

# Extension of MARLIS Evaluation Software

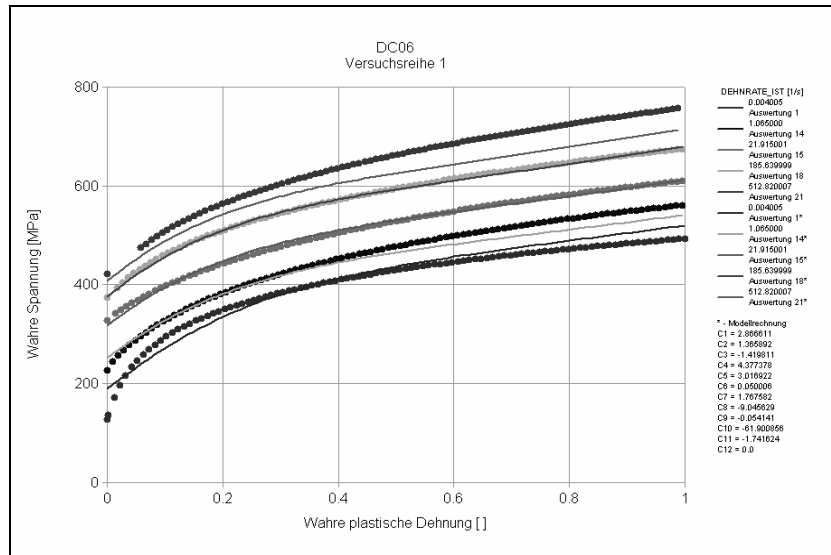
The MARLIS software for the evaluation of tensile tests, which was developed by M-Base, has two new functions. Soon these will be available for all MARLIS users.

## Strain Rate and Temperature Depending Modelling of Flow Curve Diagrams.

Nowadays, flow curves are gaged for every material and for many strain rates and temperatures. The traditional evaluation considers one single gaging at a time. In terms of a more general consideration it is intended to describe complete sets of flow curves by means of a model. Especially for crash simulations it is most important to include the adiabatic heating of the material in the model. The MARLIS evaluation software now offers the opportunity, to determine the parameters for different models of this kind. Following formulas are being approximated amongst others:

- Johnson Cook (modified)
- Extended Ludwik
- Tanimora
- El-Magd
- Copper Simons
- 11 Parameter Approach.

Assuming good raw data, all fits are



Approximation of a strain rate dependent flow curve diagram

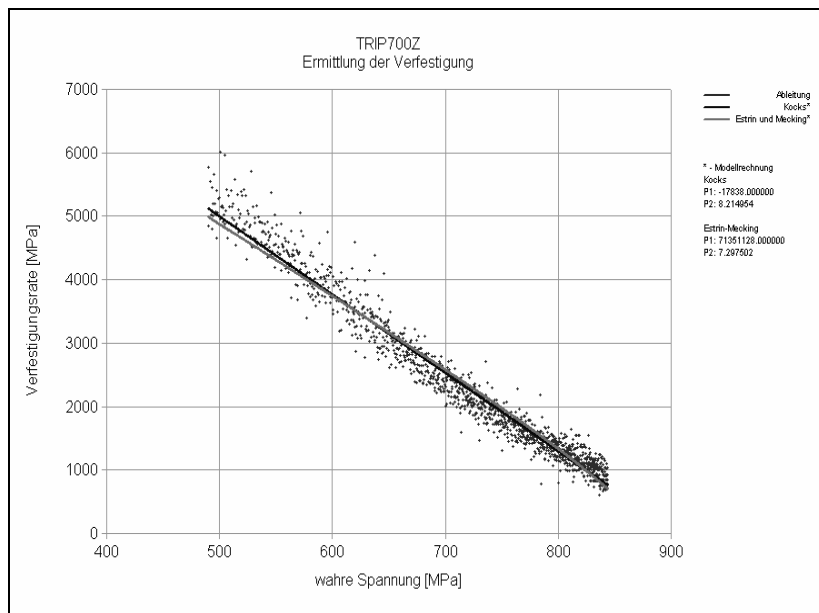
notedly good, as can be seen on the picture. MARLIS software uses original raw data from the test machine as input. Based on the raw data a direct approximation based on the relevant models can be provided, but also a step wise approach is possible, where single curves are prefitted based on the models. Afterwards the strain- and temperature dependent approximation will be run on the set of intermediate results. The second method for the time being is the

standard procedure leading to very acceptable results. The parameters for the approximation can be comfortably modified by using the graphical interactive user interface. The output is the given results which are being exported into a standard XML format. They can be further processed in the database MARLIS or any other program.

## Hardening Diagrams

It is possible to convert the traditional stress-strain diagrams in so called hardening diagrams (hardening over stress). In this kind of diagram, qualitative alterations of the material behaviour can be easier recognized. The models according to Kocks and Estring-Mecking describe these diagrams on a material physical basis.

In cooperation with the Institute of Ferrous Metallurgy at the RWTH Aachen (IEHK), the MARLIS evaluation software was extended to a module for the display of hardening curves and their approximation with both of the mentioned models.



Approximation of a hardening curve