

# **New High-Temperature Corrosion Resistant Alloys for Oxidizing and Metal Dusting Environments**

V.P. Deodeshmukh

Haynes International, Inc.  
1020 West Park Avenue, Kokomo, IN 46904, USA

A new type of alumina-forming Ni-Fe-Cr-Al-based alloy (HAYNES<sup>®</sup> HR-224<sup>®</sup> alloy) has been recently developed for aggressive oxidizing environments. The paper evaluates cyclic oxidation resistance of the HR-224 alloy and its comparative performance to selected alumina- and chromia-forming heat-resistant alloys in air and water vapor containing environments. The HR-224 alloy outperformed several chromia-forming alloys owing to its ability to form and maintain a continuous, slow-growing, and adherent alumina scale. Moreover, high temperature mechanical properties of the alloy are presented and compared with Alloys 600 and 601. Additionally, another new high temperature Ni-Cr-Mo-Cu-based alloy (HAYNES<sup>®</sup> HR-235<sup>®</sup> alloy) was recently developed for metal dusting resistance in syngas containing environments. The new alloy possesses a unique combination of metal dusting resistance and fabricability. The metal dusting behavior of the new alloy will be compared with high chromium containing nickel alloys in a variety of CO containing gas mixtures with high carbon activity. The effect of small amounts of NH<sub>3</sub> in CO containing environments was also studied. In addition, an overview of mechanical properties, thermal stability and weldability of the alloy will also be presented.