

# CAPITAL MARKETS DAY 2017

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Highlights and innovations

Peter Schwab, Head of Metal Forming Division

# PHS – WHAT'S NEXT?

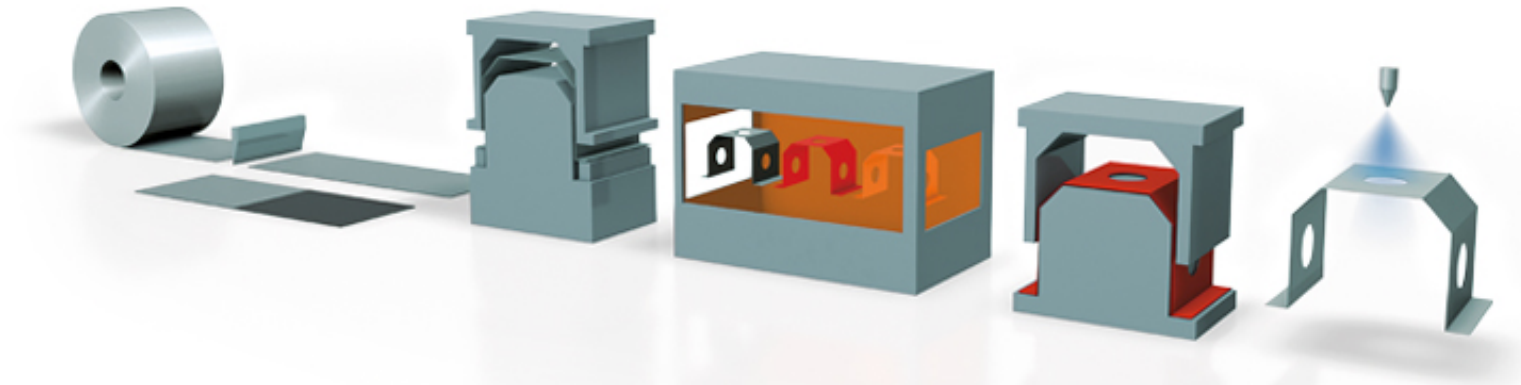
## Hotforming tool box

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# phs-ultraform®

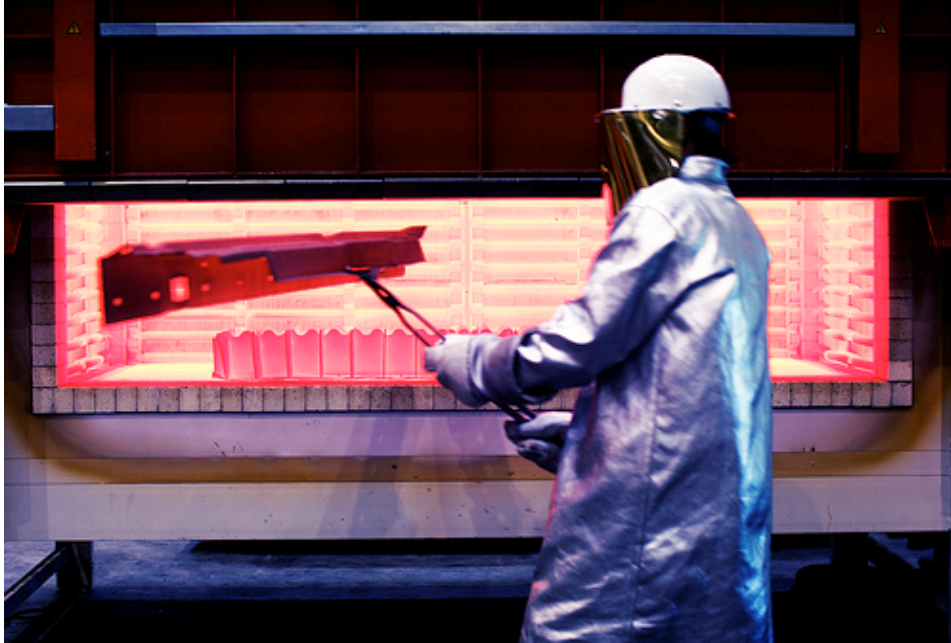
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- » The original for galvanized, press-hardened components produced through indirect forming



