# ***PEAK PERFORMANCE COMPOUNDING OFFERS METAL TO PLASTIC REPLACEMENT WHILE MAINTAINING METAL MAGNETIC PROPERTIES***

*A Customer Success Story*

Metal has a history of use in a wide range of industrial applications, including drill components for the oil and gas industry. While metal offers a range of performance benefits, including part durability, it also has design limitations and cost disadvantages.

The following case study will examine how Peak Performance Compounding, LLC assisted an Original Equipment Manufacturer (OEM) in the qualification of a polymer-based alternative for enhanced design functionality and overall cost reduction.

***Customer Profile:*** The customer for this development was an OEM in the oil and gas industry.

***Material Needs:*** The customer was looking to replace a metal drilling component with a polymer alternative for enhanced part functionality (as metal restricted the part design) and lower material and overall manufacturing costs. The foundation of their formulation includes:

- Polyphenylene Sulfide (PPS)
- Glass reinforcements
- Metal additives for magnetic properties

***Customer Challenges:*** The OEM was looking to expand their product portfolio and improve their design by utilizing a polymer compound. Modifications to their existing product were restricted due to metal design limitations and they were struggling to find a trusted and capable partner to aid in the product formulation, material selection and compound manufacturing process. The Critical to Quality (CTQ's) of their application required a high loading level of metal powder to achieve the desired magnetic properties, while glass was needed as a reinforcement additive for strength. Additionally, when transitioning from metal to plastic, the part needed to meet the following application challenges:

- Strength at elevated temperatures
- Chemical resistance at elevated temperature
- Mechanically robust

***The Peak Solution:*** Peak has extensive experience in processing complex, highly filled compounds for tight-tolerance applications. Utilizing a custom formulation, material testing and scale-up procedures, we were able to satisfy the customer's unique needs and successfully provide a dynamic solution for future polymer-based products. We proudly provided the following value-added solutions:

- Ability and willingness to process a wide variety of resins for evaluation, including glass reinforcements and a high loading of metal powders, with a continued focus on health and safety
- In-house formulation development, technical support, material testing and manufacturing
- Development of a Design of Experiments (DOE) for formulation & material selection
    - Prototype compositions for testing
    - Test bars for evaluation of mechanical properties
    - Coordination for prototype molding

***The Outcome:*** This collaboration successfully resulted in the selection of a custom polymer formulation for their drilling product. The formulation catered to their unique requirements for material strength, temperature resistance, chemical resistance and magnetic properties. Following evaluation of the samples, the customer was able to successfully mold a prototype of the new product and move forward with further product testing (which has also been successful thus far). Transitioning from a metal part to a polymer-based solution allows the customer freedom in product design and injection molding process, while also enhancing part performance. Additionally, manufacturing a high volume of parts via injection molding provides a significant cost reduction over metal tooling and machining.

**For more information on this case study or to discuss how Peak Performance Compounding, LLC can assist with your unique material needs, please email info@peak-pci.com**