 01-71 52 - 0

Fax. +49- 63 01-71 52 - 20

<http://www.comat.de>





URKUNDE

Innovationspreis

der Arbeitsgemeinschaft Verstärkte Kunststoffe e.V. (AVK)

für die

HOCHSCHULARBEIT DES JAHRES 1996

wird verliehen an

Herrn Dr.-Ing. Ralph Funck,
Institut für Verbundwerkstoffe GmbH, Kaiserslautern

für

Fertigung glasfaserverstärkter Druckbehälter mit
thermoplastischen Matrizes und Linern

Frankfurt, den 11. September 1996

Erich Kleine
AVK-Geschäftsführer

Peter Selnar
Vorsitzender des AVK-Arbeitskreises Innovationspreis

Innovation DExWin[®]

- Thermoplastic Matrix Materials
- Efficient Impregnation Technology
- Continuous Production
- High Production Flexibility

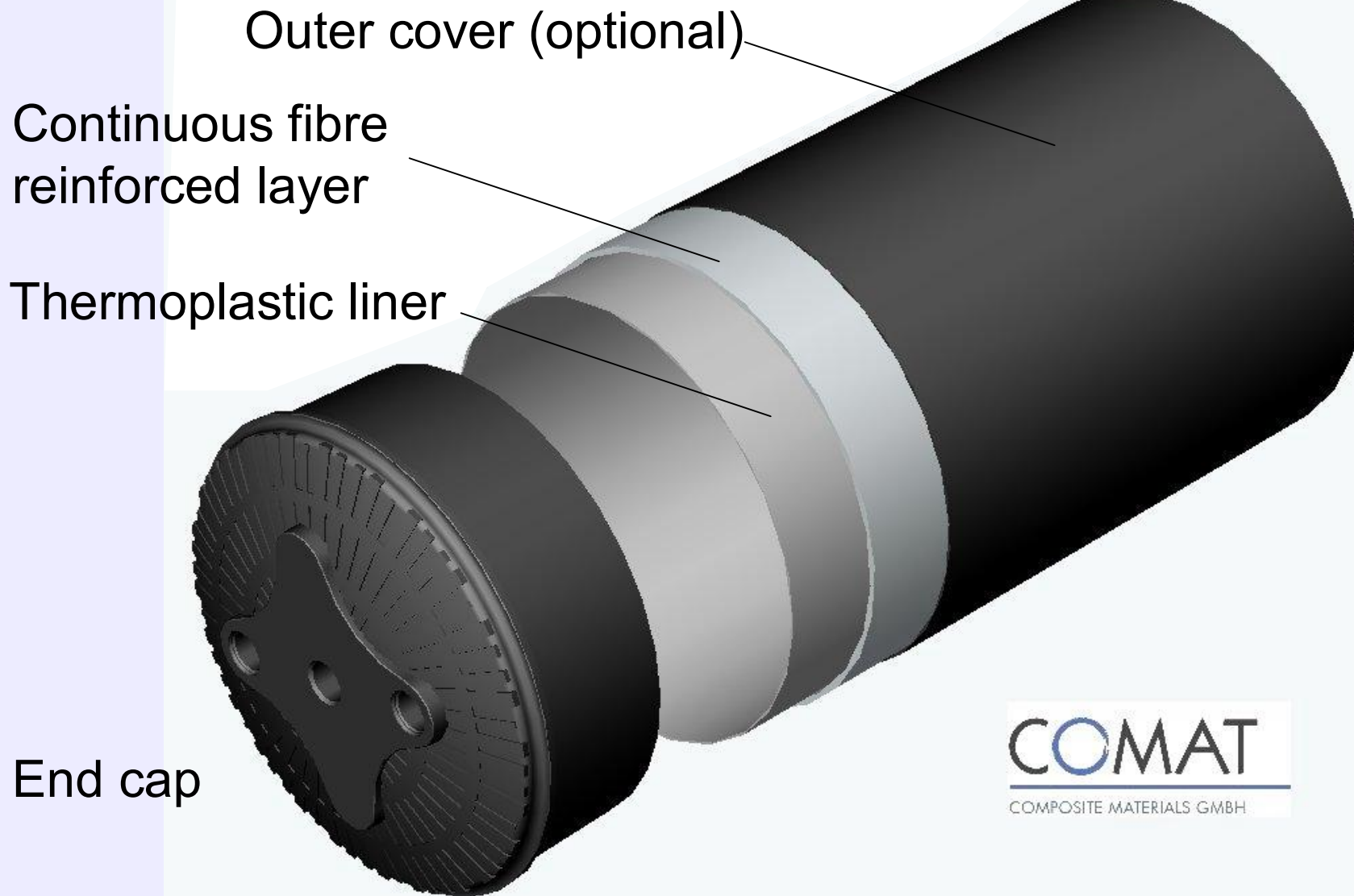
Concept



DExWin[®] Pressure Vessel Concept

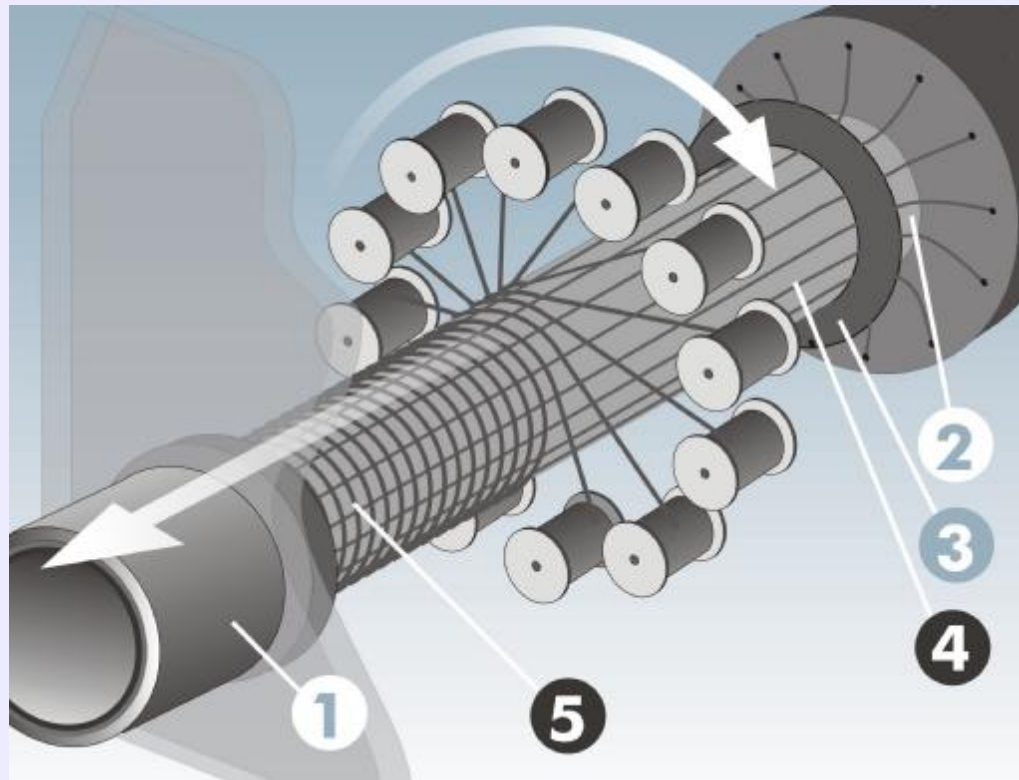
COMAT

COMPOSITE MATERIALS GMBH



COMAT
COMPOSITE MATERIALS GMBH

