application note

Metal Hardness Testing

Hydro Aluminium

Cold Rolling of Aluminium Products: Failure to maintain a constant roll hardness will shorten the roll life

Cold rolling is a metal working process in which metal is deformed by passing it through rollers at a temperature below its recrystallization temperature. It is a method often used to decrease the thickness of plate and sheet metal. As the accumulated tonnage of rolled material increases, the hardness of the roll increases above its original manufacturer certified roll hardness due to work hardened material. This has to be removed by grinding to bring the roll hardness back to its original value. Failure to do so will eventually lead to phenomena such as "spalls" which tend to significantly reduce the overall roll life. Back-up rolls suffer an even faster reduction of their roll life due to spalling.

Application

Hydro Aluminium uses Equotip for incoming goods inspection of steel rolls. A typical roll diameter is 400 mm. The roll hardness is measured in two ranges, i.e. 780 HLD (~ 650 HV) and 850 HLE (~ 950 HV) and at intervals of 100 mm. For a higher hardness range, the impact device E is preferred to the D device due to the higher robustness of its ball indenter. The rolls hold relatively high chromium content which is important to know when converting different hardness scales i.e. comparing Equotip and Vickers measurements.

Equotip is a standard for roll testing and the Leeb hardness unit (HL) has been well-known in the industry for many years.

Customer Quote

"We have been using Equotip for many years, predominantly in the area of roll grinding. Particularly, we appreciate its portability and easy handling. Equotip has delivered a very good performance in the daily on-site inspection."

Hydro Aluminium Deutschland GmbH, BU Roll Grinding – Proceq customer since 1998

Profile

Customer

Hydro Aluminium Deutschland GmbH
Hydro's foil, strip, liquid packaging and aseptic packaging products are typically used in the following industries: automobile, transport, building, engineering, electrical, printing and packaging.

Employees

22'000 in over 30 countries

Requirements

- Accurate hardness profile measurements across very hard steel rolls (up to 1000 HV) to improve quality levels of roll suppliers and demonstrate best-in-class professionalism to Hydro's customers
- Increased testing frequency
- Verification of functionality and accuracy

Proceq Product

Equotip 3 with type D and E impact devices

Benefits to the Customer

- Versatility; accessibility of impact devices, ability to measure very hard materials
- Accurate management of full roll life (cost savings)
- Reliability; years of testing without defects

Contributed by Proceq Europe