Maintaining and optimizing cooling and temperature control circuits

Mission: Pipe free

Framas Kunststofftechnik, based in Pirmasens, produces high-quality injection molded components for the shoe industry. As part of the optimization and renewal of the cooling water supply piping, it was necessary to clean the injection moulding machines and heat exchangers in the system through which cooling water flows. The Comprex process from Hammann was used for this.

In total, there were 30 injection molding machines and two free coolers that had to be cleaned of assembly residues, deposits and contamination before the new piping system was put back into operation. In addition, the temperature control channels in injection molds with a nominal diameter of around 8 mm had to be cleaned separately. The aim of the cleaning was to prevent impurities from entering the new piping system from the existing system parts and to ensure that the new piping system was not contaminated.

Remove assembly residues.

Comprex process in use

Hammann's patented Comprex process was used to clean the cooling and temperature control systems. The process works without chemicals and is based on the targeted use of water and compressed air, which is added in pulses. This creates effective cleaning water blocks with high flow velocities of up to 20 m/s in the pipe or system. Deposits, biofilms and impurities can be effectively removed [1].

A mobile Comprex MCU-300 unit with a corresponding connect box was used to clean the machine and tool circuits, as can be seen in Fig. 1. This combination allows the rinsing water to be recirculated in order to save water.

clean. The Connect-Box filtered the mobilized deposits from the water flow using filter fleece. Figure 2 shows the discharge of mobilized deposits in the filter fleece of this Connect-Box. Finally, fresh water was used to remove residual impurities from the temperature control systems and to condition them before recommissioning after conversion.

A large Comprex unit was used to clean the two free coolers in the outdoor area and the piping of the main circuits due to the larger nominal diameter [2]. This Comprex unit in the form of a trailer has its own compressed air generation, preparation and supply. As a result, it works autonomously and therefore enables the main circuits to be cleaned and the

Advantages of the Comprex process:

- *Gentle cleaning thanks to low pressures below the system pressure*
- *Low water requirement*
- *Applicable for variable pipe diameters and lengths*
- *Geometry-independent, for example for fittings, nominal diameter changes and branched systems*

View o f the Framas production facility in Pirmasens.

Pictures: all Hammann

Image 1: MCU-300 during cleaning of the tool and machine circuits

Figure 2: Discharge from the mold and machine circuits of the injection molding machines in the filter fleece of the Connect Box

Figure 3: MCU-20 and filter fleece in run-out box

free cooler at the same time for cleaning the tool and machine circuits by a second team of technicians. This parallel operation in shifts - including at weekends if required - minimizes downtimes for the operator.

Cleaning dismantled injection molds

Due to the small nominal width of the temperature control channels in the range of 6 to 12 mm in the injection molds, the MCU-20 mobile Comprex unit is suitable for this application [3]. Depending on the application and requirements, different purchase and rental options are available. The MCU-20 allows several temperature control channels to be cleaned simultaneously. The compact design of the MCU-20 allows mobile use directly on the injection mold. Special cleaning programs for

Different tools are stored in the software and can be selected using the touchscreen control. The selected cleaning program runs automatically. Changing the flow direction ensures optimum cleaning results. After Comprex cleaning, the next program step is to expel the residual water. This is the prerequisite for loading or reinstalling the tool. A decompression box suitable for the MCU-20 ensures the separation of air and water as well as discharged solids. Here, too, mobilized discharge could be collected on filter fleece and examined. Figure 3 shows a new arrangement of the calming bar above the filter fleece next to the MCU-20.

Before cleaning in the factory, Framas brought two injection molds for test cleaning and dismantling.

Tool	1	2	3	4	5	6
Operating time	6 months	6 months	8 months	6 months	10 months	60 months
Flow before cleaning	4.76 l/min	3.33 l/min	3.40 l/min	4.06 l/min	3.37 l/min	1.64 l/min
Flow rate after cleaning	5.72 l/min	3.94 l/min	4.14 l/min	5.28 l/min	4.02 l/min	3.77 l/min
Improvement	20 %	19 %	22 %	30 %	20 %	130 %
Measured values: Framas						

Table 1: Results of tool cleaning with MCU-20

Figure 4: Example of injection mold and mold insert for shoe sole

tration of effectiveness to Hammann's technical center [4]. In these tools, the temperature control channels were previously blown out with compressed air, which corresponds to the company's previous standard procedure. Figure 4 shows such a typical tool. The test cleaning took about 10 minutes in each case and, in addition to suspended turbidity, also produced solids that could be collected in the filter fleece of the decompression box, which can be seen in Fig. 5. The flow rate at the same pressure serves as a parameter for the condition of the temperature channels in the tools. Measurements before and after cleaning showed significant improvements. After instructing the staff of the Pirmasens-based company in the operation of the MCU-20, various tools could be cleaned on site. Hammann presented the MCU-20 for a period of one week. Table 1 shows the results using the example of six selected tools. Depending on the operating time, the deposits were differently pronounced. Comprex cleaning showed significant improvements in the flow rate of up to 130 %. "The results of cleaning with the Comprex unit are very good, and in some cases it was even possible to remove blockages. Thanks to the simple operation, we were able to operate the unit safely after a short briefing. There were no problems during the test phase, so we were able to end the test with a positive overall impression," summarizes Oliver Leis, Technical Manager Injection, Framas Kunststofftechnik.

Wide range of applications

The tasks for cleaning with Comprex technology at Framas were diverse. They ranged from existing and newly built pipelines of the cooling and temperature control system, including free coolers, to machine circuits in injection molding machines and temperature control channels in injection molds. While a large Comprex unit with its own compressed air generation, preparation and supply was used for the main circuits with two free coolers, a mobile MCU-300 Comprex unit with a corresponding Connect Box was used to clean the machine and mold circuits. The MCU-20 mobile Comprex unit is suitable for cleaning the temperature control channels in the 6 to 12 mm range in the removed injection molds. •

Literature

The bibliography can be found in the online version of the article at plastverarbeiter.de

Author:

- Sven Kopp, *Senior Key Account Manager Industry*

Contact:

- *Hammann, Annweiler am Trifels info@hammann-gmbh.de*
- *Framas Plastics Technology, Pirmasens info@framas.com*

Figure 5: Discharged solids from injection mold on filter fleece