# Article information:

Effect of vein-bionic surface textures on the tribological behavior of cylindrical roller thrust bearing under starved lubrication | Scientific Reports
<https://www.nature.com/articles/s41598-021-00800-x>

# Article summary:

1. Laser surface texture (LST) can be used to improve the tribological behavior of various mechanical components, including sliding bearing, journal bearing, piston rings, and gears.

2. The vein of a leaf is a natural anisotropic non-smooth surface that has selectively evolved in nature for millions of years. Vein-bionic textures have not been studied in the surface texture field until now.

3. The effect of vein-bionic textures on the tribological behavior of rolling element bearings (REBs) was investigated using cylindrical roller thrust bearings (CRTBs). The results showed that vein-bionic textures can improve the wear resistance of REBs and prolong their mild wear periods.

# Article rating:

Appears moderately imbalanced: The article provides some useful information, but is missing several important points or pieces of evidence that would be required to present the discussed topics in a balanced and reliable way. You are encouraged to seek a more balanced perspective on the presented issues by exploring the provided research topics and looking at different information sources.

# Article analysis:

The article titled "Effect of vein-bionic surface textures on the tribological behavior of cylindrical roller thrust bearing under starved lubrication" published in Scientific Reports discusses the impact of laser surface texture (LST) on the tribological behavior of rolling element bearings (REBs). The article highlights that friction and wear between moving parts are undesirable and unavoidable, resulting in a large amount of power consumption and material losses. Therefore, it is essential to lower such losses by improving the wear resistance of REBs.

The article provides a comprehensive review of previous studies on LST and its impact on various mechanical components. It also discusses the main mechanisms of friction-reducing and wear-improvement of textured parts, including an increase in oil film thickness, reducing effective contact area, storage of debris, and secondary lubrication.

The article then introduces vein-bionic surface textures as a new type of non-smooth surface inspired by natural anisotropic leaves. The authors designed six vein-bionic patterns based on different plant leaves and marked them on the shaft washers of 81107TN bearings using a fiber laser marking system. The friction and wear properties were researched using a vertical universal tribo-meter under starved lubrication with a customized tribo-pair.

The results showed that vein-bionic textures had a significant impact on the tribological behavior of CRTBs. However, there are some potential biases in this study that need to be considered. Firstly, the sample size is relatively small, with only three bearings tested for each group. Secondly, there is no information provided about how the six plant leaves were selected or why they were chosen over other plants. This lack of transparency raises questions about potential biases in selecting these specific plants.

Additionally, while the article provides detailed information about the design and preparation process for vein-bionic textures, it does not discuss any potential risks associated with using this technique or any limitations that may affect its practical application. Furthermore, there is no discussion about possible counterarguments or alternative approaches to improving wear resistance in REBs.

Overall, while this study provides valuable insights into the potential benefits of vein-bionic surface textures for improving tribological behavior in REBs, further research is needed to address potential biases and limitations associated with this approach.

# Topics for further research:

* Risks and limitations of laser surface texturing for improving wear resistance in rolling element bearings
* Alternative approaches to reducing friction and wear in mechanical components
* Biases in selecting specific plant leaves for vein-bionic surface textures
* Practical applications of vein-bionic surface textures in industrial settings
* Comparison of vein-bionic surface textures with other non-smooth surface designs for improving tribological behavior
* Impact of lubrication conditions on the effectiveness of vein-bionic surface textures in reducing friction and wear.

# Report location:

<https://www.fullpicture.app/item/35b61970e2c5cd36c1c72bf25106ed87>