Conference Goals

Realization Concepts for Zero Failure Forming Methods

In the last decade, virtual forming technology was mainly focused on a realistic numerical representation of forming processes. The high level of efficiency of the planning tools used in the industry has led to today’s axiom of the tool planning process, which says «No hardware without software». Latest efforts in this field are aimed at the prediction of the influences of varying process parameters and mechanical material properties on the process by means of stochastic simulations.

The next step in this development will be the monitoring of perturbations and the intelligent correction of the process parameters in order to increase the process robustness. Therefore, the virtual methods and the real behavior have to be coupled to one control chain. The aims of this development are «zero failure production methods».

To achieve this goal, the following steps have to be realized:
- Non-destructive monitoring of the variation limits of the mechanical material properties
- Monitoring of the significant process parameters like temperature, friction and tool forces
- Virtual prediction of the process behavior under varying process conditions
- Rapid determination of the correction measures by means of metamodels
- Adaptive processes with mechatronic tools
- Link to the press control system

At this conference, examples from the fields of car body, part and as semi-finished products manufacturing shall help to demonstrate how these systems can be realized.

Within the framework of the presentations, innovative developments in the different fields as well as already realized concepts will be introduced.

Prof. Dr. P. Hora
<table>
<thead>
<tr>
<th>Time</th>
<th>Session I-A: Modelling of stochastic behavior</th>
<th>Session I-B: Modelling of material properties</th>
<th>Session II: Software concepts for evaluation of process sensitivities</th>
<th>Session III: Distortion free control of material properties</th>
<th>Session IV: Process control by sensors</th>
<th>Session V: Intelligent control systems and meta-model based planning tools</th>
<th>Session VI: Realized Zero Failure Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00</td>
<td><strong>Registration / Welcome Coffee</strong></td>
<td><strong>Session I-A: Modelling of stochastic behavior</strong></td>
<td><strong>Session II: Software concepts for evaluation of process sensitivities</strong></td>
<td><strong>Session III: Distortion free control of material properties</strong></td>
<td><strong>Session IV: Process control by sensors</strong></td>
<td><strong>Session V: Intelligent control systems and meta-model based planning tools</strong></td>
<td><strong>Session VI: Realized Zero Failure Systems</strong></td>
</tr>
<tr>
<td>9:45</td>
<td><strong>Opening of the conference</strong></td>
<td><strong>On the way from an ideal virtual process to the modelling of the real stochastic behavior</strong></td>
<td><strong>A new formulation of the MMFC to avoid the numerical instability</strong></td>
<td><strong>Extension of possibilities and system limits, which are based on the eddy current method</strong></td>
<td><strong>Optical 3D measuring solutions in optimization of sheet metal development and manufacturing</strong></td>
<td><strong>Systems for monitoring and control of deep drawing processes</strong></td>
<td><strong>Modelling of material properties variation in FE-simulation</strong></td>
</tr>
<tr>
<td>10:00</td>
<td><strong>Capabilities and limitations of the virtual methods in the modelling of process sensitivities</strong></td>
<td><strong>Characterisation and modelling of stochastic behavior of deep drawing steels</strong></td>
<td><strong>A new formulation of the MMFC to avoid the numerical instability</strong></td>
<td><strong>Application of the eddy-current method in industrial car body production</strong></td>
<td><strong>Virtual layout of adaptive deep drawing processes</strong></td>
<td><strong>Systems for monitoring and control of deep drawing processes</strong></td>
<td><em><em>M. Abspoel, M. Scholting, E. Atzema</em> (Tata Steel)</em>*</td>
</tr>
<tr>
<td>10:30</td>
<td><strong>Experiences with process robustness of sheet metal forming processes</strong></td>
<td><strong>Modelling of material properties variation in FE-simulation</strong></td>
