FAMOR raises plunger cooling to newer heights of excellence

Today plungers in automatic high-capacity glass presses with twelve or more stations come as increasingly inadequate - whether the presses have just one station or whether they're automatic, with up to six. All get cooled from within by a flow of water. Yet despite the use of this method in both crystal manufacturing and technical glassware production in general, such excessive cooling is evidently unsatisfactory for fields of application that are so specific and usually have small production runs besides. Nowadays, indeed, externally-applied compressed air is the preferred cooling method for press plungers, both in single station presses and in those that are automatic and have up to six stations.

CURRENT PAIN POINTS

The procedure has various notable disadvantages. Firstly, it necessitates a high energy consumption. And not only. The noise generated by both compressors and nozzles often reaches a level that's unbearable for operators. Secondly, productivity is hardly enhanced by the constant nozzle adjustments and required cooling air volume. Thirdly, this method involves an intricate system of ducts and pipework that obstructs both access to the machine and view of the work-

With plunger cooling systems being a must for many automatic presses, GMP&A recently contacted FAMOR for some first-hand impressions on the advantages of the company's new automatic plunger cooling system.

ing area itself. Other pain points come with air current adjustments, which are entirely left to the skill and experience of the operator. S/he will usually set the temperature to the lowest possible level, given that an overheated plunger will likely stick to the glass and even need dismantling – all to the detriment of glass quality, which comes best when temperature is at its highest. Here, too, quality is negatively affected yet further by unavoidable fluctuations in plunger temperature.

NEW COOLING SYSTEM REQUIREMENTS

To best avoid the above-mentioned disadvantages, an improved plunger cooling system would need to offer the following features:

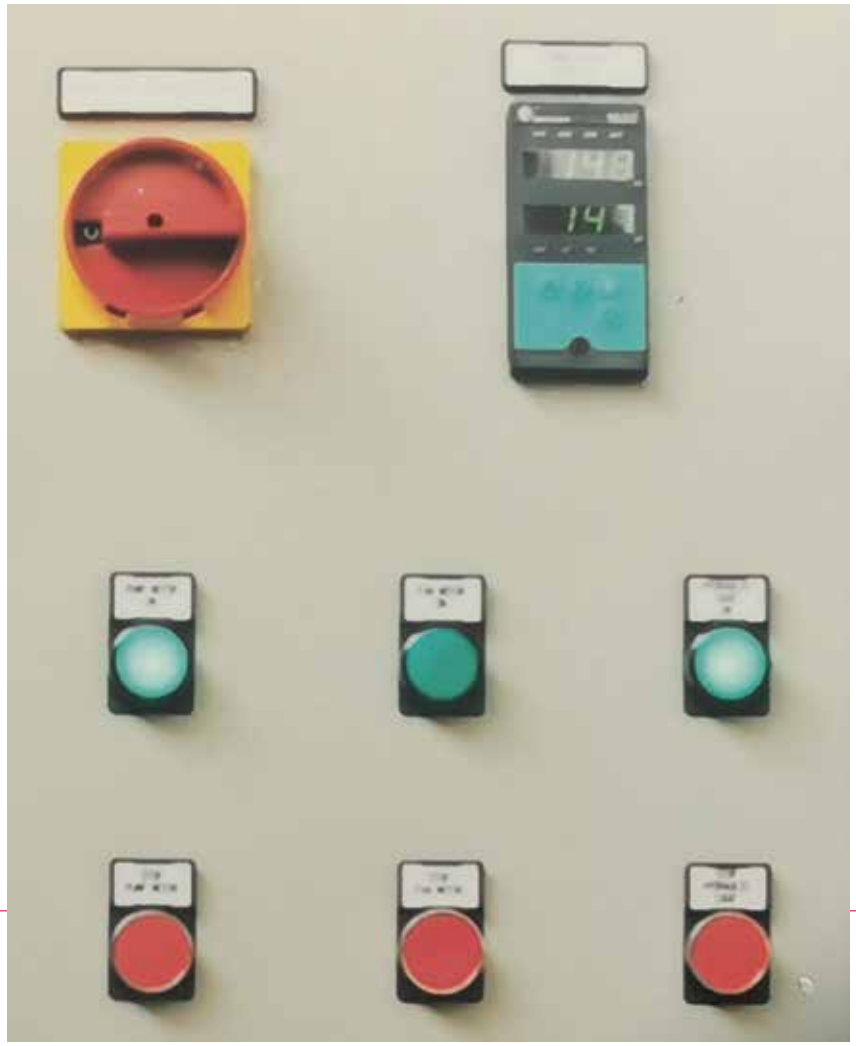
- Maintenance of a constant plunger temperature at a given level;
- Lowering of noise pitch to acceptable indices;
- Reduction of running costs using water as cooling medium;
- Plunger cooled from within;
- Reduction in technical measures to be taken, with necessary investments brought to a reasonable level;
- Guaranteed automatic monitoring of the plunger temperature.

