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A REVIEW OF METALLIC MATERIALS USED FOR MANUFACTURING SCREWS OF EXTRUSION MACHINES AND METHODS OF INCREASING THEIR DURABILITY

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Keywords: metallic materials for screws of extrusion machines, steels for nitriding, heat resisting steels, tool steels, stainless steels, surface treatment

The article presents a review of metallic materials used for manufacturing screws of extrusion machines. The aforementioned materials are characteristic for their high resistance to abrasion and mechanical load occurring during the operation of the extrusion machines. Moreover, no adhesive tack between the ridges of screw gears and the inner surfaces of the cylinder occur. The screws are usually manufactured from steels for nitriding, heat resisting steels, tool steels and stainless steels. In the study an analysis of the chemical composition and mechanical properties of the most commonly used material types was conducted. Among those, the following types of steel for nitriding, in accordance with the standard PN-EN 10085:2003 can be distinguished: 34CrAlNi7-10, 34CrAlMo5-10, 31CrMoV9. The type of heat resisting steel used for screws of extrusion machines is 14CrMoV6-9 according to the standard PN-H-84024:1975 (withdrawn without replacement). The most commonly used tool steels are X37CrMoV5-1 and X153CrMoV12 according to the standard PN-EN ISO 4957:2018-09. Among the stainless steels of the standard PN-EN 10088-1:2014-12 the steels X90CrMoV18 and X39CrMo17-1 are used in the production of screws. The study also presents methods of increasing the durability and strength of the screws of extrusion machines, including surface treatment processes. Among those processes there are: hardening, surfacing and coating, as well as thermochemical treatment in the form of carburizing, nitriding and sintering.

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