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**HÄGGLUNDS**

**Futamura takes a  
modern approach with  
Häggglunds churn drives**



# Futamura takes a modern approach with Hägglunds churn drives

**Established in Japan in 1950, Futamura is now a global leader in renewable packaging films. At its production site in Cumbria, UK, the company is pursuing renewal of a different sort – by replacing 10 outdated churn drives with Hägglunds hydraulic direct drive systems from Bosch Rexroth.**

## SUSTAINABILITY IN PRODUCT AND PRODUCTION

Though built on a long tradition, Futamura as a company is clearly looking ahead. At its site in the UK, the company manufactures sustainable packaging films under the Cellophane™ and NatureFlex™ brands. The NatureFlex™ range is a next-generation film, not only produced from managed wood sources but also certified for home and industrial composting.

“Futamura is aiming to produce only compostable films by 2025,” says Christopher Green, Mechanical Design & Development Engineer. “We get a lot of inquiries, especially for the compostable range. That increases demand for us to deliver orders on time and to potentially increase production.”

Future-proofing production is one of the main reasons Futamura is updating to Hägglunds hydraulic direct drive systems. The churns at the UK site are used to convert wood pulp into viscose, and seven out of ten have had their drive systems replaced since 2017.

## A LEGACY BEST LEFT BEHIND

The churns, as well as their original drive systems, are nearly 70 years old. Moreover, they are located in an ATEX IIC T6 area.

“On the original drives, you had a legacy FLP (flameproof) motor driving a self-change two-speed gearbox, which provided a slow-speed mode of 12 rpm and a fast-speed mode of 60 rpm,” says Shaun Asbridge, Electrical Design &

Development Engineer. “But ATEX wasn’t even applicable when the gearboxes were installed, and so there were a handful of reasons why that legacy should be modernized.” “It was difficult to obtain spare parts and sustainability was becoming a problem, so we had to find a solution to the risk,” adds Green.

## TAKING A NEW PATH WITH HYDRAULICS

While the need for change was clear, however, it took several years and a number of study visits to other plants to arrive at a hydraulic solution. “We use a lot of inverter drives and inverter-driven motors at Futamura,” says Asbridge. “That was our common practice on site, so it was our go-to solution.”

Although different possibilities were explored, the combination of ATEX and two fixed speeds proved difficult with an electromechanical solution. One option was installing a slow and a fast motor, then switching between them using mechanical gearing. Another was a single motor with a gearbox.

“The latter was a no-go because of the size of motor needed to get the required power at such a slow speed, as well as the high speed required,” says Asbridge. “When we came through it all, the hydraulic option was the only suitable option.”

## AN ELEGANT ANSWER TO SPECIALIZED NEEDS

The solution now being implemented on Futamura’s churns is built around the Hägglund CA hydraulic motor. The Hägglunds CA has an ATEX IIC T6 rating, and the drive units containing the pumps and power supply are installed in a







non-hazardous area some distance away. The drive supplies the right amount of working torque, and its built-in torque limiting function protects against overload.

More efficient than the old drives, the solution replaces a 22 kW motor with a 15 kW pump. Through variable displacement, it also efficiently solves the problem of two speeds. “There’s a valve on the motor that engages or disengages the pistons to achieve the two speeds,” Green explains. “Compared to the old electromechanical solution, it’s a lot more compact.”

### LESS SPACE – AND FAR LESS NOISE

Asbridge backs Green up when it comes to the size of the drive. “It’s a massive change,” he says. “Compared to the electromechanical solution, the Hägglunds option is around a 60 % saving on space.”

Yet Asbridge is even more impressed by the noise level. “The Hägglunds motors are so silent!” he exclaims. “Two of the churns are in their own room, and when we first replaced those drives we weren’t even sure if the churns were running. It’s phenomenal how quiet they are. The noisiest thing in there now is the ventilation.”

Most importantly, Asbridge notes, the solution is a good match for the process. “The way the Hägglunds system operates is perfect for what we required,” he says.

### GENTLER AND FASTER CHURN HANDLING

Among the improvements with the Hägglunds drives is the stepless adjustable speed. Although Futamura runs its churns at fixed speeds, the variable speed is used to ramp the drive up or down, rather than starting and stopping the churn abruptly.

