

# CASE STUDY: OPTIMIZING A CBD EXTRACTION PROCESS WITH ROTARY GEAR PUMPS

Featuring the Pulsafeeder ISOChem and Eco Gear Pumps



## October 2020 – Auburn, California

To create an optimal system, it is critical to recognize that all applications are not equal. Botanical extraction poses a unique collection of challenges that must be overcome in order to build the most reliable system.

These include dealing with:

1. Varying viscosities as the process fluids change in temperature through the process
2. Matching pump materials for diverse fluids conditions
3. Dealing with vacuum conditions
4. Removing complexity from the system to increase system uptime



Figure 1 – TruSteel's EVO Series for Modular Wiped Film Distillation using Pulsafeeder ECO and ISOChem Gear Pumps

Pulsafeeder has both the product portfolio and experience in botanical extraction processes to help tailor your system to a specific process as we did for TruSteel LLC. in California.

TruSteel LLC. is a leading manufacturer of CBD extraction, solvent recovery and distillation equipment. They employ rotary gear pumps to transfer tincture, solvent, terpenes and CBD crude from one step to another. In these applications, the pressure, temperature and viscosity can be vastly different at each part of the process which means that one pump does not fit-all.

While gear pumps can reliably handle these fluids, the materials of construction and sealing options must be considered for each set of conditions.

Pulsafeeder's ECO and ISOChem gear pumps, installed with expert advice from their local representative, Flo-Line Technologies, have helped to make TruSteel's equipment be more dependable, produce higher quality CBD oil and make TruSteel a leader in the CBD extraction market.

## THE CHALLENGE – MAXIMIZING SYSTEM UPTIME

TruSteel was exploring ways to increase the amount of run time of their extraction systems, before any maintenance was required. The pumps were a critical piece to accomplish this because they were often a source of maintenance and repair. If they could extend the life of these critical components, they would be able to provide even

greater process uptime. Looking closer at the pumps, TruSteel recognized that they were experiencing varying levels of gear wear, the internals of the pumps that transport the fluid, at different process points.

Specifically, the deterioration of the gears was more pronounced at the points in the process where the oil was hot. This meant maintenance would be required sooner than at colder parts of the process. TruSteel reached out to Flo-Line and pitched the challenge of extending the life of their equipment while ensuring the highest quality product was being produced.

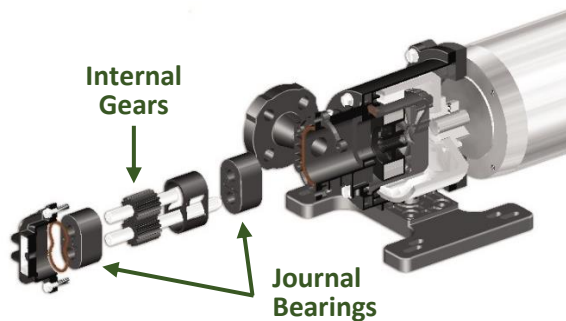
## THE SOLUTION – CHOOSING THE OPTIMAL PUMP DESIGN

### *Matching Materials to Varying Conditions...*

Flo-Line and Pulsafeeder met with TruSteel to discuss Pulsafeeder's series of ECO and ISOChem gear pumps. These series of pumps are available with a wide variety of gear materials and they, along with Pulsafeeder's expertise, meant that TruSteel could optimize each process point for maximum efficiency and equipment life.

The team verified that the wearing issue was caused by low viscosity that resulted from the process fluid heating up while in use. This lower viscosity ultimately resulted in:

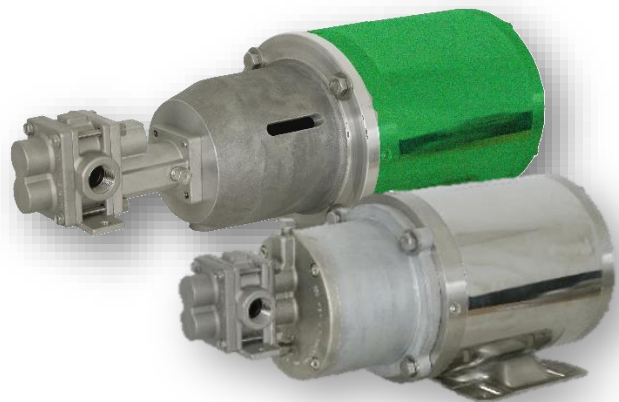
- 1) A lack of lubrication between the gears
- 2) Faster revolutions required to make the same flow



*Figure 2 – Internals of a typical gear pump, like those used in a CBD extraction process*

Both factors, the lack of lubrication between the gears and the gears spinning faster, ultimately lead to excessive wearing of the pump's internals and the need for earlier than expected maintenance. While metal to metal gearing would normally be recommended for high viscosity fluids, such as low temperature CBD crude, the elevated temperatures meant that it behaved more like water than oil, providing inadequate lubrication.