Functional principle of DExWin[®] - Tube Line

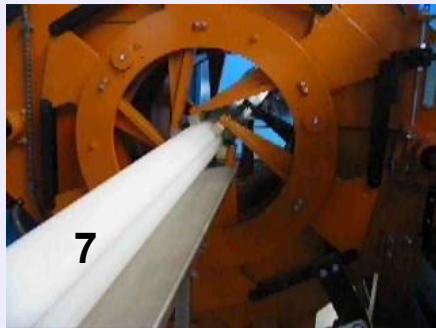
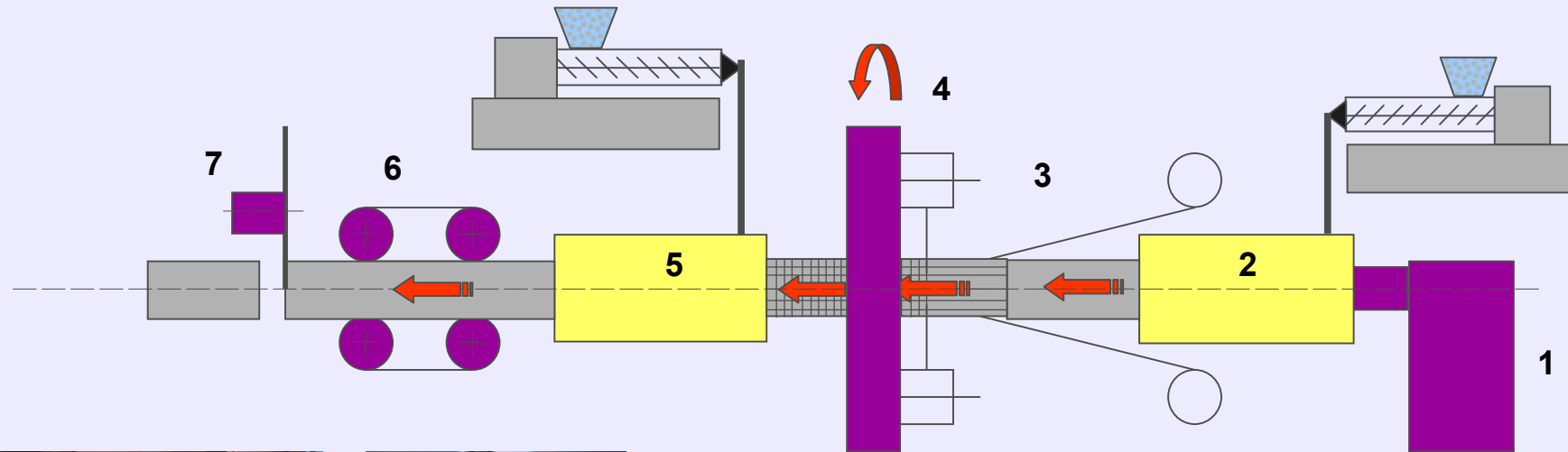


(1) Outer Cover (2) Inner liner (3) Fastening-Tool

(4) Fibre axial (5) Fibre radial

DExWin[®] - Tube Manufacturing Process COMAT

COMPOSITE MATERIALS GMBH



FILM

- 1 Mandrel
- 2 Liner extrusion
- 3 Fibre axial
- 4 Fibre radial
- 5 Cover extrusion
- 6 Puller device
- 7 Saw

Fibre used:

StarRov[™] 473A



StarRov[™] direct roving 473A is a strand of continuous glass filaments coated with a sizing. Typical applications of this product include the LFT reinforcement technology.

Properties:

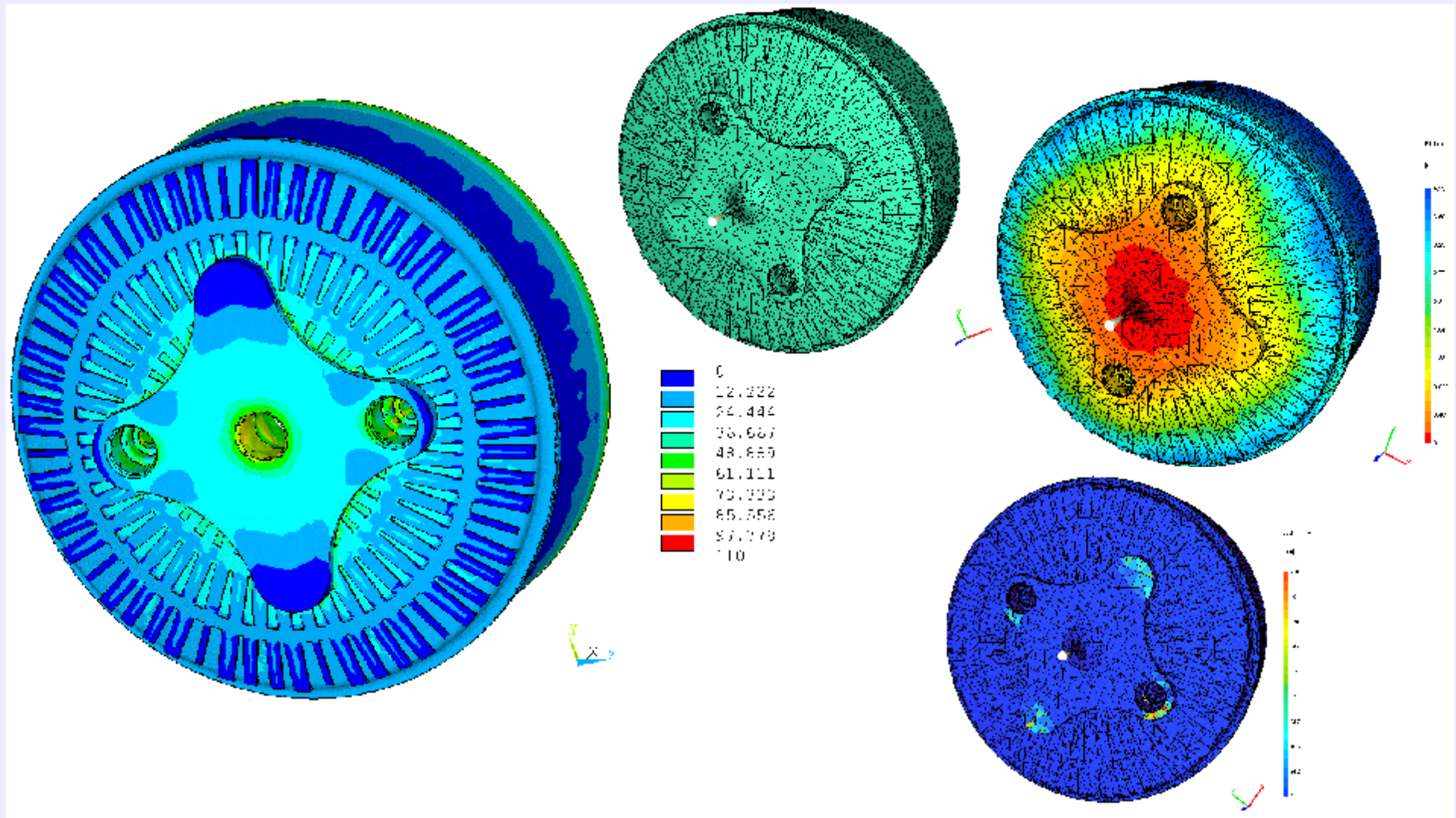
- excellent mechanical tensile strength and flexural strength in PP
- good impact strength in PP
- outstanding processing behaviour in direct process
- easy to unwind
- low fuzz generation during processing