# FROM FIRST PROTOTYPE PLANT...

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» 2006

# ... TO INTERNATIONALIZATION

» 2017

**voestalpine Automotive Components  
Cartersville Inc., USA**

- » 2 phs lines at startup
- » 2 additional phs lines in procurement
- » 1 additional phs line planned in NAFTA

**voestalpine Automotive Components  
Schmölln, Germany**

- » 2 installed phs lines

**voestalpine Automotive Components  
Schwäbisch Gmünd, Germany**

- » 4 installed phs lines
- » 1 installed phs-directform line
- » 1 additional phs line planned in Europe

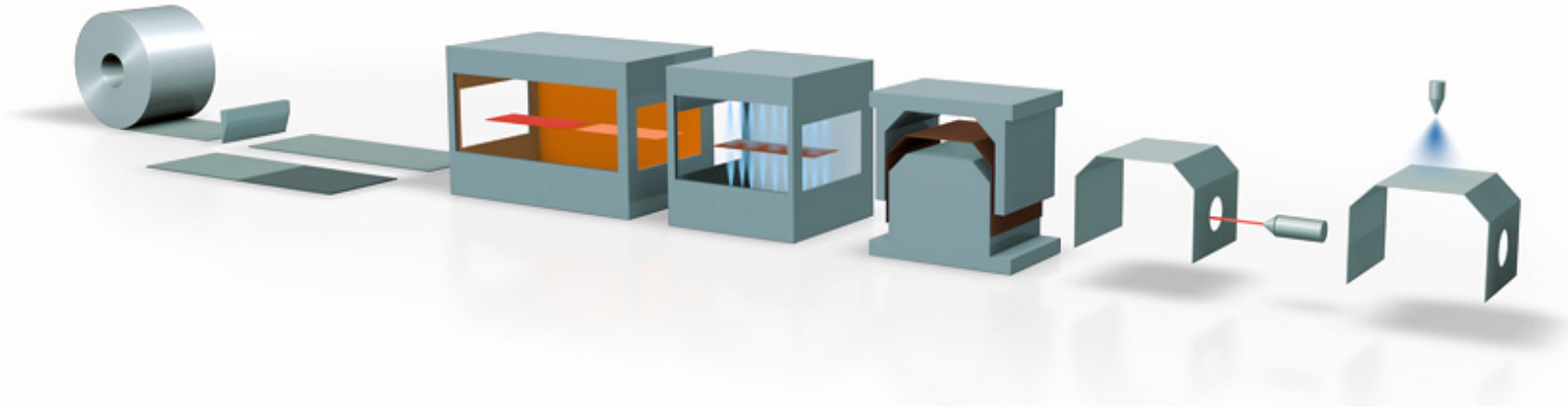
**voestalpine Automotive Components  
Shenyang, China**

