

# CASE STUDY: Eliminating Cold Flow in Heavy Equipment Applications

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## The Challenge

A heavy equipment OEM was experiencing premature failure in a critical wear component used in a high-load pivot and sliding application. The part was originally manufactured from UHMW, which provided low friction but struggled under sustained compressive load. Over time, the component experienced cold flow (creep), resulting in loss of dimensional stability, increased clearance, and misalignment. This led to frequent replacements and unplanned maintenance in the field.

## What is Cold Flow?

Cold flow, also known as creep, is the tendency of a material to permanently deform over time when subjected to a constant load. Unlike elastic deformation, where a material returns to its original shape once the load is removed, cold flow is irreversible.

In plastic materials like UHMW, this effect becomes more pronounced under continuous pressure, especially in load-bearing applications. Even if the initial design meets dimensional requirements, the material can slowly “move” or compress over time, leading to loss of tolerance, increased clearances, and misalignment between mating components.

This is particularly problematic in applications involving sustained loads, tight tolerances, or critical alignment where even small dimensional changes can impact performance, accelerate wear, or lead to premature failure.

## The Solution

Lehigh Valley Plastics worked with the customer to evaluate the application and recommend a material upgrade to cast nylon, specifically a load-bearing grade in Nylatron GSM. Nylon provided significantly higher compressive strength, improved resistance to creep, and better long-term dimensional stability under continuous load. LVP machined the components to print, maintaining critical tolerances required for proper fit and function.

## The Results

The material conversion delivered immediate performance improvements. Cold flow deformation was eliminated, and the components maintained their geometry over extended use. The customer achieved a 2–3x increase in part life, reduced maintenance frequency, and improved overall equipment reliability in demanding field conditions.

## **Application Context**

Industry: Heavy Equipment

Application: Wear pads, slide components, pivot interfaces

Environment: High load, continuous pressure, outdoor conditions

## **Takeaway**

While UHMW is effective in low-friction applications, it is not ideal for high-load environments due to cold flow. Engineered nylon materials provide superior load-bearing capability and dimensional stability, resulting in longer life and lower total cost of ownership.

## **Let's Talk**

If you are experiencing deformation, wear, or frequent part replacement, there may be an opportunity to improve performance through material selection. Lehigh Valley Plastics specializes in machined plastic components for demanding applications. Send us a print or connect with our team to explore solutions.