



## Die Analysis

**How to extend the lifetime of your dies? How to assess temperature changes in your dies? If you want to learn more about die analysis, then this course is for you!**

Tooling costs represent up to 15% of the total forging cost. Extending the service life of dies is an ongoing challenge for producing more parts using the same dies and lowering production costs. After this course, you will be able to assess wear, quantify the deformation affecting your dies and predict premature die failure. For hot forging, you will master the steady state approach and you

will be able to determine the die temperature after a number of forging operations. For cold forging, you will know how to model prestressed dies (assembled by interference fit) and optimize shrinkage. Based on industrial examples, this course allows you to improve dies design even prior to manufacturing them!

### LEVEL

**Intermediate - Users willing to enhance their knowledge of die analysis.**

### PREREQUISITES

**A good grounding in the use of FORGE® is required.**

### GOALS

- **Simulating die mechanical and thermal behavior (failure, deterioration due to fatigue)**
- **Analyzing and interpreting computation results (wear, stress, etc.)**

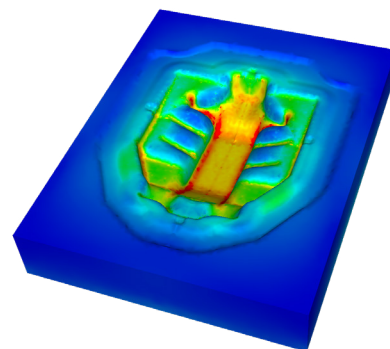
### OTHER RECOMMENDED COURSES

- FORGE® - Automatic optimization
- FORGE® - Heat treatment of steel and aluminum

TRAINING	DURATION	PRICE EXCL. TAX	PARTICIPANTS
In-company	2 days	€3000 per training	1 to 3 people

**DAY 1 >** 8.30 a.m. to 12.00 p.m. & 1.30 p.m. to 5.00 p.m.

<b>Introduction</b>	<ul style="list-style-type: none"> <li>• Presentation of Transvalor</li> <li>• Course goals</li> </ul>
<b>Rigid tool computations</b>	<ul style="list-style-type: none"> <li>• Why this kind of computation?</li> <li>• Recommendations for meshing the surfaces of 2D/3D dies</li> <li>• Analysis of the results of forging simulations with 2D/3D rigid dies (abrasive wear, normal stress, etc.)</li> </ul>
<b>Uncoupled computations</b>	<ul style="list-style-type: none"> <li>• Recommendations for volume meshes of 2D/3D dies</li> <li>• Setup</li> <li>• Analyses of additional results on 2D/3D tooling (Von Mises stress, principal stresses)</li> </ul>
<b>Coupled computations</b>	<ul style="list-style-type: none"> <li>• Why this kind of computation?</li> <li>• Defining Master-Master and Master-Slave contacts</li> <li>• 2D/3D setup</li> <li>• Analyzing results (stress, temperature)</li> <li>• Options in coupling computations</li> </ul>



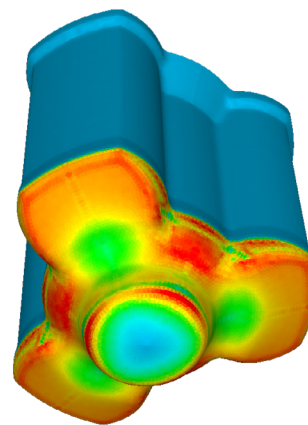

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Maximum effective stress observed in the fillet radii

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**DAY 2 >** 8.30 a.m. to 12.00 p.m. & 1.30 p.m. to 5.00 p.m.

<b>Uncoupled and coupled computations comparisons</b>	<ul style="list-style-type: none"> <li>• Material flow</li> <li>• Normal stress</li> <li>• Abrasive wear</li> <li>• Von Mises stress</li> <li>• Die deformation</li> <li>• Forging load</li> <li>• Choosing the type of computation</li> </ul>
<b>Prestressed dies</b>	<ul style="list-style-type: none"> <li>• Defining the prestress concept</li> <li>• Deformable die interpenetration in 2D mode</li> <li>• Virtual Interference Fit in 3D (VIF)</li> <li>• Setup</li> <li>• Viewing and interpreting results</li> </ul>
<b>Steady state</b>	<ul style="list-style-type: none"> <li>• Concept</li> <li>• Setup</li> <li>• Viewing and interpreting results</li> </ul>
<b>Archard's wear model</b>	<ul style="list-style-type: none"> <li>• Description of the model</li> <li>• Setup</li> <li>• Comparing results with the 'standard' abrasive wear model</li> </ul>
<b>Conclusions</b>	<ul style="list-style-type: none"> <li>• Questions and course assessment</li> </ul>




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Abrasive wear on a punch when forming a constant velocity joint

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