

# JMatPro

PRACTICAL SOFTWARE FOR MATERIALS PROPERTIES

**Version 14.3 – April 2024**

**Version 14.2 – January 2024**

**Version 14.1 – November 2023**

**Version 14.0 – September 2023**

## **VERSION 14.3 (April 2024)**

### **NEW FEATURES**

- Improved calculation of elastic limit point in stress-strain curves
- Improved model and fixed inconsistencies in Al alloys strength calculations
- Implemented a more efficient algorithm to accelerate the calculation of flow-stress curves

### **BUG FIXES**

- fixed bug stopping the running calculation when saving data to a mat file
- fixed possible failing calculation in Reaustenitisation Properties when temperature unit in Fahrenheit

## **VERSION 14.2 (January 2024)**

### **BUG FIXES**

- changed name of intermediary file in creep calculation to fix rare issue with local rules on file extensions

## **VERSION 14.1 (November 2023)**

### **BUG FIXES**

- removed confusing phase labels in back-diffusion profile plot
- corrected typo in a parameter for mechanical properties of some Aluminium alloys
- corrected links in documentation
- fixed auto-diagnostics of failed write permissions not working
- fixed path to user data files when added in material browser
- added forgotten CU phase in General Steels Simultaneous Precipitation calculation



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## **VERSION 14.0 (September 2023)**

### **NEW FEATURES**

- addition of a back-diffusion option in the solidification of General Steels and Stainless Steels
  - internal overhaul of solidification calculation for General Steels and Stainless Steels
  - new dendrite arm spacing model for General Steels and Stainless Steels
  - improved calculation of latent heat of formation of Ferrite from Austenite
  - consideration of tempered alloy condition in High Temperature Strength calculation for General Steels
  - improved creep and rupture strength model in Nicked based alloys
  - overhaul of the kinetic calculations for Nickel based superalloys (TTT,CCT, isothermal)
    - a) consideration of phase transitions of GAMMA" -> DELTA and CAMMA' -> ETA in isothermal kinetics
    - b) consideration of DELTA/ETA formation at grain boundaries and within grains (intragranular precipitation)
    - c) consideration of grain size effect
  - re-assessment of pipe diffusion in precipitation kinetics
  - new dislocation cutting mechanism in Aluminium alloys kinetics
  - new solidification model for Titanium alloys
  - improved TTT/CCT/isothermal calculations for Al3Sc phase in Aluminium alloys
  - new modelling of age hardening calculations for Al3Sc phase in Aluminium alloys
  - addition of Schaeffler diagrams for Stainless Steels
  - added paste back of local composition from solidification or back-diffusion calculations to be used as the main composition
  - modified homogenisation model
  - added possibility to select dendrite geometry in homogenisation calculation also when no back-diffusion is considered
  - addition of homogenisation calculations to General Steels and Stainless Steels
  - new re-assessed creep for BCC in steels
  - improved model for the simultaneous precipitation of maraging steels
  - consideration of CU phase in the simultaneous precipitation of powerplant steels
  - addition of user-profile in the homogenisation calculations
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- allowed selection of a single strain rate in the Flow Stress Analysis of Aluminium alloys
  - improved data export from back-diffusion profile plots
  - improved stability of the thermodynamic solver
  - removed misleading cooling curve from Solidification calculations when back diffusion is enabled
  - better process control to avoid sub-calculations to remain in memory (the "s" key)
  - auto-check of missing write permissions in installation
  - auto-check and correction of some corruption in the user preferences file
  - updated Sentinel software used for licensing



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## **DATABASES CHANGES**

- Adjustments in the Aluminium alloys thermodynamic database
- fixed Ti<sub>2</sub>Cu and Ti<sub>2</sub>Ni molar volume (Titanium Alloys)

## **EXPORT CHANGES**

- added export to Ansys Workbench xml file for all material types
- added nitriding and carbo-nitriding export to Transvalor SIMHEAT®
- added InspireCast export for white and grey Cast Iron
- extended export (liquidus/solidus/latent heat) for Simufact software
- extended export for COMSOL Multiphysics®

## **BUG FIXES**

- fixed back calculation of precipitates sizes for NiFe Superalloys in high temperature strength calculation when both GAMMA' and GAMMA" are present and input of room temperature property is tensile stress or hardness
- fixed LS-Dyna export failing when back diffusion is used
- fixed possible Aluminium strength calculation failure
- fixed possible failing calculation in high temperature strength of General Steels
- fixed possible failing calibration calculation in Forming Limit Diagrams
- fixed rare failing Aluminium cast strength calculation
- fixed wrong colour definition
- fixed possible failure when clicking on a mechanical properties plot
- fixed immediate display of the phase boundary control option if selected
- fixed usage of TTT shift factors in the Quench Properties calculation of General Steels with calibrated TTT diagrams
- fixed issue related to the temperature unit change in the cooling curve given with Solidification calculations
- fixed a possible visual refresh glitch when deleting a folder in the material browser

