MATERIALS

ENGINEERING

Composition of stainless steel bolts assessed by neutrons

Bumax is a Swedish manufacturer of premium-brand high strength stainless steel fasteners, designed for extreme environments. A number of different materials are used to produce A4-grade stainless steel, and Bumax-88 is one of these.

THE PROBLEM TO SOLVE:

ELEMENTAL COMPOSITION

Bumax was looking to enhance its quality assurance programme with extremely precise measurement techniques, which would be used to benchmark their methods for assessing the elemental composition of the raw materials required for the manufacture of Bumax-88.

A STEP TOWARDS THE SOLUTION

SINE2020 advised Bumax to consider the use of Neutron Activation Analysis (NAA), an analysis technique using nuclear processes to determine multi-element concentrations. Samples were sent to the Netherlands' Reactor Institute in Delft. This laboratory has a quality system compliant with ISO-IEC 17025:2005.

THE RESULT

The concentrations of manganese (Mn), nickel (Ni), molybdenum (Mo), cobalt (Co) and copper (Cu) could be quickly determined for each sample. Measurements revealed that the composition of Bumax-88 is significantly different from the standard A4-grade material tested for comparison. Figure 3 shows the total uncertainty values obtained for the A4 samples with NAA.

"The analysis performed by the people at Delft is really great and shows that Neutron Activation Analysis technology can help us with particularly precise characterisation of our products!

Camille Feuillet, Field Application Engineer, BUMAX France

Credit: Bumax®

Fig. 1 Examples of bolts and nuts manufactured by Bumax.

Credit: Reactor Institute Delft TUD

Fig. 2 Encapsulation of the sample before final packaging in an irradiation container. The container is then sent to a position close to the reactor's core by means of a pneumatic tube system.

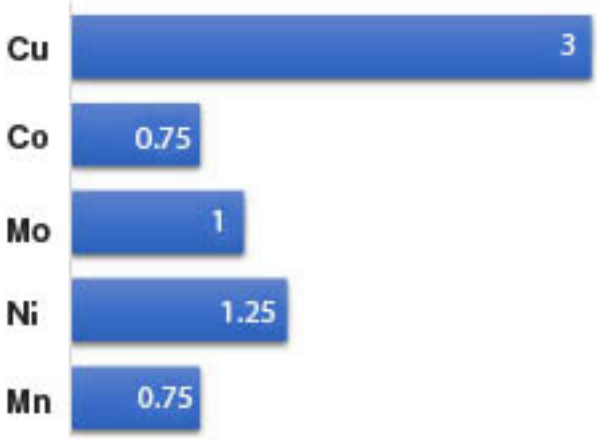

Fig. 3 Total Uncertainty of Neutron Activation Analysis for concentration measurements in A4-grade stainless steel, [1 standard deviation in %].

NEUTRONS FOR INDUSTRY

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NEUTRONS FOR INDUSTRY

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