STRAIN AGE CRACKING IN NICKEL-BASE SUPERALLOYS

Background:
This project is a part of a large project about welding of nickel base alloys. These alloys are used in the high temperature parts of aero engines and are thus heavily alloyed. However, the weldability of these alloys is limited, mainly due to the risk of different kinds of hot cracks. Cracks can occur both in the Heat Affected Zone and in the weld metal. The cracks can be formed at very high temperatures, like 1200°C. These cracks are often related to melting of certain phases like carbides or Laves phase eutecticum. At lower temperatures, like 800°C, so called “ductility dip” cracks may appear. A further type of cracking appear for example during heat treatment of welded components. These cracks are called "strain-age cracking". The cracks may also be found in multi-layer weld metals. Depending on the alloying content of the material and which kind of hardening particles is used, the materials have different sensitivity for the different kind of cracking.

In the present project four different alloys with different kind of alloying content will be investigated. The investigation is directed towards the presence of strain age cracking in multi-layer weld metals (simulating repair of materials).

Goal
To determine the sensitivity to strain age cracking of four different nickel base alloys

Work procedure
The project will consist of a literature review about strain age cracking followed by experimental work on welded samples. The investigation will require the use of different metallographic techniques for identification of the cracks. The work will mainly be carried out in University West welding laboratories in Trollhättan. The project is made in cooperation Volvo Aero.

Group size: 1
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