HERZOG

Predictive maintenance in disc mills using sensory signal monitoring

Abstract

Disc mills are used to comminute sample material for analysis by XRF, XRD or other methods. Here we present a method for predictive maintenance (PdM) monitoring the anchor bolts joining the drive motor to the swing aggregate. Based on acceleration evaluation by the PrepMaster Analytics software the impending failure of the bolts was clearly detected several days before actual breakage of bolts. This time period was long enough to schedule the necessary maintenance tasks in a timely manner. This case study underlines the potentials of PdM to maximize availability and cost efficiency of an automated system.

Key words

• **Disc mill** • **Predictive maintenance** • **Swing aggregate** • **Acceleration**

Introduction

Disc grinding mills are standard equipment used for comminution of non-organic material in preparation for analytical procedures like, e.g., X-ray fluorescence or diffraction. Typical target grain sizes are between 20 and 150 µm depending on the analytical application. In order to start the grinding process, a motor puts the grinding vessel into an eccentric circular motion. This again will lead to a circular movement of the grinding set inside the grinding vessel. Depending on the grinding mill type, material and analytical method, different types of grinding sets are used including disc, ring and/or stone. The particles are ground based on shearing, impacting and compression of the material between grinding set, wall of the vessel and among each other (Figure 1).
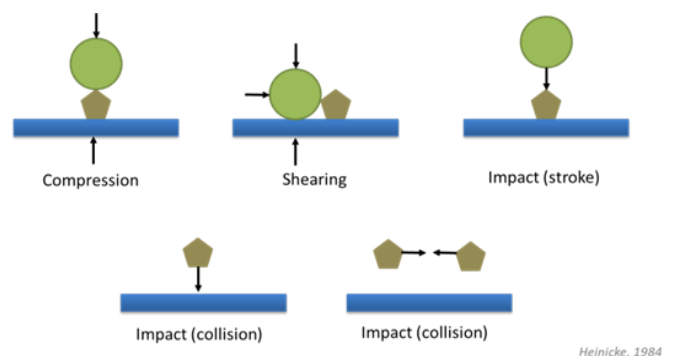

Figure 1: *Grinding mechanisms taking place in a disc mill include compression, shearing and impacting. (modified from Heinicke, 1984)*