- » 2 installed phs lines in China

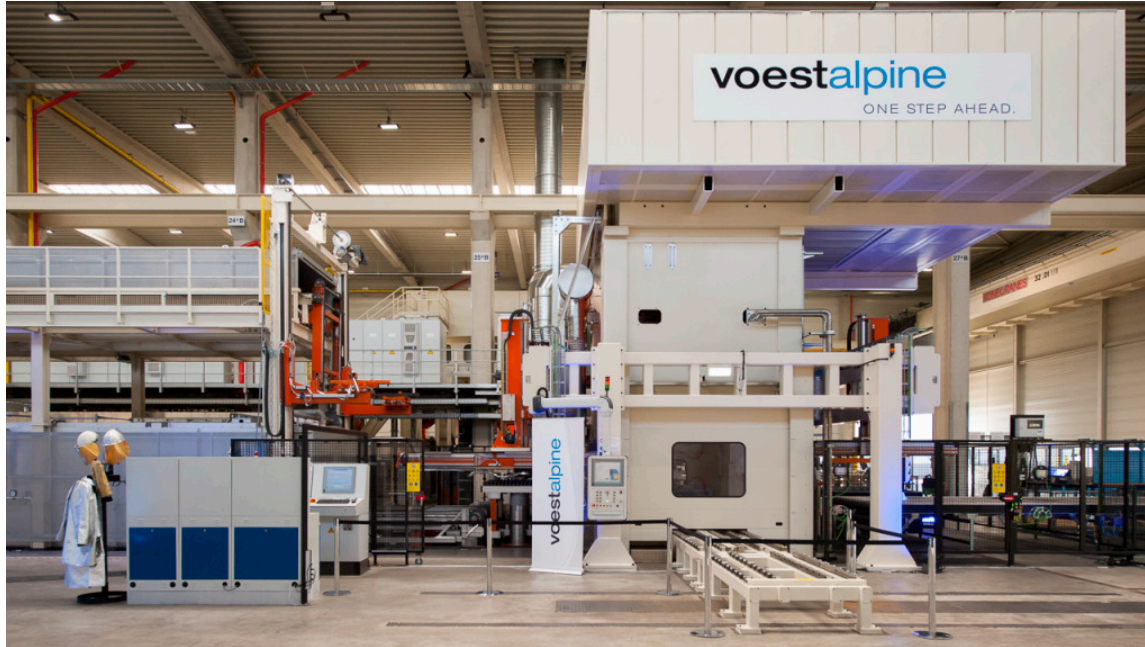


# THE NEXT INNOVATION STEP: phs-directform®

- » The pioneer in galvanized, directly hot-formed, press-hardened components



# FIRST phs-directform® PLANT



- » Opened July 2016
- » Schwäbisch Gmünd, GERMANY

# TAILORED PROPERTY PARTS

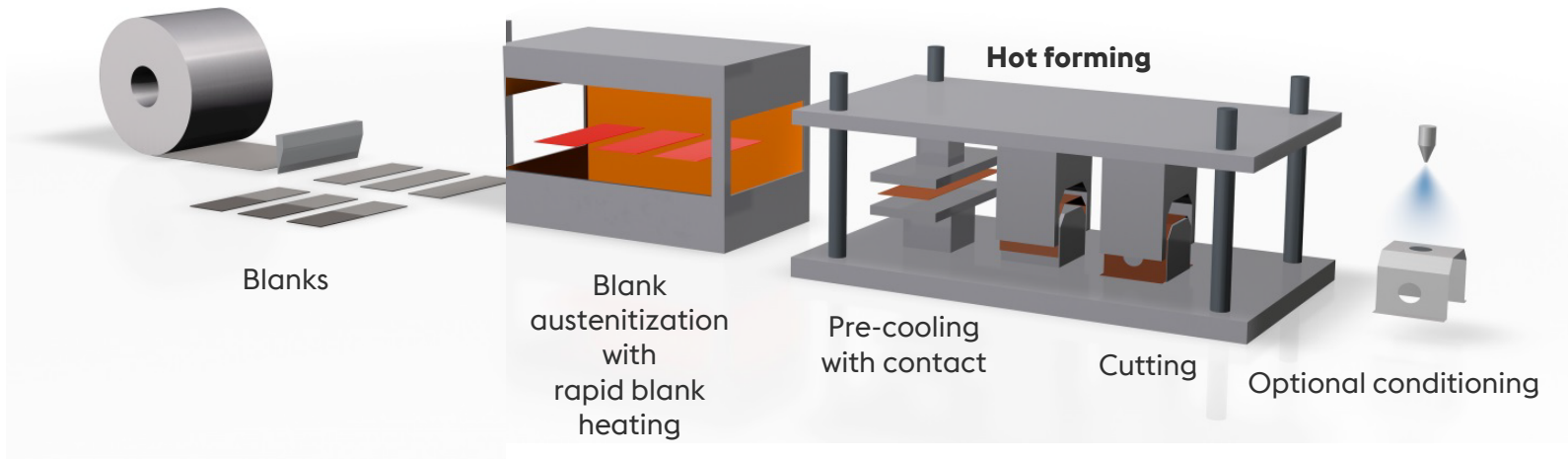


