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Electric Injection Molding Machine with New Process Technology and Linear Motor Drives

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For manufacturing parts with optical properties or thin walled parts the injection unit of the injection molding machine has to fit some special demands. To ensure an high quality standard the unit has to offer good dynamics in conjunction with best reproducibility. Standard reciprocation screw systems have system-dependant disadvantages in this field. One disadvantage among others is for example the longitudinal varying melt quality due to the discontinuous operation mode and the decrease of the effective screw length. The technology of the new injection molding machine completely separates the processes of plasticizing and injection. This is achieved by using a continuously rotating single-screw extruder, located above the plunger injection unit, and an melt accumulation/conveying unit. Running in auto cycle this device stores the polymer melt plasticized during injection and holding pressure phase. After injection and holding pressure are finished, the polymer melt flows gently but fast into the injection cylinder. The polymer plasticized by this time is lead directly through the melt accumulator into the injection cylinder, so that continuous operation of the plasticizing unit is possible. In comparison to discontinuously operating reciprocating systems, here one gets more degrees of freedom in designing the injection system to the desired characteristics, furthermore this technology supports the application of alternative drive systems. In fact the new injection molding machine uses four combined linear motors as drive for the injection stroke, that are characterized by its maximum precision and dynamic performance. Both are strong criteria that can have a great effect on the expectable product quality. The developed an built prototype will be introduced and results of comparative investigations to the above mentioned topics are presented.