DExWin® Pressure Vessel

COMAT

COMPOSITE MATERIALS GMBH



DExWin[®] Pressure Vessel

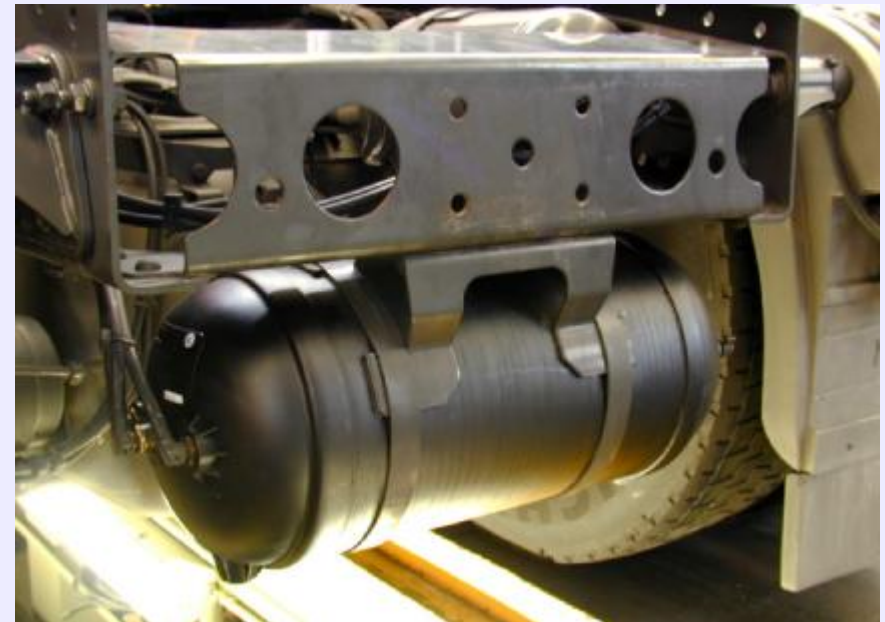
COMAT

COMPOSITE MATERIALS GMBH

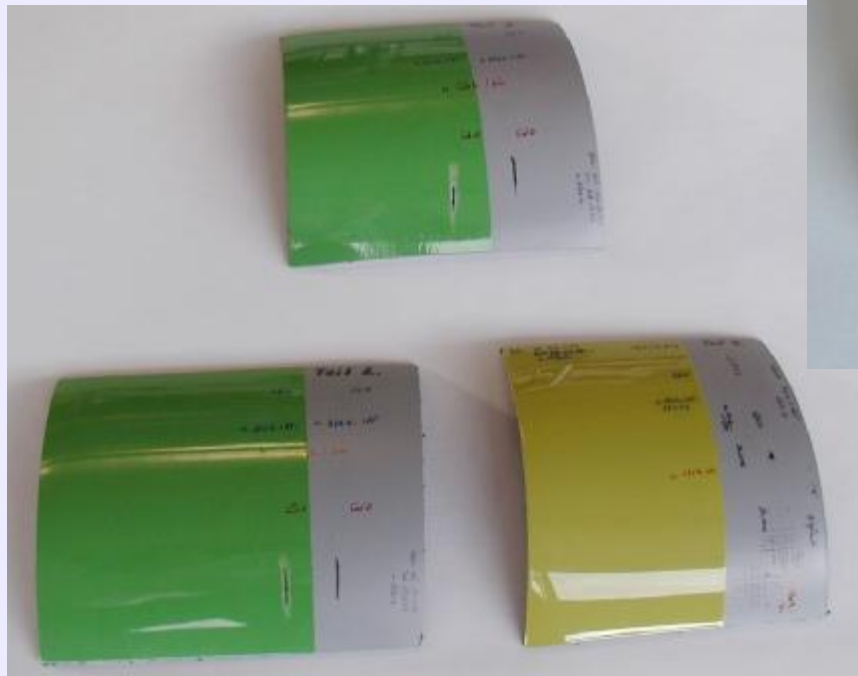


Typ: D 276 / 12,5 bar / 30l

DaimlerChrysler Summer- / Winter-tests



Painting tests



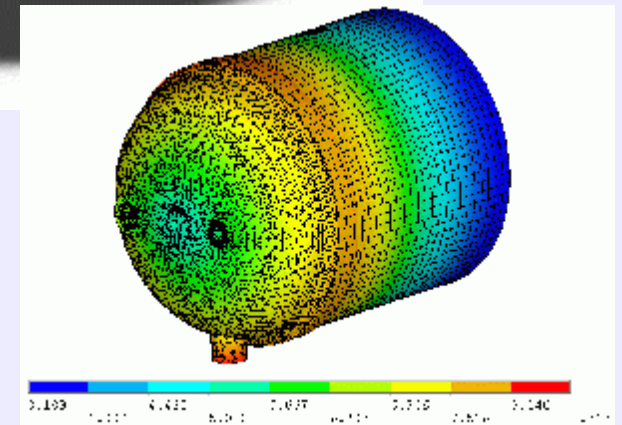
