

Micropitting: Impact and How to Avoid It

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Micropitting, despite its small size, may have major effects for the sector. Read the article to find out how to avoid the effects of micro cracks.

Micropitting is a widespread issue in all segments of the industry. After all, when there are gears, there is a possibility of teeth surface cracking. Gearboxes and transmission units are two primary examples of equipment that suffer from this issue.

Micropittings are not visible to the naked eye (normally they are between 10 and 20 μm deep and wide, with lengths ranging from 25 to 100 μm). It does not receive the attention it deserves since it is so little. This is a huge error since minor cracks may grow into bigger ones, compromising the accuracy of the gears and creating vibrations and noise.

More than that, they may be directly responsible for a breaking of the gear teeth, resulting in equipment stoppage. You'll soon have a better understanding of the effects of these minuscule fissures. For the time being, you should be aware that this issue demands attention and that both the maintenance and supply departments must take it into account.



Continue reading to learn more about the effects of micropitting on gears and what you can do to prevent it. Read on.

Micropitting's Effects on Production

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There is still no clear answer as to what causes this issue. According to one theory, the roughness of the material has a role in the appearance of micropitting. According to this, the problem begins when significant loads are applied to the surface roughness, causing deformation and the generation of residual stresses.

However, studies demonstrate that gears lubricated with antifoam additives are more susceptible to microcracking. Lubricants of poor quality that do not meet the requirements of these systems, such as withstanding high temperatures and stresses, quickly rupture, exposing metal faces to contact.

While its emergence remains a point of contention, its influence on the business is undeniable. This is because when neglected, it can quickly evolve into a macropitting, this one being apparent to the naked eye (0.5 to 1.0 mm in diameter). Along with the initial issues of vibration, noise and decreased operational precision, the gear teeth are subjected to unexpected stresses and will eventually fail due to contact fatigue.

It should be mentioned here that tooth fracture should not be the primary concern. This is a relatively typical error, in which components are replaced without evaluating what caused the system to fail. Micropitting, in this scenario, is the main fault that must be considered, as a 'domino effect' is generated by the initial microscopic cracks contributing to the tooth's degradation.

As with any breakdown, the equipment's service life is shortened, and the unexpected stoppage may result in the complete shutdown of production, depending on the equipment's criticality level.

What to do to avoid micropitting in assets

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Because these are tiny cracks, there is only a handful of tests to detect micropittings:

➤ **destructive tests: these require mechanical examination of the material itself, which may leave markings on the parts (in many cases, these are not unusable after the test)**

➤ **industrial borescopy: a service that uses precise pictures to examine the interior components of equipment without the need for extensive disassembly**

➤ **oil analysis: you can visually inspect for contaminants caused by surface wear**

Since detecting micropitting is not the easiest of tasks and frequently entails significant expenditures, the best course of action is to seek to prevent it. Microcracking is prevented by coating the surfaces, providing an acceptable lubricant film thickness and employing the correct fluid specifications.

However, understanding which portion of the part is most prone to this issue enables maintenance personnel to examine the appropriate areas. Although micropitting may occur anywhere on the tooth, it most commonly begins at the root or crown where rapid sliding speeds occur.

Analyzing the equipment during the preventive maintenance plan, considering its significant points of wear, is one of the ways to identify micro cracks. If present, you can think about its correction (in some cases it is possible to eliminate it by polishing the surfaces during the rotation of the gears).

In any case, proper gear lubrication is the most prudent preventive measure. Consider the following factors while selecting the appropriate fluid.

What to avoid while selecting a gear lubricant

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Each equipment has a purpose and unique maintenance needs. However, multiple components within the same machine require unique characteristics of the products used for their maintenance. When selecting a gear lubricant, keep the following system conditions in mind:

- **operational environment**
- **type of movement**
- **temperature**
- **speed**
- **load**

Certain properties are required of gear oils. For example, additives with extreme pressure, anti-wear, and anti-corrosion properties complement the synthetic base utilized to create this type of fluid. Additionally, it is critical to know that lubricants can assist conserve energy by dissipating heat and enhancing performance.

Due to the product's use in extreme conditions, it's important to pay attention to its certifications. It means that it has undergone rigorous quality testing and will perform as expected. In the case of gear lubricants, the following are the most important:

- **AIST 224 (US Steel 224)**
- **Siemens Flenders**
- **AGMA 9005-D94**
- **DIN 51517 part III**

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Homologation of OEMs (Original Equipment Manufacturer) is also necessary to certify the fluid's quality. These are tests devised by equipment manufacturers that are relatively costly for oil developers but confirm that investment was made in accordance with the tight standards specified.

- **Siemens MD Revision 15 (Flender);**
- **Fives Cincinnati Machine Gear;**
- **David Brow s1.53.101;**
- **GM LS 2 EP Gear Oil.**

It's worth noting that the quality of the oil is not determined only by certification. Following selection and purchase, the product must be properly stored to prevent contamination. For instance, the presence of dust particles impairs the oil's homogeneity and may even contribute to the appearance of micropittings.

Proper asset lubrication is critical for the industry's competitiveness, as it directly impacts equipment availability. Download the free Lubrication Plan Spreadsheet and manage this part of your maintenance better in your plant.



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