

Lightweight high-performance power transmission components

Field of use

New materials, Power
transmission components

Current state

Lab test

Intellectual property

Patent application number:
SI_110621

Developed by

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Engineering

Reference:

UL20210782015P

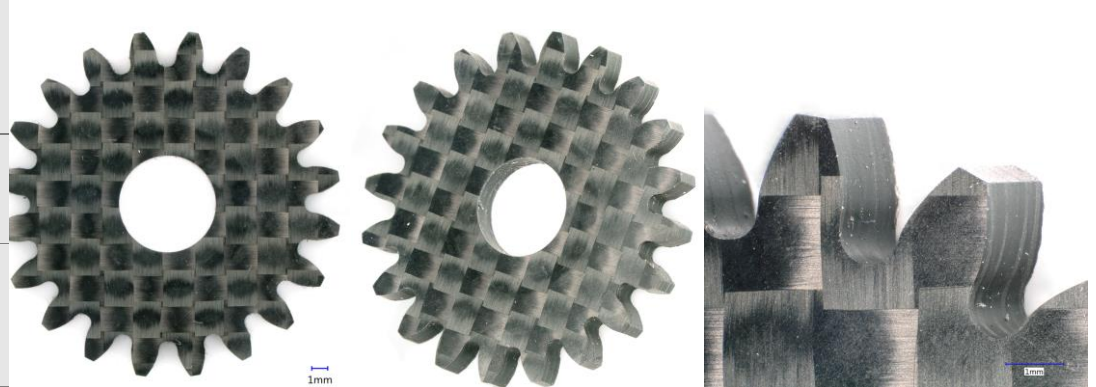
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Background

Polymer composite gears are a modern technology which is increasingly replacing metal gears due to its many advantages (lower weight, less noise, no need for lubrication, etc.). They are used in different sectors, e.g., kitchen appliances, robotics, medicine, e-mobility and automotive. The key problem such gears exhibit is that their load-bearing capacity is 8 to 10 times lower than that of steel gears. We managed to solve this problem. Gears according to our invention have shown a 100% higher load-bearing capacity than the polymer and composite gears currently being used. This enables to replace metal gears in new applications, where this was not previously possible, and to further optimize the performance of existing applications with polymer gears.

Description of the Invention

Our solution utilizes a new, in-house developed, carbon fiber reinforced polymer (CFRP) composite material with continuous fibers. The invention has already been studied into great detail in laboratory environment. Compared to currently best performing polymer/composite gears the results were outstanding. So far, only composites with short (discontinuous) reinforcing fibers were used for gear applications. Such materials, however, still exhibit low fatigue strength, wear resistance and heat dissipation. With our invention, these problems are successfully solved.

Main Advantages

Modern gear transmissions are optimized for minimum volume and weight, which is why the development of high-strength materials which can withstand high loads is crucial. There is currently a large gap between the load-bearing capacity of polymer gears and steel gears. With our invention, we aim precisely at this yet untapped area, with a significant reduction in the large lag behind steel gears and the preservation of all the advantages of polymer gears. Gearboxes that will use gears according to our invention will provide up to a 100% higher power transmission density than polymer gear drives made of currently available materials.