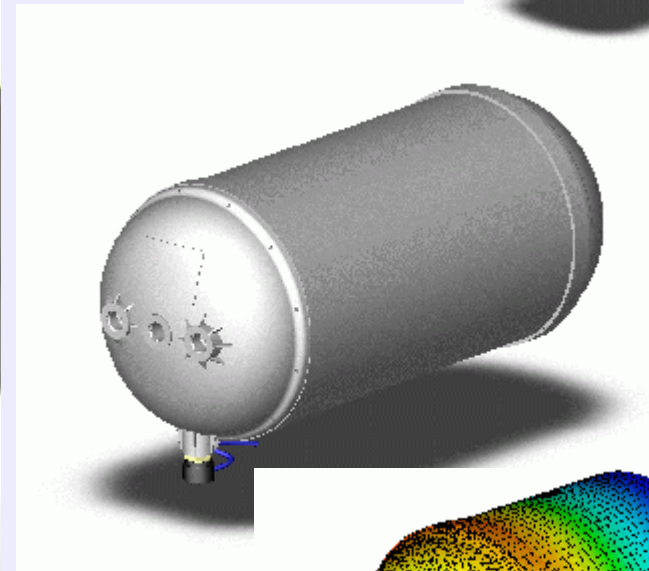
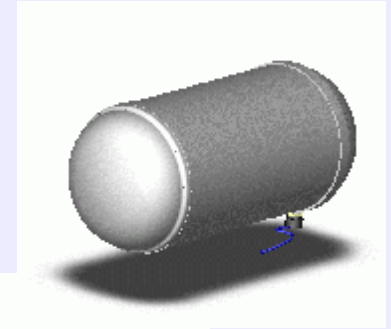
DExWin[®] Pressure Vessel

COMAT

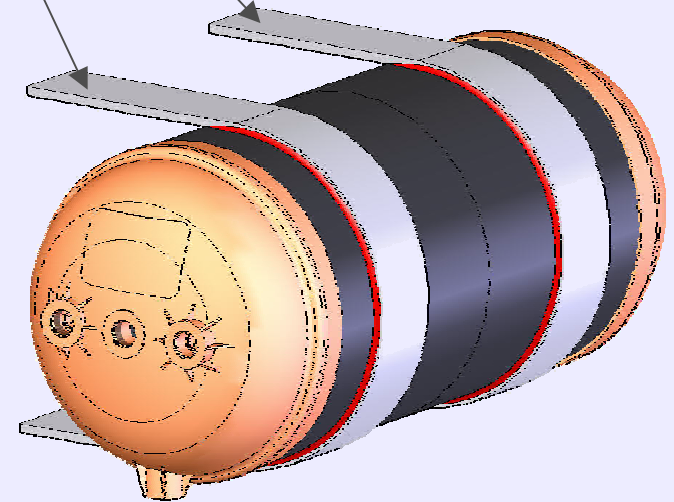
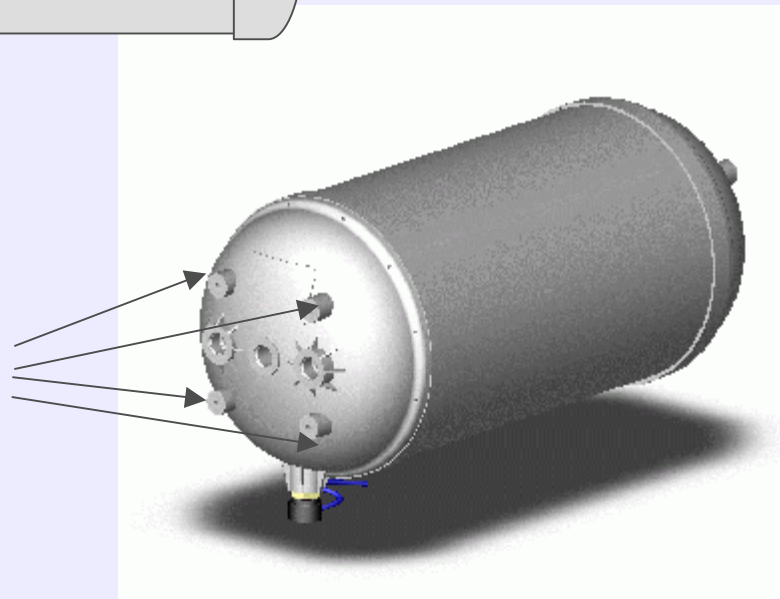
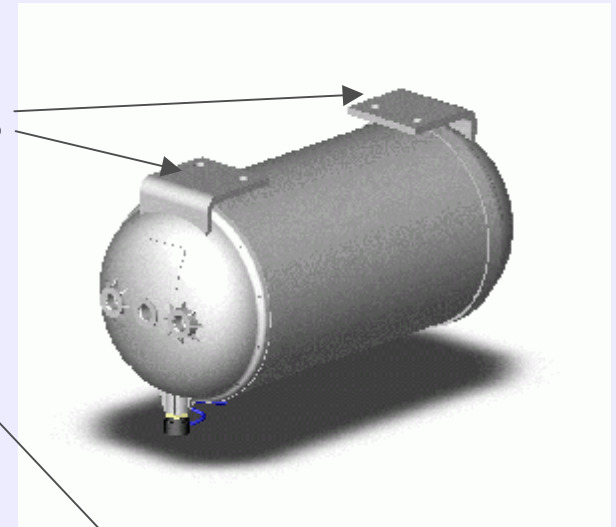
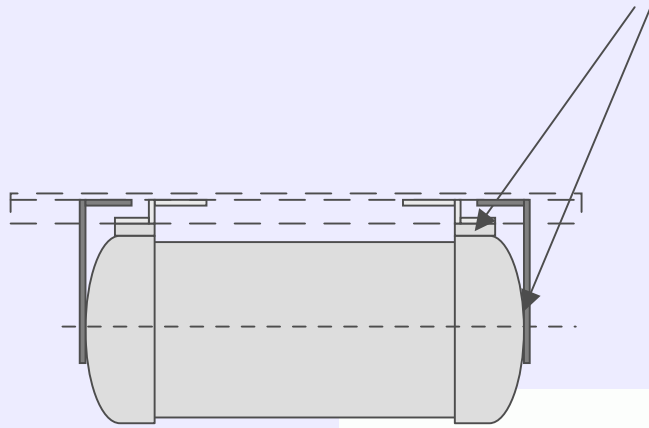
COMPOSITE MATERIALS GMBH