- » Hardened: 1500–1800 MPa
- » phs-ultraform® 490: ~ 500 MPa

- » **Tempered: < 1500 MPa**
- » **Partially heated: ~ 500 MPa**



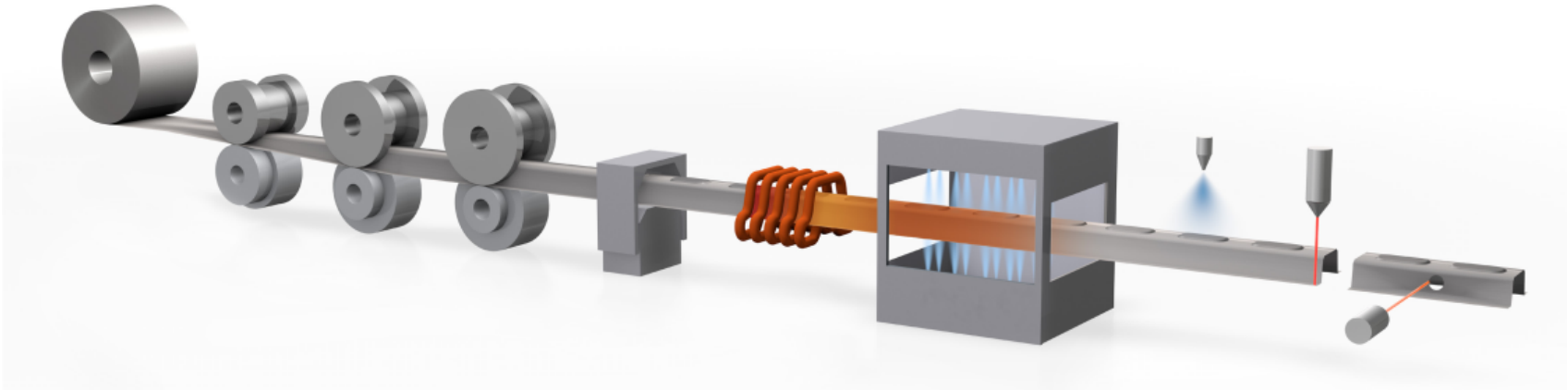
# PREVIEW: MULTI-STEP PROCESS



# PREVIEW: phs-rollform®

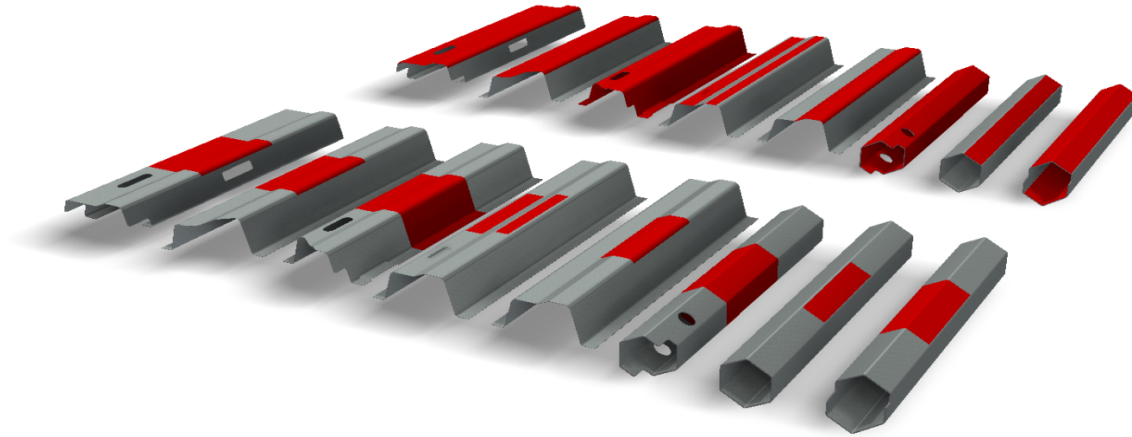
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» The pioneer in galvanized and roll-formed components



