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TECHNOLOGY FOR MANUFACTURING TWISTLOCKS FOR A SPREADER BY CASTING IN SAND-CLAY MOLDS

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The paper deals with the twistlock system of the spreader and the container. The twistlock system is becoming more widespread in container handling in ports. The twistlock is designed to lock the container to the spreader. This is an important element that makes it possible to transport containers in a variety of ways. The problem with twistlocks is the brittleness of the material they are made of.

The main reason for twistlock failure is pin breakage. The pin or rod wears under repeated/cyclic loads losing its strength characteristics and breaks after some time under repeated loads. This negatively affects the rating and performance of the container shipping company.

In this study, 38Cr2H2N2MA steel was chosen as the pin material. The material has good strength characteristics. Structural alloyed chromium-nickel-molybdenum steel 38X2H2MA is used for the manufacture of heavily loaded large parts with a complex configuration, used after thermal improvement of the material - connecting rods, shafts, studs, bolts, other products. Steel exhibits no temper embrittlement.

Sand-clay mold casting was chosen as the method of manufacturing the pin. So far, the technology of sand-clay mold casting has been improved. This helps create better molds and not spend a lot of money on both one-off and mass production. With this manufacturing method, it is easier to make a mold for casting. Less metal is consumed to make one pin. During further machining, fewer chips are removed. More parts can be produced due to less material consumption during pin manufacturing. For manufacturing companies, this will result in lower production costs, and for customers, it will have a positive impact on the cost of purchasing products as well as the cost of repairing equipment.

The SOLIDWORKS software was chosen to create the pin. This software is a good tool for design and research tasks. A three-dimensional solid model of the workpiece was created using this software. Loading simulations were also performed. For the simulation, a workpiece material was selected. To obtain more accurate data, a fine grid was added. Besides, pressure forces were applied to certain surfaces, and the calculation was done in tension. Based on the data obtained, the pin was modified and a sand and clay mold was developed for it, taking into account the features for creating molds for casting parts.

In the future, the calculations obtained with the software and the calculations obtained after loading of the real part will be compared. After comparative analysis of the results, the next steps in the study will be set.