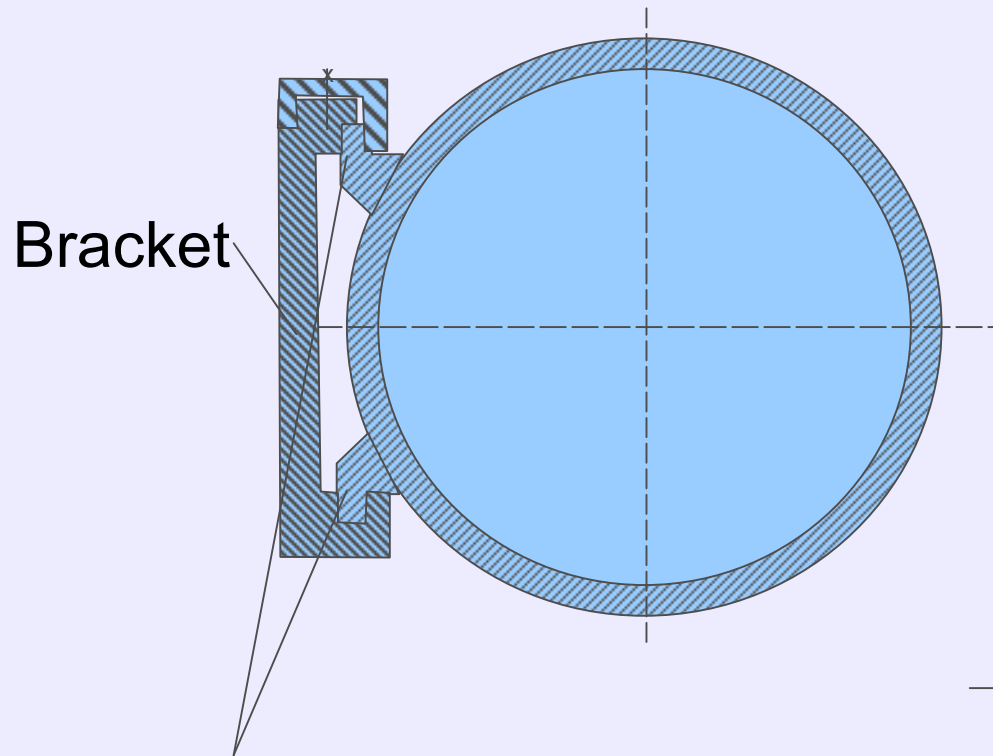
Typ: D 276 / 12,5 bar



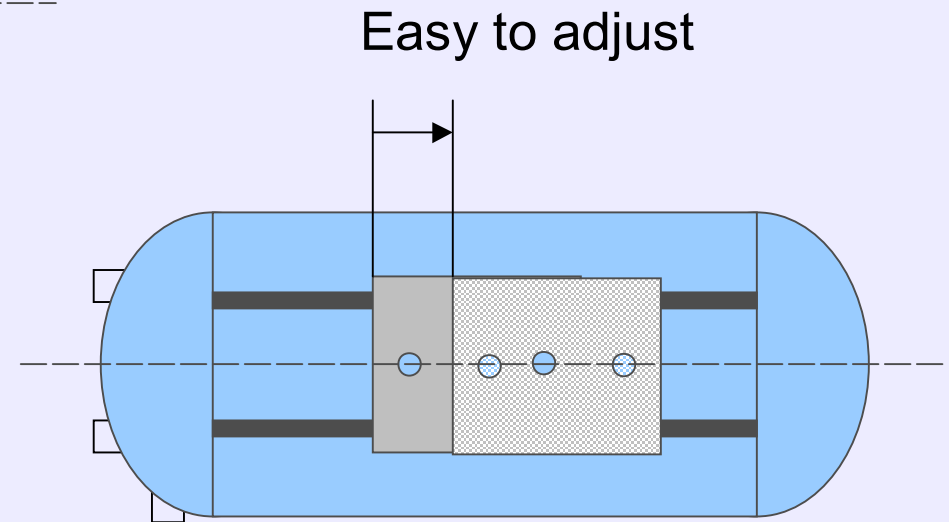
Integrated mounting devices



Integrated mounting devices

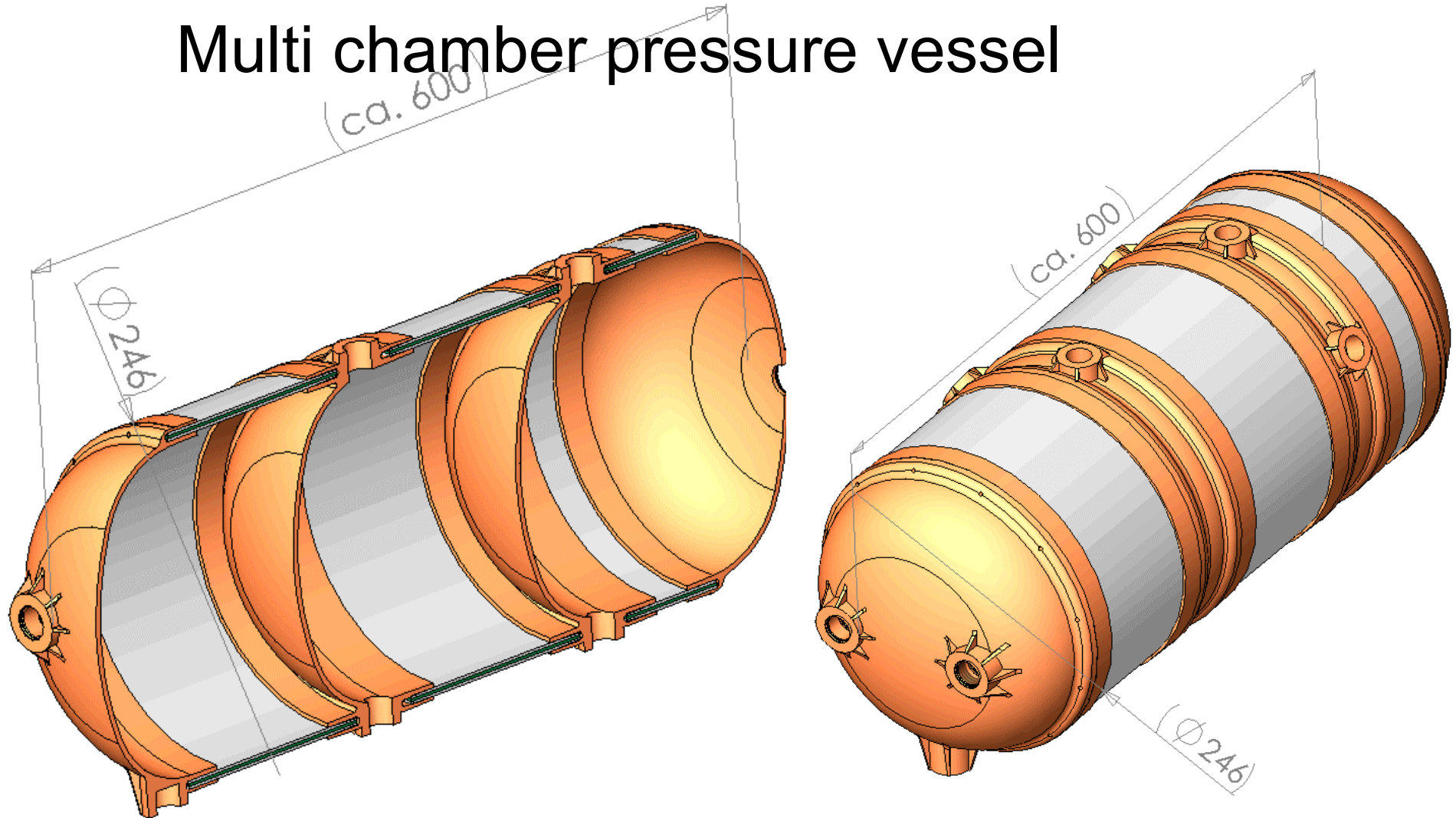


Integrated clamping-bar



Easy to adjust

Multi chamber pressure vessel



Typ: MK321327/ diameter D 246 / 10 bar / 8l / 9l / 8l / ca. 6,2 kg

