Appendix D

This is the documentation for the database used to train the neural network models, as described in chapter 8.

Data Library MAP_DATA_AUSTENITIC_STMECH

Provenance of Data

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Purpose

Provides the short-term (yield and ultimate tensile strength) mechanical properties data on austenitic stainless steel at different test temperatures and heat treatment temperatures.

Description

The file STMECH_AUS_SS.zip contains :-
- STMECH_AUS_SS.txt - a text version of this document.
- STMECH_AUS_SS.xls - a Microsoft Excel file containing the data.

Each file contains the chemical composition of the steels studied, and their mechanical properties at different heat treatment and test temperatures. These data have been collated from available literature [1,2]. The presence of an `na' indicates that the value was not reported in the publication. This is *NOT* meant to be an indication that the value is zero. Although many columns are presented here, those that only had a small amount of data were removed from training the neural network MAP_NEURAL_AUSTENITIC_YIELD and MAP_NEURAL_AUSTENITIC_UTS. This enabled more input lines to be used for neural network analysis.

The file STMECH_AUS_SS contains 35 columns as follows: -

Column 1   Chromium wt%
Column 2   Nickel wt%
Column 3   Molybdenum wt%
Column 4   Manganee wt%
Column 5   Silicon wt%
Column 6   Niobium wt%
Column 7   Titanium wt%
Column 8   Zircomium wt%
Column 9   Tantalum wt%
Column 10 Vanadium wt%

Column 11 Tungsten wt%
Column 12 Copper wt%
Column 13 Nitrogen wt%
Column 14 Carbon wt%
Column 15 Boron wt%
Column 16 Phosphorus wt%
Column 17 Sulphur wt%
Column 18 Cobalt wt%
Column 19 Aluminium wt%
Column 20 Tin wt%
Column 21 Lead wt%
Column 22 Solution treatment temperature / K
Column 23 Solution treatment time /s
Column 24 Water quenched after solution treatment
Column 25 Air quenched after solution treatment
Column 26 Grains mm^{-2}
Column 27 Type of melting
Column 28 Size of ingot
Column 29 Product form
Column 30 Temperature / K
Column 31 0.2% proof stress / MPa
Column 32 UTS / MPa
Column 33 Elongation (%)
Column 34 Area_reduction (%)
Column 35 Comments

References

1. The British Steelmakers Creep Committee: BSCC High Temperature Data. *Technical report, The Iron and Steel Institute, 1973.*
2. Datasheets 16B, 33A and 38A from the National Research Institute for Metals (NRIM, Japan).

Further Comments

None.

Keywords

materials, data, austenitic stainless steel, neural network, mechanical properties, yield strength, UTS.