For Famor Engineering, these mandatory requirements have resulted in development of the APCS (Automatic Plunger Cooling System) which, in practical applications, has proved itself exceptional.

DESCRIPTION OF FUNCTIONALITY

A thermocouple element gets inserted into the plunger to measure temperature near its outer wall at a spot where contact is made between the plunger and the glass. The values recorded are then checked and processed by an electronic unit which regulates proportions. Should temperature exceed what's been preselected, the cooling medium is passed to the plunger, with supply interrupted only once the plunger has cooled again and the temperature has dropped below the rated value.

In practice, maximum temperature fluctuations from the rated value have been verified to never exceed 10°C. Here, even under such unfavourable conditions as those of borosilicate glass, the fluctuations -as read off the regulating unit- will just slightly exceed that tolerance level. Any short-term interruption of the working cycle has only a modest effect upon cooling, given that it will be instantly cut-off in the event of temperature dropping below the rated value. Soft water leaving the plunger is then evacuated by a hose. As for the two IN and



OUT hoses, both are equipped with quick-coupling fixtures which facilitate set-up and dismantling of the plunger.

NECESSARY MODIFICATIONS

The plunger gets bored out (i.e. diameter increase) and fitted with an insert that very precisely controls all flow of the coolant while also being used to potentially exclude the upper plunger section from the cooling effect (the top drinking glass edge, which is almost invariably too low in temperature). For the interior layout of the modified plunger, the cooling medium is supplied through the centre pipe, leaving through the cavity. A recess is used for preventing a drop in temperature by the cooling medium in the upper section of the plunger. With considerable experience in the modification and conversion of plungers, Famor Engineering -as producer of this system- has already signalled that it remains at the disposition of customers in terms of making drawings available or undertaking plunger conversions for an appropriate charge.

ADVANTAGES

- Maintenance of a constant and controlled temperature will greatly reduce the number of rejects attributable to over- or under-heated plungers;
- There's no need for constant cooling readjustment, thereby saving work time and relieving operators of a considerable burden;
- Intensive cooling allows for high working speeds (cycle times);
- The ingenious plunger modification (insert) ensures a uniform temperature over the entire exterior surface of the plunger;
- Precise temperature control allows for constant operation which yields optimum quality (improved surface finish, cracking prevention) and, to a certain extent, a reduction in wall thickness (thus saving in material) as well as improved appearance of drinking glasses, particularly at the rims.

FIXING THE GUIDE RING

In automatic presses today, the guide ring is normally left on the spring cage – a method that's mostly unusable for single station presses, given that external plunger cooling will also cool the guide ring. As a result, this will cool to an unacceptable level, especially because so little heat is transferred from the pressed article. The guide ring is therefore left on the mould and only lifted from it once the pressed article has been removed. In some cases, the guide ring is given additional heating between press cycles - a somewhat unproductive procedure rendered obsolete by the plunger cooling described above. The guide ring now remains on the plunger, its temperature being constantly adjusted to that of the plunger. The free play between plunger and ring can thus be reduced to an unprecedented degree – a system which results not only in improved product quality as it also prevents seizing of the ring upon the plunger (due to the difference in temperature between the two parts). Here, a saving of the time previously required for setting-up and dismantling the rings remains of greatest importance.

SUMMARY

The new system offers the following trio of key takeaways:

- The above-mentioned automatic plunger cooling system, for automatic glass presses with only a few stations, semi-automated presses and single-station presses, yields improved quality whilst offering a decreased wall thickness of the pressed glass article. This occurs at increased operational speed (cycle time).
- Noise is reduced to an acceptable level.
- The attention of the press operator is no longer consumed by constant checking of the plunger temperature and can instead be diverted to other, more important activities. ■

FAMOR
FAMOR ENGINEERING SRL
Via Avigliana, 3
10040 Cottino-Rivalta (TO) - Italy
Tel.: +39 011 952629
Renato TROTTA
Sales Director
E-mail: r.trotta@famoreng.com
www.famoreng.com