DExWin[®] Pressure Vessel

COMAT

COMPOSITE MATERIALS GMBH



Pressure vessel 5l
Working pressure 16,5bar
Max pressure 20,0bar

Weight: 225 kg
Height: 1,75 m
Speed: 21 km/h
Pressure: 20,0bar



DExWin[®] Pressure Vessel

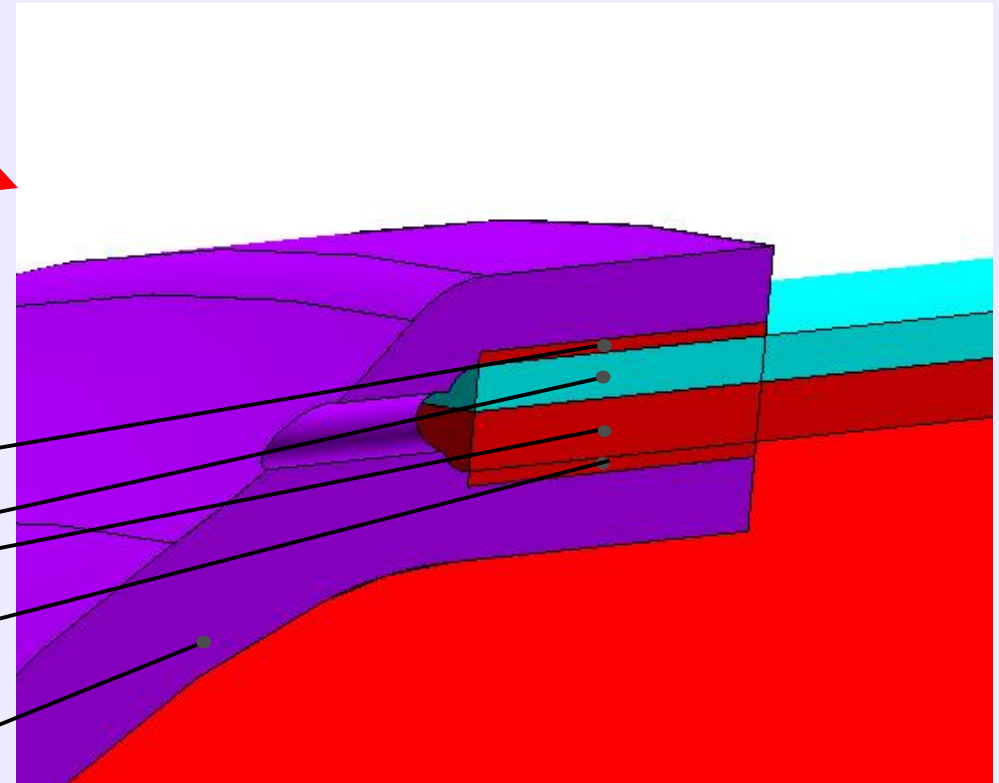
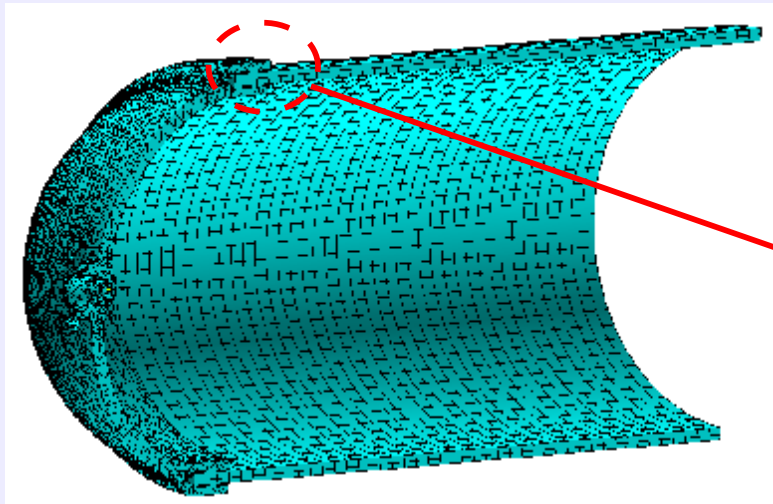
COMAT