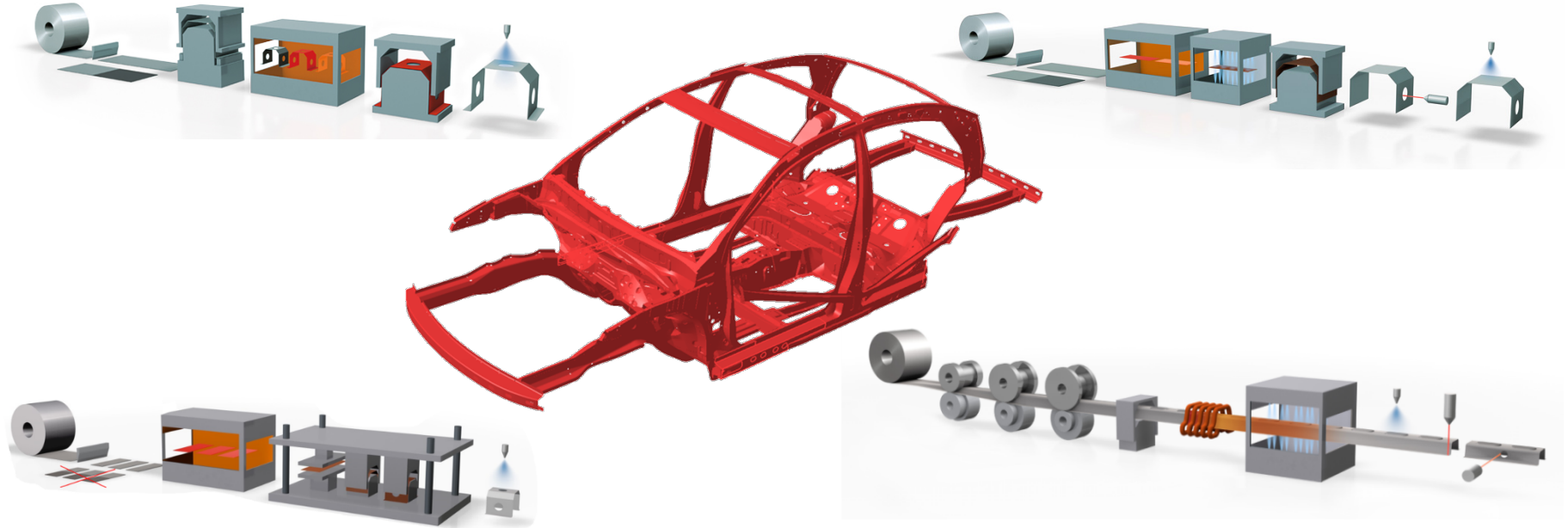
# PREVIEW: phs-rollform® – TAILORED TUBES

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- » Excellent cathodic corrosion protection
- » High economic efficiency
- » Excellent crash performance
- » Tensile strengths up to 2000 MPa

