„Optimized hydraulic oil reduces the energy requirement of hydraulic injection moulding machines to a minimum"

Anyone who thought that the optimization potential of the drives of fully hydraulic injection moulding machines was exhausted with the highly efficient servo technology, such as it has been the case with the BOY E-series, was definitely wrong. A series of extensive tests by the BOY engineers have proven that the use of an energy-efficient hydraulic fluid results in further savings in the double-digit percentage range.

In times of rising energy costs and increasing environmental awareness, BOY has already made energy efficiency its central topic in the recent years. After the market launch of the servo motor pump drive in 2008 and with EconPlast - the most economical plasticizing technology available on the market since 2013 - the machine hydraulics has now become the key issue.

Very optimistic energy savers could hardly see the possibility of further optimization potential in the case of the highly efficient E-series, but first positive test results with high-performance-hydraulic-oil delivered surprising results.
A number of test series revealed the enormous potential of the oil, which until today has mostly been seen as a simple consumer good; for many buyers this oil does not enjoy the same reputation as engine oils, whose marketing and optimization have been growing for many years. In order to fully exploit this potential, BOY defined the spectrum of decisive parameters and uses a tailor-made hydraulic fluid for injection moulding machines - the BOY-EconFluid.

Key parameters are above all the kinematic viscosity, the density and the viscosity index. The viscosity determines the flow resistance of the oil in pipes and valves and the indication of the value 46 mm² / s is often too high. A reduction of the viscosity means

also a reduction of the line resistances and thus of the energy requirement of the drive. Above all, however, the viscosity index is of great importance. It has a major influence on the temperature dependence of the viscosity and – in case of the correct choice - ensures a wider range of application of the oil. All these values are perfectly matched with the BOY EconFluid. The optionally available EconFluid has been approved by BOY and can also be used for the injection moulding machines.

Runs like clockwork

In numerous tests BOY could reduce the energy requirement of the drive of a BOY 35 E with EconFluid to up to 10%, which is an enormous saving. Savings of this size cannot be achieved, even with the most extensive design measures in the piping system, such as e.g. the dimensioning of cross sections of hoses, pipes and blocks (limited space).

