

# **Damage sequences of austenitic stainless steels in chloride solutions under cyclic loading**

*G. Mori<sup>1</sup>, A. Visser<sup>1</sup>, R. Fluch<sup>2</sup>, M. Kapp<sup>2</sup>, H. Leitner<sup>2</sup>,  
B. Holper<sup>3</sup>, M. Panzenböck<sup>4</sup>*

*<sup>1</sup>Chair of General and Analytical Chemistry, Montanuniversitaet Leoben,  
Franz Josef-Strasse 18, 8700 Leoben, Austria*

*<sup>2</sup>Böhler Edelstahl GmbH & Co KG,  
Mariazeller Strasse 25, 8605 Kapfenberg, Austria*

*<sup>3</sup>Schoeller Bleckmann Oilfield Technology GmbH,  
Hauptstrasse 2, 2630 Ternitz, Austria*

*<sup>4</sup>Department of Physical Metallurgy and Materials Testing, Montanuniversitaet  
Leoben, Franz Josef Strasse 18, 8700 Leoben, Austria*

## **Abstract**

Austenitic stainless steels have been tested under cyclic loading in both corrosive and inert media. S/N curves have been compiled to show the effect of environmental conditions such as chloride content, temperature and pH-value on fatigue limit and damage. Also S/N curves at two different R-values are compared.

Furthermore fracture surfaces have been carefully analysed using a scanning electron microscope (SEM). Different damage mechanisms have been identified. These are pure fatigue, corrosion fatigue, pitting followed by fatigue and stress corrosion cracking followed by fatigue.

The relations between these damage sequences and their change from one to the other with changing conditions is discussed and shall contribute to an improved understanding of corrosion fatigue behaviour of austenitic stainless steels in chloride solutions.

Key words: Corrosion fatigue cracking, Austenitic stainless steel, Chloride solutions