<td><strong>A new formulation of the MMFC to avoid the numerical instability</strong></td>
<td><strong>Application of the eddy-current method in industrial car body production</strong></td>
<td><strong>Virtual layout of adaptive deep drawing processes</strong></td>
<td><strong>Systems for monitoring and control of deep drawing processes</strong></td>
<td><em><em>M. Abspoel, M. Scholting, E. Atzema</em> (Tata Steel)</em>*</td>
</tr>
<tr>
<td>11:00</td>
<td><strong>Application of simulation tools during try-out and series production of sheet metal forming</strong></td>
<td><strong>Modelling of material properties variation in FE-simulation</strong></td>
<td><strong>A new formulation of the MMFC to avoid the numerical instability</strong></td>
<td><strong>Extension of possibilities and system limits, which are based on the eddy current method</strong></td>
<td><strong>Virtual layout of adaptive deep drawing processes</strong></td>
<td><strong>Systems for monitoring and control of deep drawing processes</strong></td>
<td><em><em>M. Abspoel, M. Scholting, E. Atzema</em> (Tata Steel)</em>*</td>
</tr>
<tr>
<td>11:30</td>
<td><strong>Stochastic analysis in FE-simulation of sheet metal forming processes</strong></td>
<td><strong>Modelling of material properties variation in FE-simulation</strong></td>
<td><strong>A new formulation of the MMFC to avoid the numerical instability</strong></td>
<td><strong>Application of the eddy-current method in industrial car body production</strong></td>
<td><strong>Virtual layout of adaptive deep drawing processes</strong></td>
<td><strong>Systems for monitoring and control of deep drawing processes</strong></td>
<td><em><em>M. Abspoel, M. Scholting, E. Atzema</em> (Tata Steel)</em>*</td>
</tr>
<tr>
<td>12:00</td>
<td><strong>Conference Dinner</strong></td>
<td><strong>Coffee Break</strong></td>
<td><strong>A new formulation of the MMFC to avoid the numerical instability</strong></td>
<td><strong>Optical 3D measuring solutions in optimization of sheet metal development and manufacturing</strong></td>
<td><strong>Virtual layout of adaptive deep drawing processes</strong></td>
<td><strong>Systems for monitoring and control of deep drawing processes</strong></td>
<td><em><em>M. Abspoel, M. Scholting, E. Atzema</em> (Tata Steel)</em>*</td>
</tr>
<tr>
<td>12:00</td>
<td><strong>Lunch</strong></td>
<td><strong>Coffee Break</strong></td>
<td><strong>A new formulation of the MMFC to avoid the numerical instability</strong></td>
<td><strong>Optical 3D measuring solutions in optimization of sheet metal development and manufacturing</strong></td>
<td><strong>Virtual layout of adaptive deep drawing processes</strong></td>
<td><strong>Systems for monitoring and control of deep drawing processes</strong></td>
<td><em><em>M. Abspoel, M. Scholting, E. Atzema</em> (Tata Steel)</em>*</td>
</tr>
<tr>
<td>13:00</td>
<td><strong>Session I-B: Modelling of material properties</strong></td>
<td><strong>Modelling of material properties variation in FE-simulation</strong></td>
<td><strong>A new formulation of the MMFC to avoid the numerical instability</strong></td>
<td><strong>Optical 3D measuring solutions in optimization of sheet metal development and manufacturing</strong></td>
<td><strong>Virtual layout of adaptive deep drawing processes</strong></td>
<td><strong>Systems for monitoring and control of deep drawing processes</strong></td>
<td><em><em>M. Abspoel, M. Scholting, E. Atzema</em> (Tata Steel)</em>*</td>
</tr>
<tr>
<td>13:30</td>
<td><strong>Contribution of improved material models to the virtual assessment of the process robustness of sheet forming processes</strong></td>
<td><strong>Modelling of material properties variation in FE-simulation</strong></td>
<td><strong>A new formulation of the MMFC to avoid the numerical instability</strong></td>
<td><strong>Optical 3D measuring solutions in optimization of sheet metal development and manufacturing</strong></td>
<td><strong>Virtual layout of adaptive deep drawing processes</strong></td>
<td><strong>Systems for monitoring and control of deep drawing processes</strong></td>
<td><em><em>M. Abspoel, M. Scholting, E. Atzema</em> (Tata Steel)</em>*</td>
</tr>
<tr>
<td>14:00</td>
<td><strong>Application of simulation tools during try-out and series production of sheet metal forming</strong></td>