COMPOSITE MATERIALS GMBH



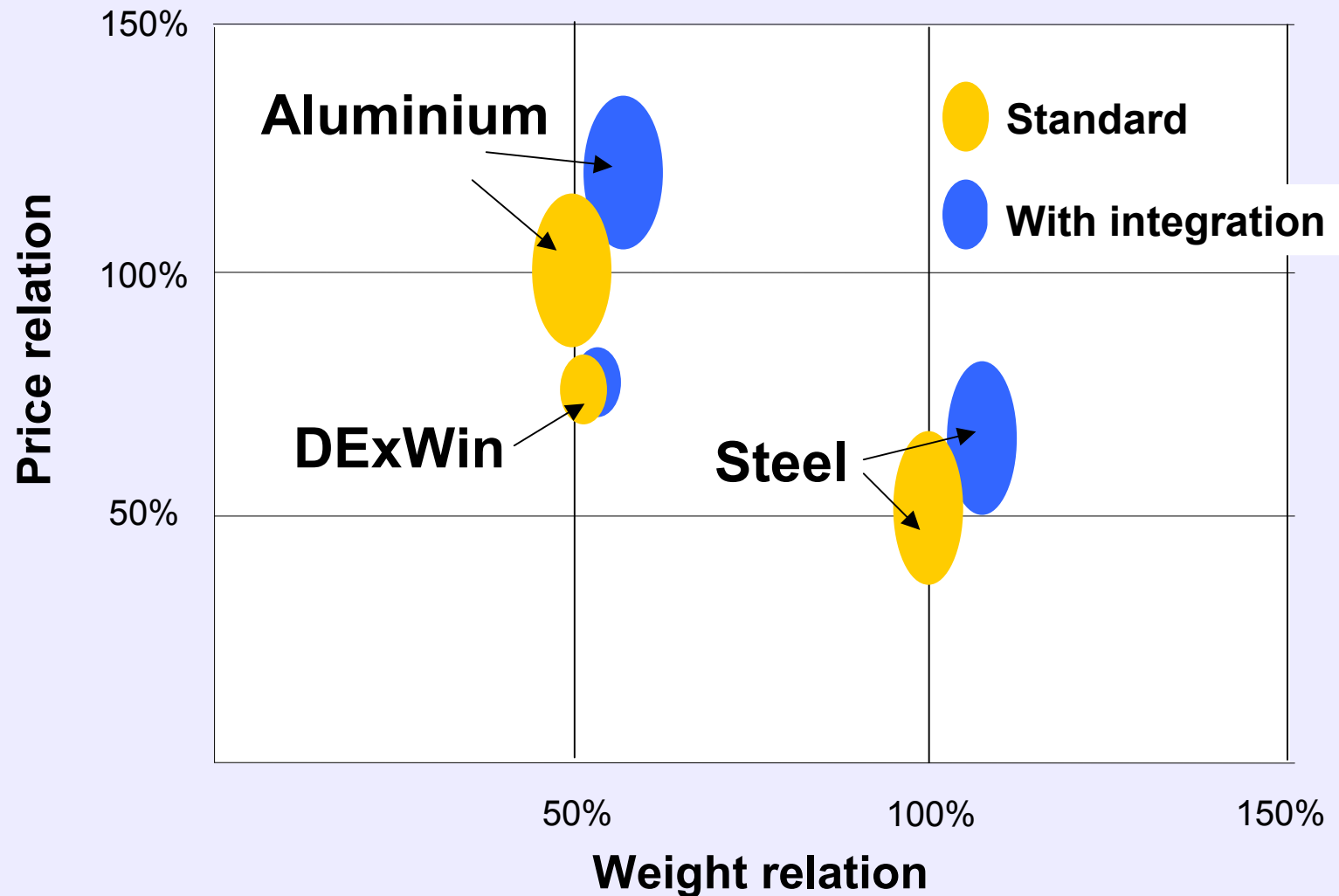
Automatic
tire pressure control

3D-Finite-Element-Model



- Polypropylene – welding zone
- Continuous fibre reinforced layer
- Polypropylene – Liner
- Polypropylene – welding zone
- LGF-Injection moulded end cap

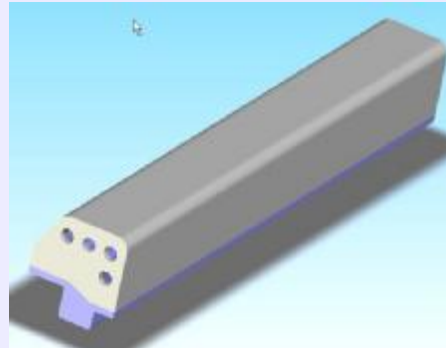
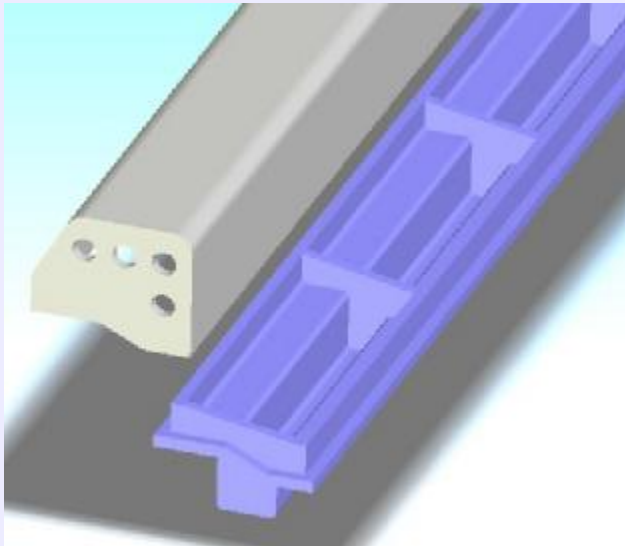
Cost/Performance fields for pressure vessels



