Tailored Coils – A New Process to Further Expand Tailored Applications

Mike Skilliter
TWB Company L.L.C.
AGENDA

- Automotive Market Drivers
- Process Introduction
  - Definition
  - Capability
  - Benefits
- Process Flexibility
  - Multi-Strip
  - Forms of Delivery
  - Materials
- Quality Assurance
- Process Impact to Customer
  - Automotive Applications
  - Roll Forming and Stamping
- Prototype Applications
## NORTH AMERICAN MARKET DRIVERS

<table>
<thead>
<tr>
<th>Customer Concerns</th>
<th>Tailored Solutions Provide</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increase in Fuel Costs</td>
<td>• Weight Reduction</td>
</tr>
<tr>
<td>• Increase in CAFE</td>
<td>• Improved Fuel Economy</td>
</tr>
<tr>
<td>• Reduce Manufacturing Costs</td>
<td>• Reduced Emissions</td>
</tr>
<tr>
<td>• Increase Occupant Safety Requirements</td>
<td>• Improved Crash Worthiness</td>
</tr>
<tr>
<td>• Improve Vehicle Dynamics</td>
<td>• Reduced Investment</td>
</tr>
<tr>
<td></td>
<td>• Reduced Variable Cost</td>
</tr>
</tbody>
</table>
NORTH AMERICAN APPLICATIONS

Top 3 represent 63% of total applications

- Front Door: 78
- Rear Door: 54
- Bodyside Inner: 40

- Number of Applications

- Top 3 genres account for 63% of total applications.

- Chart showing frequency distribution:
  - Front Door
  - Rear Door
  - Bodyside Inner
  - Front Rail - Orr.
  - Rear Rail - Mbr.
  - Liftgate
  - Wheelhouse - Front
  - B' Pillar Reinf.
  - Front side window Frame
  - A Pillar/Cowl Reinf.
  - Other 2-

- Total applications summarized:

- w w w . a u t o s t e e l . o r g
EUROPEAN AND ASIAN APPLICATIONS

Top 8 represent 69% of total applications

- Front Door
- Rear Door
- Body Side Inner
- Front Rail - Inn
- C Pillar/Rear/Floor Pan
- C Pillar Reinforcement
- Wheelhouse - Front
- C Pillar Reinforcement
- Rear Rail - Membrane
- A Pillar/Cowl Reinforcement
- Rear Rail - Cover Plate
- Shotgun - Out
- Shotgun - Inside
- Door Ring
- Dash Panel
- Tunnel - Reinforcement

Top 8 represent 69% of total applications
EVOLUTION OF TAILORED PRODUCTS

Transfer Press Applications
Hydroform Applications
Prog Die & Roll Form Parts

Tailor Welded Blanks
Tailor Welded Tubes
Tailor Welded Coils

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• Two or more COILS of steel that are continuously laser welded.
• Laser welding direction is parallel to the rolling direction
• Material combinations may vary in any combination of gage, grade, and/or coating.
• Material delivered in coil for progressive die and roll form applications
**PROCESS BENEFITS**

**Tailored Coil**

**Process Advantages**

- Enables Roll Forming & Progressive Die Applications
- Mass Reduction
- Investment Reduction
  - Tooling
  - Fixtures
  - Containers/Racks
- Variable Cost Reduction
  - Stamping
  - Assembly
  - Logistics
- Reduced Dimensional Variation
- Fit and Finish Improvements
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CURRENT PROCESS CAPABILITY

Tailored Coil

Line Capability

- 2 or 3 coil capability
- Multiple steel grades
  - Mild Steel
  - HSLA
  - Dual Phase
  - Stainless
- Current Coil
  - Width - 50mm to 1200mm
  - Thickness - 0.6 mm to 3.0 mm
FORMS OF DELIVERY

Coil to Coil

Coil to Roll Form

Coil to Progressive Die
# MATERIAL COMBINATIONS

<table>
<thead>
<tr>
<th>Material</th>
<th>IF</th>
<th>HSLA 350</th>
<th>DX 56</th>
<th>DP Stainless 600</th>
<th>DP Stainless 800</th>
<th>DP Stainless 1000</th>
<th>STAINLESS STEEL</th>
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<tr>
<th>Integrated Systems Output</th>
<th>Coil Mapping</th>
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<tbody>
<tr>
<td><img src="www.autosteel.org" alt="Image" /></td>
<td><img src="www.autosteel.org" alt="Image" /></td>
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- No weld
- Crater
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MULTIPLE APPLICATIONS

- Roll Form Rocker Panel
- Steel Wheels
- Stamped Seat Supports
POTENTIAL APPLICATIONS

1. Door Belt Reinforcement
2. Reinforcement - Side Intrusion
3. Liftgate Reinforcement w/Hinge Supports
4. Front Seat Cross Member
5. Rear Seat Cross Member
6. Floor Cross Member – Below Floor Panel
7. Pillar Reinforcement w/Hinge Supports
8. Roof Cross Member
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SIDE RAIL
PROGRESSIVE DIE APPLICATION

2 Coil Example

3 Coil Example

3 Coil Example

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3 Coil Example

3 Coil Example

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</thead>
<tbody>
<tr>
<td>1.0mm</td>
<td>324.5</td>
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<tr>
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<td>324.5</td>
</tr>
<tr>
<td>0.7mm</td>
<td>200mm</td>
</tr>
<tr>
<td>1.0mm</td>
<td>269mm</td>
</tr>
<tr>
<td>0.7mm</td>
<td>180mm</td>
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<tr>
<td>1.0mm</td>
<td>200mm</td>
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1st application – Width of 1100 mm
Continuously welding coil lengths over 250 meters
Progressive die trials – very successful
3 welded coils processed – no forming issues
Cycle time – comparable to normal coil
Tailored coils provide engineered solutions for progressive die and roll form applications:

- Weight Reduction
- Improve Fuel Economy
- Reduce Emissions
- Improve Crash Worthiness
- Reduce Investment
- Reduce Variable Cost