<td><strong>Modelling of material properties variation in FE-simulation</strong></td>
<td><strong>A new formulation of the MMFC to avoid the numerical instability</strong></td>
<td><strong>Optical 3D measuring solutions in optimization of sheet metal development and manufacturing</strong></td>
<td><strong>Virtual layout of adaptive deep drawing processes</strong></td>
<td><strong>Systems for monitoring and control of deep drawing processes</strong></td>
<td><em><em>M. Abspoel, M. Scholting, E. Atzema</em> (Tata Steel)</em>*</td>
</tr>
<tr>
<td>14:30</td>
<td><strong>Characterisation and modelling of stochastic behavior of deep drawing steels</strong></td>
<td><strong>Modelling of material properties variation in FE-simulation</strong></td>
<td><strong>A new formulation of the MMFC to avoid the numerical instability</strong></td>
<td><strong>Optical 3D measuring solutions in optimization of sheet metal development and manufacturing</strong></td>
<td><strong>Virtual layout of adaptive deep drawing processes</strong></td>
<td><strong>Systems for monitoring and control of deep drawing processes</strong></td>
<td><em><em>M. Abspoel, M. Scholting, E. Atzema</em> (Tata Steel)</em>*</td>
</tr>
<tr>
<td>15:00</td>
<td><strong>Coffee Break</strong></td>
<td><strong>Modelling of material properties variation in FE-simulation</strong></td>
<td><strong>A new formulation of the MMFC to avoid the numerical instability</strong></td>
<td><strong>Optical 3D measuring solutions in optimization of sheet metal development and manufacturing</strong></td>
<td><strong>Virtual layout of adaptive deep drawing processes</strong></td>
<td><strong>Systems for monitoring and control of deep drawing processes</strong></td>
<td><em><em>M. Abspoel, M. Scholting, E. Atzema</em> (Tata Steel)</em>*</td>
</tr>
<tr>
<td>16:00</td>
<td><strong>On-line quality control in metal forming using stochastic simulations</strong></td>
<td><strong>Optical 3D measuring solutions in optimization of sheet metal development and manufacturing</strong></td>
<td><strong>A new formulation of the MMFC to avoid the numerical instability</strong></td>
<td><strong>Optical 3D measuring solutions in optimization of sheet metal development and manufacturing</strong></td>
<td><strong>Virtual layout of adaptive deep drawing processes</strong></td>
<td><strong>Systems for monitoring and control of deep drawing processes</strong></td>
<td><em><em>M. Abspoel, M. Scholting, E. Atzema</em> (Tata Steel)</em>*</td>
</tr>
<tr>
<td>16:30</td>
<td><strong>Interrelation analysis for metal forming processes with LS-OPT and LS-DYNA</strong></td>
<td><strong>Optical 3D measuring solutions in optimization of sheet metal development and manufacturing</strong></td>
<td><strong>A new formulation of the MMFC to avoid the numerical instability</strong></td>
<td><strong>Optical 3D measuring solutions in optimization of sheet metal development and manufacturing</strong></td>
<td><strong>Virtual layout of adaptive deep drawing processes</strong></td>
<td><strong>Systems for monitoring and control of deep drawing processes</strong></td>
<td><em><em>M. Abspoel, M. Scholting, E. Atzema</em> (Tata Steel)</em>*</td>
</tr>
<tr>
<td>18:30</td>
<td><strong>Conference Dinner</strong></td>
<td><strong>Coffee Break</strong></td>
<td><strong>A new formulation of the MMFC to avoid the numerical instability</strong></td>
<td><strong>Optical 3D measuring solutions in optimization of sheet metal development and manufacturing</strong></td>
<td><strong>Virtual layout of adaptive deep drawing processes</strong></td>
<td><strong>Systems for monitoring and control of deep drawing processes</strong></td>
<td><em><em>M. Abspoel, M. Scholting, E. Atzema</em> (Tata Steel)</em>*</td>
</tr>
<tr>
<td>20:00</td>
<td><strong>Program</strong></td>
<td><strong>Coffee Break</strong></td>
<td><strong>A new formulation of the MMFC to avoid the numerical instability</strong></td>
<td><strong>Optical 3D measuring solutions in optimization of sheet metal development and manufacturing</strong></td>
<td><strong>Virtual layout of adaptive deep drawing processes</strong></td>
<td><strong>Systems for monitoring and control of deep drawing processes</strong></td>
<td><em><em>M. Abspoel, M. Scholting, E. Atzema</em> (Tata Steel)</em>*</td>
</tr>
</tbody>
</table>