“Effectively, this is like a big paddle mixer inside a vessel,” Green explains. “Being able to start and slowly increase the rotation increases longevity of the paddle, the shafts, the coupling – everything.”

“Ramping is kinder to the churn itself,” Asbridge agrees, “and there are parts of the cycle where we don’t have to stop now. Previously we had to stop the motor, wait, allow the changeover of the gearbox, then restart. Now we don’t have to stop the electric motor at all. We just ramp the pump down to zero, change the speed and then ramp it back up again. So it’s reduced the time for speed changes a lot, and any time we can save is very useful.”

### CERTAINTY MEANS GREATER SAFETY

Safety has also improved with the Hägglunds solution, especially at the point when alkalized crumb is added to the churn. To prevent the creation of other hazardous areas down the line, operators need to know that enough crumb has been added.

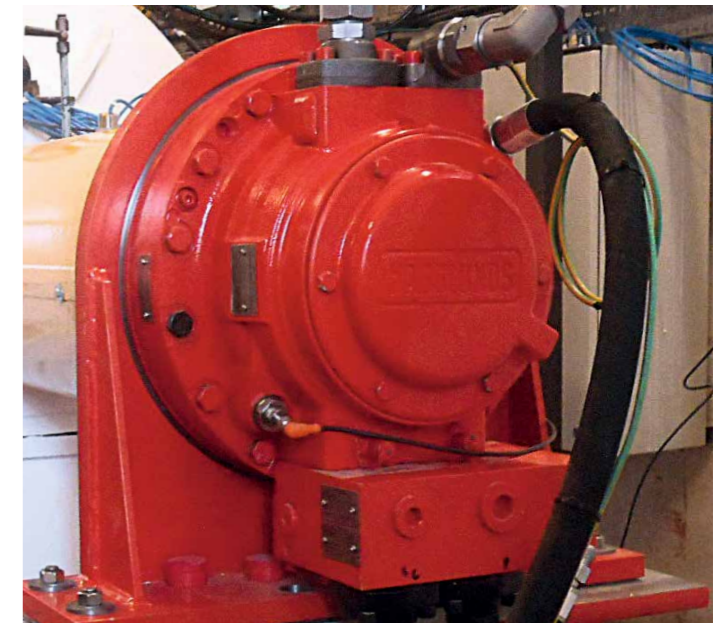
“Previously we checked the level by monitoring the load on the electric motor, but the losses from the gearbox and couplings meant the difference was just a few amps and difficult to see,” Asbridge says. “Now we monitor the hydraulic pressure, and there’s a distinct change – around 35 bar of pressure for an empty churn, and around 100 bar when it’s full. You see that change because the hydraulic motor is directly connected to the churn shaft. It’s a hundred times better.”

### A HIDDEN PROCESS ISSUE BROUGHT TO LIGHT

In fact, switching to a direct drive solution revealed an issue that Futamura had not previously been aware of. After the first Hägglunds drive was installed, the churn began stalling when the vacuum was applied.

“We didn’t see this with the electromechanical systems, because the gearboxes hid the problem,” says Asbridge. “But cross-checking the motor load showed that this had been happening all the time. With the hydraulics, because there’s no gearbox in between, the spike change is significantly bigger.”

Once the issue was apparent, it was easily resolved through the flexibility of the control system. The drive now automatically stops, ramps down, restarts and ramps up, which usually provides the torque to overcome the problem. Operator intervention is only required after a third stall. “The drive has improved our understanding of what’s actually taking place in the process,” says Green.



### CLEARLY PART OF FUTURAMA’S FUTURE

As Futamura nears the implementation of all ten Hägglunds drive systems, the two engineers are very pleased – not only with the results but also with the process.

“The collaboration with the Hägglunds team is very good,” says Green. “The person who comes on site to do the installation and commissioning is the same one who handles the ongoing maintenance, so we have a close relationship already.”

If anything, the two would like to see even more Hägglunds systems on site. “There are other places where we’ve got legacy electromechanical systems and old gearboxes,” says Asbridge. “From my point of view, I’d like to install Hägglunds drives anywhere we can think of!”

“I have to concur with Shaun,” says Green. “There are a lot of applications where Hägglunds solutions could help us.”