Thermo-Calc Software

TTNI8

Database name:	Thermotech Ni-based Superalloys Database	Database acronym:	TTNI8
Database owner:	ThermoTech	Database version:	8.0
Database segment:	Nickel Based Superalloys		

Brief Description

TTNI8 is suitable for commercial Ni-based superalloys, high Fe-containing and single crystal Ni-based superalloys.

Applications

Ni-based superalloy design and engineering.

Included Elements

Al B C Co Cr Cu Fe Hf Mn Mo N Nb Ni O Pt Re Ru
Si Ta Ti V W Zr

Included Phases

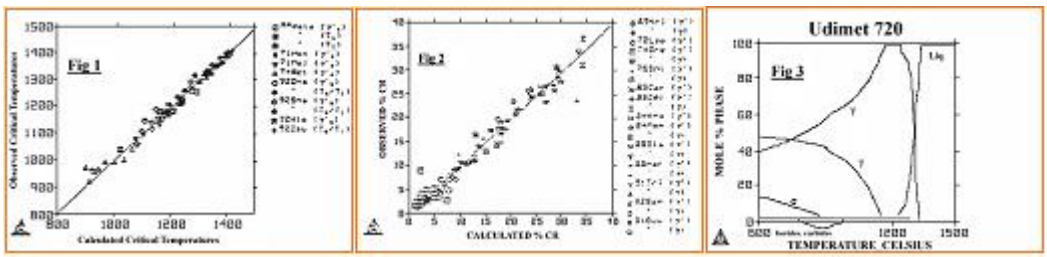
A4B_D1	GAMMA_PRIME	M2SIO4	MU_PHASE	PT2AL_H
BCC_A2	GAS:G	M3B	MULLITE	PT2AL_L
CR3NI5SI2	GRAPHITE	M3B2_TETR	NI2M	PT3AL
CR3X_A15	HCP_A3	M3O4	NI3SI_H	PT5AL3
CR5B3	L10	M6C	NI5M	PTAL
DELTA	LAVES	M7C3	NI5SI2	R_PHASE
DELTA_PRIME	LIQUID	MB_ORTH	NI7M2	SIGMA
DICTRA_FCC_A1	M23C6	MB2_C32	NIAL	SIO2
ETA	M2B_ORTH	MC	NIMO	SPINEL_AB2O4
FCC_A1	M2B_TETR	MN	P_PHASE	Z_PHASE
G_PHASE	M2O3	MO_B2	PI_PHASE	

Assessed Systems

All phases have been critically assessed and treated by some appropriate thermodynamic models (e.g. the Sublattice Model for solid solutions and liquid mixture phases, the Ideal Gas Model for gas mixture phase, etc), which are applicable over a wide temperature-pressure-composition range. TTNI8 include new work about Pt containing alloys. Extensive assessments on oxides based around the Ni-Al-Cr-Fe-Si-Ti-O system have been done.

Validation

During validation process of the TTNI8 database, extensive comparison has been made between the simulated results and available experimental data for superalloys (Figures 1 and 2). The database can be used for predictions of all types of equilibria, such as γ/γ', γ' solvus, solidus/liquidus relations (Figure 3 for U720 alloy as an example).



Using the SCHEIL module in the TCC and TCW software, it is also possible to make solidification simulations that provide predictions for non-equilibrium micro-segregation, like fs vs T plots and heat evolution. For more complex modeling, the calculations provide critical information that can otherwise only be found by expensive experimental techniques.

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Limits

As in the spirit of the CALPHAD method, predictions can be made for multicomponent systems by extrapolation into multicomponent space of data critically evaluated and assessed based on binary, ternary and in some cases higher order systems. However, critical calculations must always be verified by equilibrium experimental data; it is the user's responsibility to verify the calculations but Thermo-Calc Software AB is interested to know about any significant deviations in order to improve any future release.

Scientific Models & References

See the Thermo-Calc Software reference list and reference library at: http://www.thermocalc.com/resources/

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