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LABOR PRODUCTIVITY IN INJECTION MOLDING PROCESS

Gheorghe Radu Emil MARIES[1], Dan CHIRA[2],
[1]University of Oradea, Romania, maries.radu@rdslink.ro
[2]University of Oradea, Romania, dchira@uoradea.ro

***Abstract*—** The productivity of an injection molding machine is the quantity of parts made in unity of time on a particular model of mold. The quantity of injected parts in unit time is directly proportional with the injection cycle time. The cycle time is composed of filling time, opening-ejection-closing time, cooling time inside the mold. Of these three time, the first two are constant values. Filling time depends by the rheological properties of thermoplastics, and the opening-ejection-closing time depends by mechanical characteristics of the injection molding machine. Cooling time is variable and is determined by the shrinkage of injected molded piece, or deviation from nominal dimension. Low value of shrinkage cause a higher quality of injection parts, but lower values for productivity.

***Keywords*—** cycle times, injection molding process, injection molded piece quality, labor productivity,

I. INTRODUCTION IN INJECTION MOLDING TECHNOLOGY

Injection molding process involves placing under the pressure of plastic melt inside the mold cavity, where after cooling time take the form of processed cavity.

Injection molding process is a cyclical phenomenon. The main phases of the injection cycle, without clearly defined, are:

- dosing stage,
- melting the plastic material,
- mold closing,
- placing under the pressure of melting inside the mold,
- cooling and solidification of melting inside the mold,
- opening the mold and molded part removal,

The graphic of screw motion and mold motion are represent in fig. 1.

II. THEORETICAL ASPECTS OF LABOUR PRODUCTIVITY IN INJECTION MOLDING PROCESS.

The labor productivity of an injection mold machine is the amount of injected parts performed in unit time on a particular model of mold. In mold should be taken into account the number of processed cavities, total volume of cavities and injecting network. All this, add up, will determine the default volume and mass of injected melt. Depending on the amount of injected melt will be different levels of labor productivity.

Working time calculation in injection molding process will be made by summing up time for each phase, added time for production preparation-wind up of production. In the injection molding process, preparation-wind up time is composed from time needed to heat the cylinder, and if necessary, time for change the thermoplastic material, or the color.

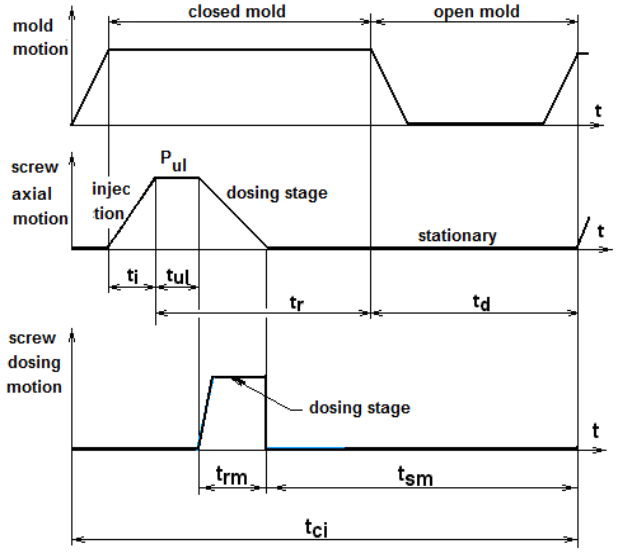

Fig. 1. Screw and mold motion graphic.

Preparation-wind up time is divided to the total number of injected parts proposed for manufacturing, having relatively small values.

Time scales, n_t, to produce one piece is given by the formula:

$$\mathbf{n_t = t_{pw} / n_{p.lot} + t_{ci} / n_c} \quad (1)$$

where: - t_{pw} – preparation-wind up time,
- $n_{p.lot}$ – number of injection parts,
- t_{ci} – injection cicle time,
- n_c – number of holes from the mold,