# HOT-FORMING TOOL BOX

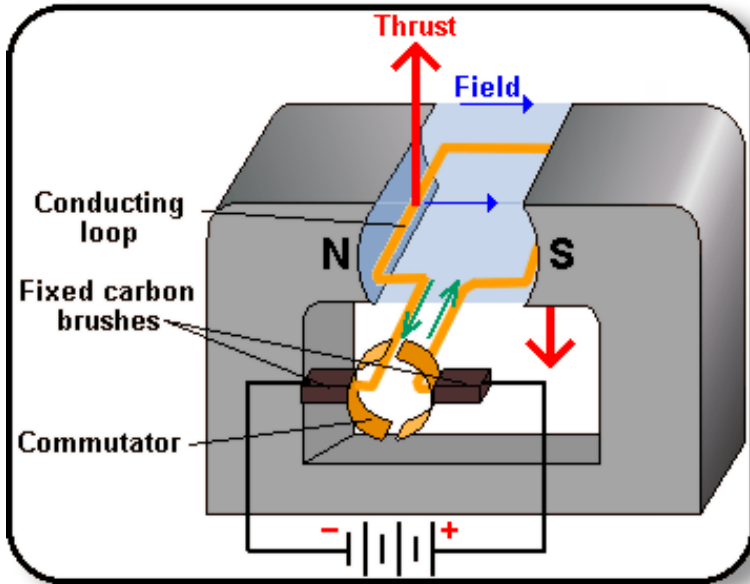


# compacore®

# Efficiency in serial production

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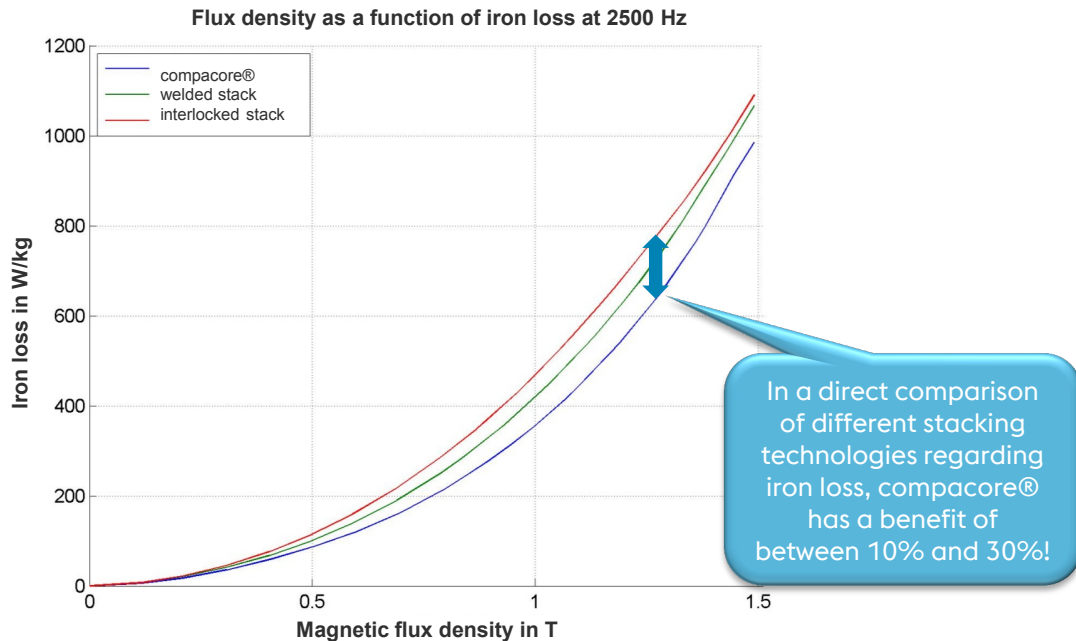
# ELECTRIC MOTOR



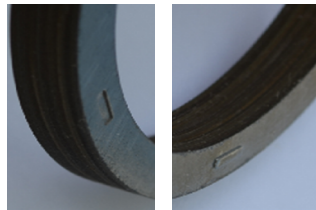
- » Ferromagnetism principle
- » Electric strip a prerequisite

# COMPARISON OF IRON LOSS

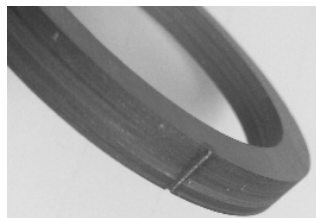
More efficient electric motors?



Interlocked stack



Welded stack











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voestalpine

ONE STEP AHEAD.

# COMPARISON OF STACKING TECHNOLOGIES

								
	Acoustics	Stability	Design freedom	Machinability	Thermal management	Downsizing	Energy efficiency	High volume
Interlocking	Improved mechanical resistance				Energy efficiency			
Welding								
Welding / annealing								
Riveting								
Clamping								
By injection molding								
Conventional "backlack"								
Spot gluing								
compacore®								

Improvement potential		
YES	LIMITED	NO



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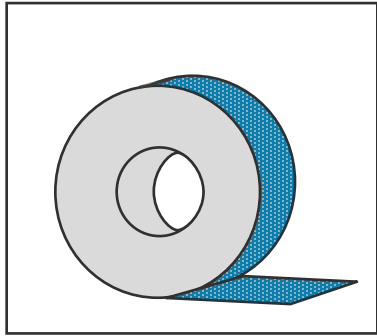
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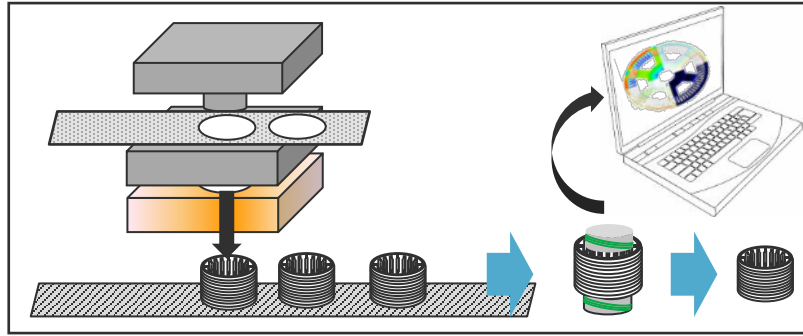
- » Highly efficient electrical strip combined with an innovative production process for energy-efficient e-motors for mobility and industry applications.

# compacore®

» Series production at voestalpine



Electrical steel with innovative coating



Fully finished stack after punching process and examination of magnetic properties

## Advantages

- » Continuous process
- » Chemical bonding
- » No manual stacking and additional clamping of stacks
- » No additional bonding in oven

# TIMELINE

