Erosive Wear due to Particle Impact

Erosive wear is a result of particles colliding with surfaces of equipment, pipe walls, and similar objects, leading to damage, loss of mass, and potential contamination of products. This type of wear can cause issues such as leaks, concerns for health, safety, and environment (HSE), and unplanned plant shutdowns. The severity of erosive wear is determined by the material properties of both the particles and surfaces they collide with. Despite the negative effects of erosive wear, particle impact erosion can also have beneficial applications, such as sandblasting, polishing, and water cutting. Therefore, it is crucial to measure, quantify, and control erosion caused by particle impact in industrial processes where powder processing and handling play a vital role.

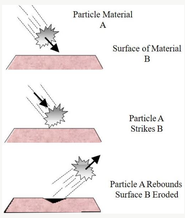

Figure 1: Schematic of erosive wear

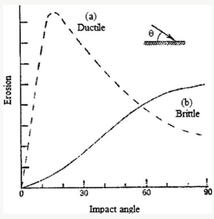

Figure 2: The influence of impact angle on the erosion rate of different surface materials.

Impact Erosion: Measurement Methods

- Particle stream is accelerated through a nozzle and impact on a target piece made of surface material
- The erosion rate is quantified by measuring the loss of weight of the target piece
- Particle velocity, impact angle, particle concentration, etc., can be varied.
- The surrounding conditions; temperature, humidity, etc., can be controlled
- The eroded surface can be visualized and analyzed with microscope and/or profilometer
- The test equipment complies to the ASTM standards G 76-89

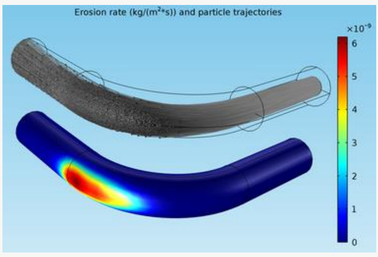

Figure 3: Computational simulation of erosive wear

Figure 4: Erosive wear damages of conveying pipelines of bulk materials

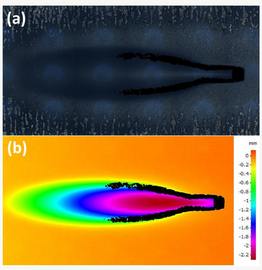

Figure 5: Erosive wear surfaces under profilometer analysis

Erosion measurements can be used to;

- Control erosive wear of powder processing and handling plants
- Optimize system operating parameters to control erosive wear
- Select surface materials to minimize erosive wear
- Complete system designs and/or troubleshooting
- Formulate computational and numerical simulations
- Ensure safe system operations; HMS issues, avoid particle emission

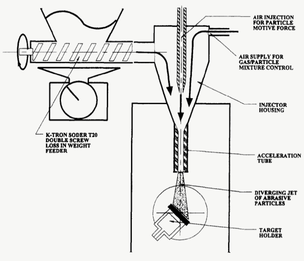

Figure 6: Erosive wear test apparatus no. 1

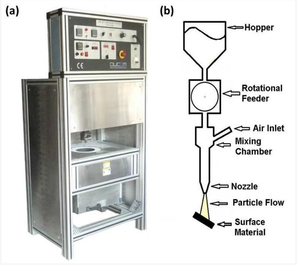

Figure 7: Erosive wear test apparatus no. 2

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