New Technologies for Rollform Intensive Autobody Structures

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Company Profile.

- Locations: Schopfheim / Germany Telford (PA) / USA
- Output: 50 lines per year
- Core Competencies:
  - Roll forming
  - Welding
  - Cutting & Piercing
Topics

- Drivers and constraints for rollform intensive car bodies
- Characteristics of rollformed components
- Manufacturing processes
- Summary and outlook
Today’s Auto Body Design

- Majority of vehicles based on a monocoque design with stamping as typical production process
- Technically advantageous and cost effective concept for high volume cars
Market Demands

- Market demands result in an ever-increasing number of types of vehicles.
- This has to be paid with raising tooling cost.
- OEM’s are forced to reduce the high investment by limiting the number of platforms.
Space Frame Technology

- Use of aluminum extrusions joined with connecting nodes
- Reduced investment for tooling and improved capability for the production of low-volume niche vehicles
- Limited to premium brands or sport cars (weight saving essential for high performance)
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Characteristics of rollformed components

- Lower cost for equipment and tooling
- Variable length with no additional tooling cost
- Open and closed sections
- Use of ultra-high strength steel and aluminum alloys
## Lower Tool Cost

Rocker reinforcement beam: length 1000 mm, weight 3.5 kg

<table>
<thead>
<tr>
<th></th>
<th>Roll formed</th>
<th>Press formed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool cost</td>
<td>$130,000</td>
<td>$800,000</td>
</tr>
<tr>
<td>Material utilization</td>
<td>95 %</td>
<td>70 %</td>
</tr>
<tr>
<td>Performance</td>
<td>30 parts / minute</td>
<td>12 parts / minute</td>
</tr>
<tr>
<td>Lead time</td>
<td>3 months</td>
<td>12 months</td>
</tr>
</tbody>
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Source: Volkswagen, Germany
Variable Length

- Variable lengths with no additional tooling costs
- Variable wheelbase and variable vehicle width
- Common platform for different types of vehicles (sedan, coupe, station wagon etc.)
- Cost reduction by increased use of common parts

Source: Linde + Wiemann, Germany
Closed and Open Sections

- Rollforming of closed sections in-line using one single strip
- Superior weld speed due to perfect weld conditions
- Typically 30 to 60 ft/min for Laser or spot welding, 60 to 120 ft/min for induction welding
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Variable cross sections.

- New rollforming process for variable cross sections
- Simple concept using tailored strips
Highly Integrated Manufacturing Processes

- Parts completed 100% in-line
- Integration of almost unlimited number of supplementary operations (piercing, bending, placing, welding)
- High flexibility (variable length, LH & RH)
- Rollformer operates like a precision feeder
Line Configuration

Uncoiler
Pre-piercing
Rollforming 1
Rollforming 2

Straightener
Intermediate piercing
Post-piercing
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Summary and Outlook

- Vehicle concepts
  - Increased use of rollformed sections in monocoque car bodies
  - Low-volume / low cost vehicles based on flexible platforms

- Rollformed sections
  - Variable cross section and sheet metal thickness
  - Non-constant Radii

- Processes
  - Increasing integration of supplementary processes into rollforming lines
  - Flexible line concepts in modular design
Automotive Rollforming Applications

Automotive percentage of total revenue
Thank you.

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