

5 MICROPLAST / MICROFLOW

Image selection key  + F3

GRAFIK

MICROPLAST		6 - 1	1996-05-13 14:09	
MICROPLAST	SET VALUE	=	0.0	0 - 999.9 indicators
MICROPLAST	Act val	=	0.0	0 - 999.9 STOP - C1
TOLERANCE	ZONE	+ / -	0.0	0 - START
MEASURING	START	=	0.0 mm r	Yes / No
MEASURING	STOP	=	0.0 mm r	
AUT. SETUP OF PARAMETERS			OFF	
MICROFLOW				
MODE OF CORR	0			0 - 3
	0. . WITHOUT CORRECTION			
	1. . SWITCHOVER PR. + POST PR			
	2. . ONLY SWITCHOVER PRESSURE			
	3. . ONLY POST PRESSURE			
CORRECTION (bar / DIGIT)	=		0.00	0 - 99.99
PLUS CORRECTION	=		0.0 bar	0 - indicators
MINUS CORRECTION	=		0.0 bar	0 - indicators
TOL. ZONE PRESSURE CORRECT.	+ / -		0.0 bar	0 - 999 indicators
HYDR. PRESS. ACT. VAL	PHx =		0.0 bar	
REJECTS FLOW NUMBER			r	indicators
MICROGRAPH		PROG. INTERRUPTION	1	
MICROPLAST				
MICROFLOW				

5.1 MICROPLAST (VISCOSITY MEASUREMENT)

At the program "Microplast" during the dynamic mould filling phase the flow number is determined as measure for the energy consumption at the mould filling process. With given mould filling resistance and unchanged machine setting as well as with constant melt and mould temperature one gets via this rheometric online measurement on the injection moulding machine an information about changed flowability of the plastic melt. Thus different materials can be compared with each other with the same machine setting and with the same mould. Moreover, batch variations of the raw material as well as changing filler content can be recorded via comparative measurements without large-scale incoming goods control. Furthermore, one can recognize processing errors, such as insufficient predrying or different regrind shares. All these changes mostly affect the moulded part (e.g. dimensions, weight).

The required injection pressure with given mould essentially depends on the viscosity and the temperature of the material as well as on the injection speed. Prerequisite is however that during the injection process the set pressure limit "P6" and/or the maximum system pressure is not reached.

Proceeding on the assumption that an injection moulding machine in the fully automatic mode can hold the temperature and reproduce the injection speed, from the hydraulic injection pressure the viscosity (flow characteristics) of the material can be inferred.

When the material gets more viscous, the injection pressure increases, when the material gets lower-viscosity, the injection pressure gets lower.

As the height of the injection pressure at the beginning of the injection process essentially depends on the acceleration of the screw and in the end on the compression of the material, the injection pressure must be measured during the mean half of the injection process.

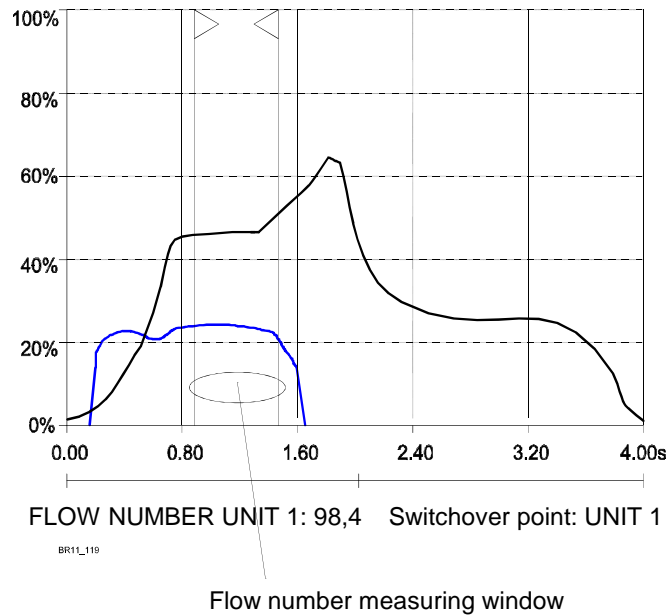
For this purpose two measuring positions must be set on the screen, which are displayed after each injection process if the control unit is equipped with a screen graphics.

The measuring positions must be set so that the flow number measurement is completed approx. 0.2 seconds before reaching the switchover position to holding pressure as otherwise the alarm 87, 'FLOW NUMBER MEASURING TIME' is displayed.

The two measuring positions are preoccupied automatically when the Microplast auto setup is activated (see next item 'Self-setting').

ATTENTION: The two measuring positions are also influenced by the program 'Cushion correction'.

Graphic image with measuring position display for the flow number:



The flow number measurement is switched on when on the screen a flow number set value is given. Via the mean value of the hydraulic pressure between the measuring positions then a so-called flow number is determined. By setting a tolerance in % now a quality monitoring and/or a rejects sorting can occur as a change in the material (e.g. batch change) or a temperature variation (e.g. operation interruption) affects the flow number and thus the quality of the part. If the flow number moves outside the set tolerance, the alarm "REJECTS FLOW NUMBER" is displayed, the piece counter is not increased and the rejects counter is counted up by 1. (The shot counter is increased), but the machine only switches off after the set number of tolerated rejects/hour. By a signal to a downstream unit a rejects sorting can occur.