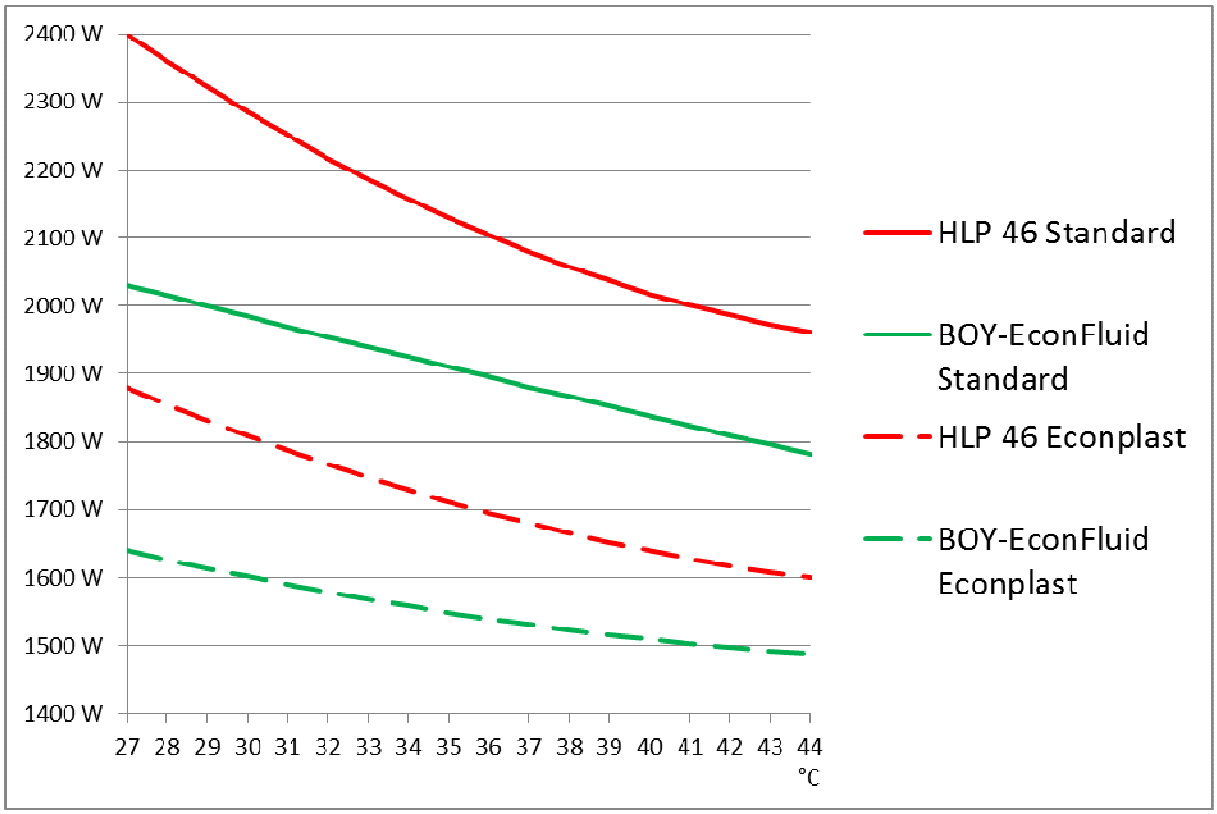

Fig.1: Oil temperature-dependent drive energy requirement of a BOY 35 E with BOY-EconFluid

Figure 1 shows the drive energy requirements of the BOY 35 E in a test cycle based on the Euromap 60.1 using a standard HLP and the BOY EconFluid, depending on the corresponding oil temperature, (standard machine equipment and EconPlast).

At first glance it is recognizable that the energy requirement with EconFluid is significantly lower than that of standard oil. In case of increasing oil temperature the graph is less steep due to the higher viscosity index, the oil thickening is less with decreasing temperature and the oil does not liquefy with increasing temperature to the extent as the standard oil. As a result, the EconFluid can be used at higher and lower temperatures, so that the pre-heating of oil is not always required. This is a time and energy advantage for the user when starting the machine.

In addition to the reduction of the drive energy requirement, the cooling effort for oil cooling is reduced, since the oil is now much less heated and therefore permanently at a lower temperature level. For example, in the case of the BOY 35 E with standard equipment and a low oil temperature of 27 ° C, savings of 370 W in the drive energy requirement could be achieved, which is 15% in this application. At a higher oil temperature of 44 ° C, however, the difference is slightly lower with 180 W, but here, too, almost 10% are achieved. Even an injection moulding machine with EconPlast technology, which includes besides the economical plasticizing unit also the hydraulic optimization measures, achieved considerable savings of 7 to 13%.

The user also benefits from these energy savings in terms of costs: In the present case (BOY 35 E with standard equipment and 37 ° C oil temperature), the annual cost savings for 6.000 operating hours and a fictive electricity price of 15 ct / kWh amounts to 180 €. Thus, the extra charge of the EconFluid for a tank filling pays off within a few months. In addition, the user of the BOY EconFluid can also expect a longer lifecycle, mainly depending on the shear stability of the additives in the oil.

The decision to use the BOY EconFluid must already be made when purchasing a BOY injection moulding machine. A subsequent retrofitting of a machine with EconFluid should be avoided according to the statement of BOY. The technical effort to completely remove existing hydraulic oil from the piping system and to replace it with EconFluid is relatively high.

These findings show that far too little attention has been paid to the "consumer good hydraulic oil" for a long time. Although alternatives for standard oils from various manufacturers have been available, these don’t have much affect on the energy consumption. Whereas the new BOY EconFluid reduces the energy requirements of the drive side of hydraulic injection moulding machines to the absolute minimum. In combination with the servo motor pump drive of the E series and the EconPlast plasticizing system, the BOY injection moulding machines represent the most efficient of their kind and can meet the challenge of a comparison with “fully-electric” competitors.

Axel Ifland,

Master of Engineering

Contact: Phone no: 02683 / 307179 E-Mail: a.ifland@dr-boy.de

25.01.2016

Worte: 825

Zeichen: 6335

Zeilen: 86