

Summary—Stainless Steels Session

The papers of the Stainless Steels Session were grouped in terms of the various types of stainless steels. Emphasis was given to alloy manufacturing as well as use problems. There was a discussion of recrystallization during hot working of austenitic stainless steels and duplex stainless steel tube production. Welding was considered from the viewpoint of narrow gap welding and weld sensitization. The embrittlement of ferritic stainless steels and the ferrite in a duplex stainless steel as the result of thermal exposure was considered and similarities were shown to exist. The corrosion of ferritic steels was also considered as was the corrosion in the ferrite and ferrite-austenite interfaces of duplex stainless steels. The precipitation hardened steels were looked at from the stand point of the kinetics of the precipitation.

As can be seen, these papers covered stainless steels from the ingot to the final product. The microstructure was considered at all stages from initial alloy production to the microstructural effects on service applications, particularly where corrosion is encountered or where embrittlement might result from high-temperature exposures.

The session on stainless steels began with Prof. Pickering's excellent review of the structure-property relationships for the major types of stainless steels. Ferritic, martensitic, austenitic, and duplex stainless steels were discussed. Particular emphasis was given to the relationship of structure to the formability of these steels and to the stability of the microstructure. The subsequent talks were grouped into those dealing with austenitic, ferritic, precipitation hardened, and duplex stainless steels.

Ahlblom and Roberts of the Swedish Institute for Metals Research followed Prof. Pickering in the program. Their paper was concerned with the development of fine-grain microstructures during hot working. Their paper was followed by one by Simpson and Kossonsky of the Westinghouse Electric Research and Development Center. Unfortunately this paper, which dealt with the structure developed in narrow gap welds, is not included in these written proceedings. Nakagawa et al of IHI Ltd. of Tokyo, Japan, discussed the sensitized structures that are developed in welds in Type 304 stainless steel. They compared the sensitization with the prior thermomechanical history of the pipe with the structure that resulted from such treatments. Another paper of the group that dealt with

the sensitization of austenitic stainless steel was that of Rao of the General Electric Corporate Research and Development Center. His paper dealt with structures developed during sensitization and with measurements of the chromium depletion that accompanies carbide precipitation. The final paper dealing with austenitic stainless steel was that of Anderson et al of the Sandvik Steel Research Center of Sweden and the Swedish Institute for Metal Research. This paper dealt with the mechanical properties and precipitation in a 19Cr-25Ni stainless steel. They presented data on the corrosion resistance and embrittlement of this alloy.

There were two papers on the program dealing with precipitation hardened stainless steels. Kosa and DeBold of Carpenter Technology Corp. reported on the effect of heat treatment and the microstructure on the mechanical and corrosion properties of Custom 450. Murali et al of the Virginia Polytechnic Institute and State University studied the influence of hydrogen on age hardening in 15-5 pH stainless steel.

The session ended with two papers dealing with ferritic-austenitic duplex stainless steels. Bodine and Sump of Combustion Engineering discussed the effects of composition and heat treatment on the production of tubing and the resulting mechanical and corrosion properties. The final paper of the session was by Solomon and Devine of the General Electric Corporate Research and Development Center. This paper dealt with the various precipitates that form in the duplex stainless steel Uranus 50 and their influence on the mechanical and corrosion properties of this alloy.

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