The flow number tolerance must be set so that only those parts are sorted out which lie outside the fixed quality tolerance.

5.1.1 SELF-PRESETTING (AUTO SETUP FOR MICROPLAST)

Microplast set value, -tolerance and the stroke values for the measuring window are preoccupied automatically.

Starting position:

The machine runs in automatic mode and produces good parts.

Setting process:

The operator switches the screen switch for the automatic parameter setting Microplast to "ON". As long as the program is active, a screen tag is set.

Beginning with the sequence cycle now the following calculation is carried out:

$$\text{delta s} = (\text{metering stroke C1} - \text{C3u}) * 0.2$$

$$\text{C17} = \text{C1} - \text{delta s}$$

$$\text{C18} = \text{C3u} + \text{delta s}$$

After the measuring range for the flow number measurement is determined automatically, at the following cycle the flow number is measured (flow number set value on 99.9; tolerance on 99.9%). At the cycle end the measured actual value is stored as set value and provided with a tolerance of 10%.

5.2 MIKROFLOW

When the part weight or the dimension of a part lies outside the requested quality tolerance due to a change of the flow characteristics of the plastic melt, the flow number value has also changed. The program 'MICROFLOW' now corrects the pressure ratios at the switchover and/or in the holding pressure process indicating a correction factor and a correction type.

MICROFLOW is active due to the input of a correction type.

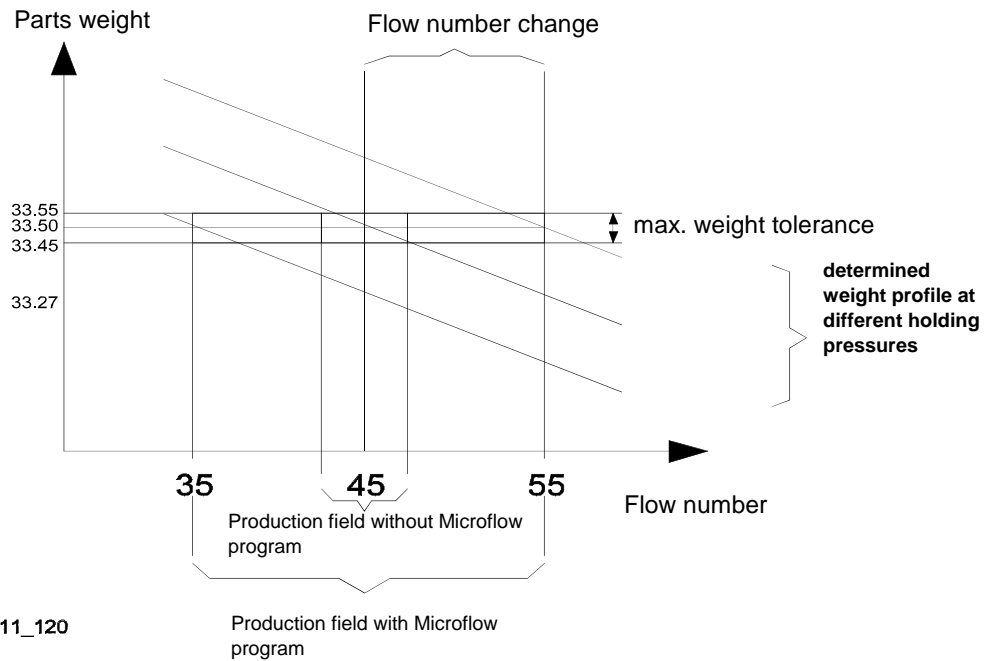
Example:

For the production of a technical moulded part of PP a mean moulded part weight of 33.50 g at a mean flow number of 44.9, a holding pressure of 30 bar, has been fixed with a tolerance zone of +/- 5 digit. After a production of several shifts the machine has gone on malfunction due to 3 flow number exceedings within the input period of 10 min..

The process data (material and mould temperatures on +/- 2 degrees centigrade constant) brought the hint to decreased flowability of the raw material.

The moulded parts ejected last lay with 33.27 g at a flow number of 55.2 clearly outside the fixed tolerance zone.

Speed profile at flow number change



BR11_120

By manual increase of the holding pressure to 35 bar with the same stroke-dependent switchover one has got moulded parts again with the original initial weight. Now the correction factor could be determined:

$$k = \text{Holding pressure change} / \text{flow number change} = 5 / 10,4$$

The production has been continued with the originally optimized holding pressure and corresponding Microplast and Microflow settings.

By the input of a tolerance zone for the pressure correction mould damage is avoided with wrongly set correction factor or flow number set value. It is run with the set holding pressure when the calculated correction is larger than the set tolerance. In this case the screen tag 'Rejects - flow number' lights up. The part is valued as rejects.