DExWin[®] Pressure Vessel

COMAT

COMPOSITE MATERIALS GMBH



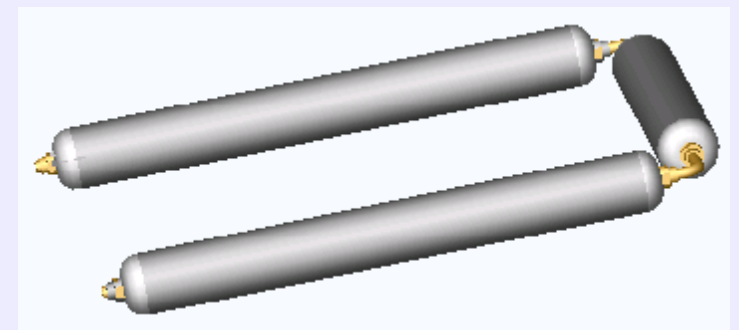
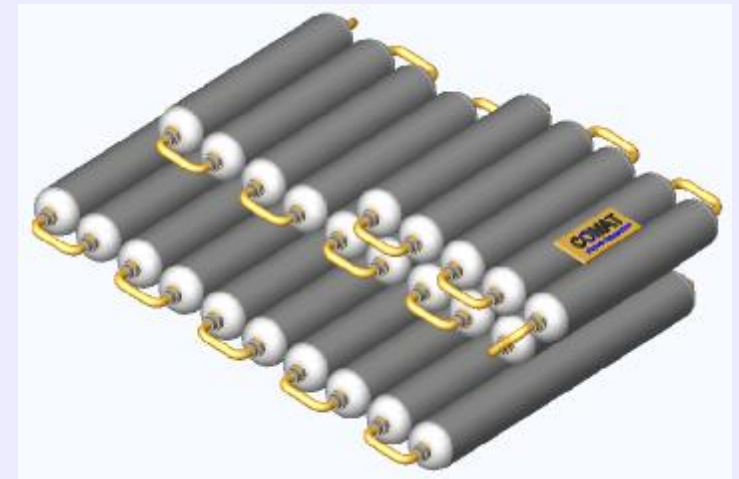
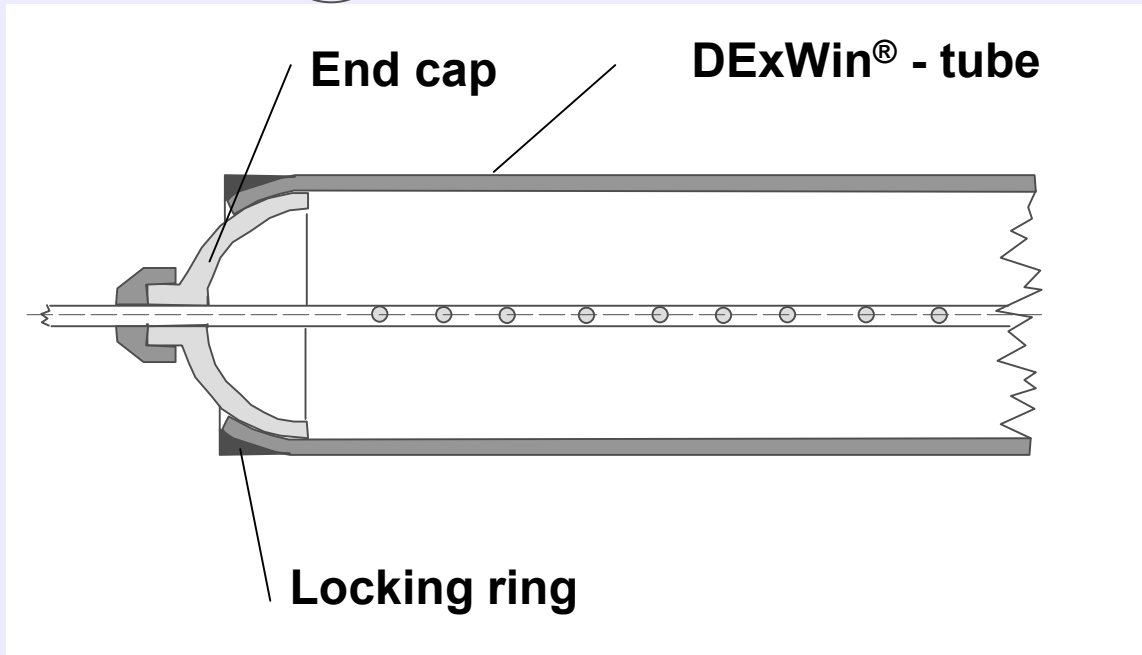
Volume 0,5 l
Pressure 20 bar



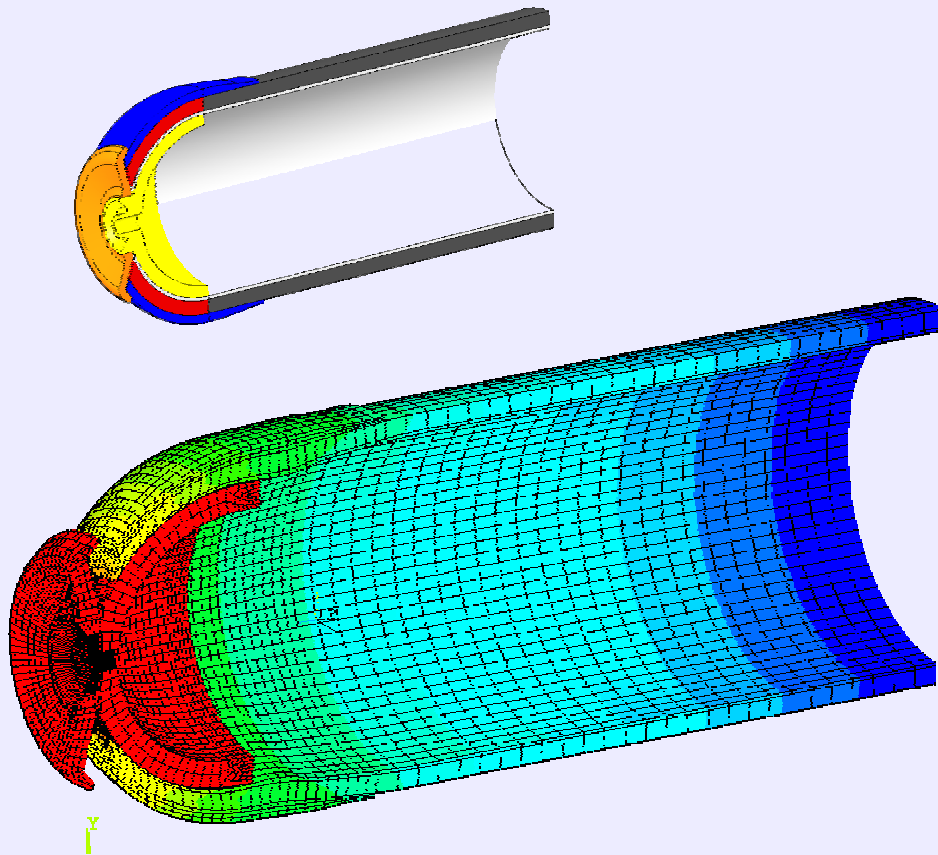
Pressure vessel for air suspension systems in seats

Application: Hydrogen and CNG storage

	PRINCIPLE SOLUTION	VAR 1	VAR 2	VAR 3	VAR 4
Dome attached outwardly		form fit	metallic fit	form fit	form fit
Dome attached inwardly		metallic fit	form fit	metallic fit	form fit
Dome attached inwardly and outwardly		metallic fit	form fit	form fit	
Dome attached axially outwardly		compression fit	form fit	metallic fit	metallic fit
Dome attached axially inwardly		form fit	metallic fit		



Under development:
CNG pressure vessel 200 bar



COMAT

COMPOSITE MATERIALS GMBH

Thermoplastic pressure vessels for automotive applications

SPE Conference 12.-14. September 2005

Ralph Funck

Marie-Curie-Str. 11

D- 67661 Kaiserslautern

Germany

Tel. +49- 63 01-71 52 - 0

Fax. +49- 63 01-71 52 - 20

<http://www.comat.de>

