HOW CLEAN IS YOUR STEEL?

WHY QUANTIFICATION OF INCLUSIONS PROVIDES CONFIDENCE IN A LONG FATIGUE LIFE

IN BRIEF

Fatigue strength and the danger of inclusions

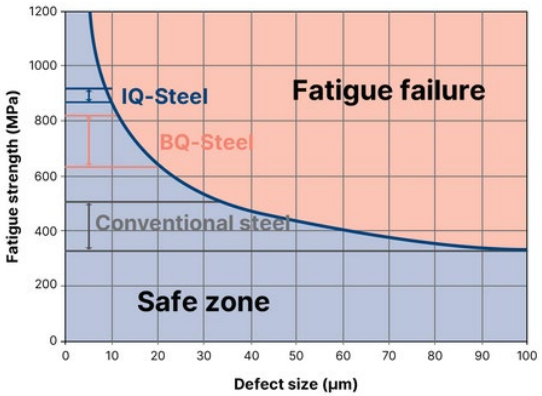
The presence of unwanted particles in steel, known as ***inclusions*, represents a significant danger, as they are the main factor initiating fatigue failures.** It is therefore vital to quantify both the size and statistical distribution of the inclusions in order to enable designers to fully exploit the potential of clean steel.

Obsolete current standards

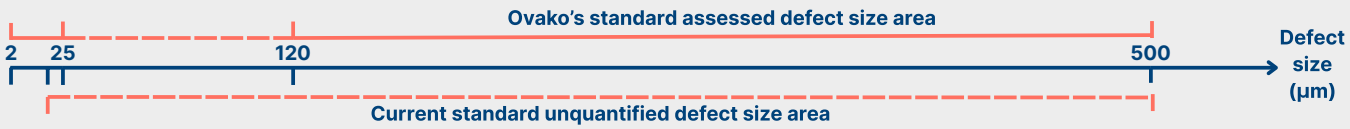
Current standards are based on techniques that do not enable accurate quantification of inclusions in terms of their size and statistical distribution. Therefore, current standards are obsolete for accurately quantifying the inclusion content of modern clean steels.

Closing the standards gap

In order to close this gap, Ovako developed a **standardized method** to accurately reflect the inclusion content in modern clean steel. This new approach is



primarily based on 10 MHz immersed ultrasonics testing, combined with light optical microscopy and scanning electron microscopy. Immersed ultrasonic testing offers a high range of detectability and allows testing of a significant volume of material giving statistical confidence of the cleanness.



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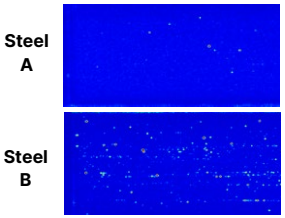
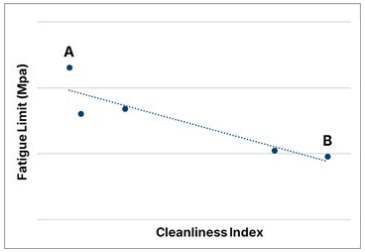
Better cleanliness assessment for better fatigue life confidence

Ovako's internally developed standard provides rich data to assess the cleanliness of steels. **A higher cleanliness correlating with a higher fatigue fracture limit, this new quantification method thus enable a high level of confidence in the fatigue strength of assessed steels.**

The standard has already been applied with considerable success for demanding components in bearing and diesel injection applications. It is now being applied for powertrain components.



Fatigue limit according to steel cleanliness



Ultrasonic scan output

Key messages

- **Inclusions are the critical factor that determine the fatigue life of steel**
- **Current steel standards are obsolete**
  They do not offer guidance in selecting clean steels
- **Clean steels can improve component's fatigue life by up to 50 %**
- **Ovako has published a new standard**
  Based on 10 MHz ultrasonic testing, for an effective quantification of inclusions in clean steels

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