Simply put, at this viscosity, while metal to metal gears will work, they will not provide the longest possible life. By better matching the materials used with the various fluids and process steps, TruSteel could provide an even more robust system.



*Figure 3 – ECO (top) and ISOChem (bottom) Gear Pumps*

Secondly, gear pumps utilize journal bearings that provide a smooth surface on which the pump shafts are supported. These are essentially two solid surfaces rotating against each other which, over time, can result in erosion of the bearing surface, leading to increased heat and ultimately pump failure.

Flo-Line recommended a combination of Pulsafeeder ECO and ISOChem gear pumps that feature self-lubricating bearing materials, hard enough to minimize this erosion, but smooth enough to provide the stainless shafts the right surface to keep them spinning efficiently. The right choice of bearing material meant TruSteel's customers were able to produce the cleanest CBD oil possible without early stoppages.

### Dealing with Vacuum Conditions

After reviewing the process with TruSteel, Pulsafeeder saw that much of the process is under vacuum. Under vacuum conditions, gear pumps with single mechanical seals were proving problematic. When a mechanical seal fails that means loss of product and a temporary shutdown of production.

Pumps with single mechanical seals work well for positive pressures but double mechanical seals with additional seal flush arrangements are best for vacuum service. In order to change their design to accommodate double mechanical seals, it would require extra piping to allow for an additional flushing system.

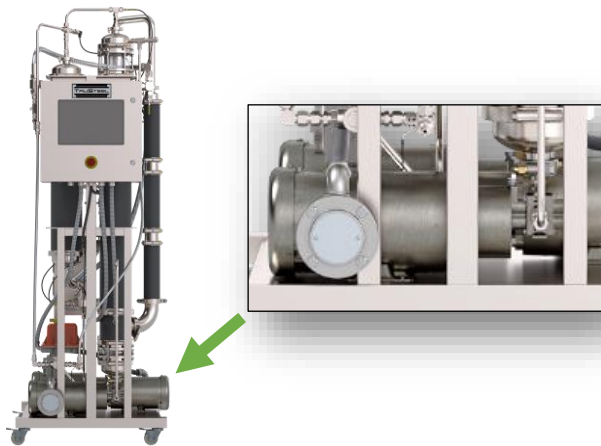


Figure 4 – TruSteel's Autovap™ System featuring IsoChem Gear Pumps

This would add unnecessary complexity for TruSteel's customers. Featuring a sealless design, Pulsafeeder's ISOChem with magnetic drive, offered a simple solution with a big impact, requiring no additional flushing system.

The ISOChem series of pumps use a sealed containment can designed to eliminate leakage and provide the maximum protection for operators and adjacent equipment. Flo-Line was able to quickly work with TruSteel to adapt Pulsafeeder ISOChem pumps into their design where vacuum and/or high temperature was a present, while the

ECO pumps (with single mechanical seals) were the right solution for process points above vacuum and lower than 250°F. The right pump for the right application means more CBD production and happier customers.



Sealed Containment Can on ISOChem

Figure 5 – The ISOChem features a sealed containment can design with a magnetically coupled drive which eliminates leakage by removing the need for drive shaft seals as well as the need for a separate flushing system.

### AN OPTIMAL DESIGN FOR EXTRACTION

Choosing the right pump for CBD extraction equipment for solvent recovery, winterization, decarboxylation and distillation equipment is crucial. Keeping the process running smoothly depends on it and it can simplify system design, save cost and avoid user frustration later.

In the end, TruSteel was able to optimize their system with the combination of the ISOChem and the ECO series of pumps from Pulsafeeder, ensuring both maximum uptime and production of the highest quality of product.

The specifics of various systems mean that each process is a little different but Pulsafeeder and our industry expert representatives have the expertise to help optimize your system.

For more information on how to maximize your system, visit [pulsa.com](http://pulsa.com) or contact a local Pulsafeeder distributor at [pulsa.com/find-a-rep](http://pulsa.com/find-a-rep).