



# NATIONAL METALLURGICAL ACADEMY OF UKRAINE

## ENERGY EFFICIENT THERMOMECHANICAL THERMAL TREATMENT (TMTT) - TECHNOLOGY FOR MANUFACTURING HIGH STRENGTH THREADED SCREW PRODUCTS

### Purposes and implication

The technology allows to manufacture thread rite screw product from low-carbon or low-alloy steels such as bolts, screws, pins with strength limit over 800 MPa in threaded joints in machine building, motor industry and other industries.

### Key characteristics of the developed technology

TMTT-technology has the following stages: 1- thermal hardening of raw materials (contirod); 2 – product hardening by cold strain during the manufacturing process; 3 – hardening of a final product by tempering. The technology allows to receive products with better consumer characteristics (high strength level) and reliability (high level of plasticity) with lower costs of production due to implication of ordinary steel grades and reducing costs for thermal treatment (include annealing of a work piece and bolt re-heating for hardening).

### Comparison with the world analogues

TMTT-technology allows to produce thread rite screw products with the strength level 8.8 and 9.8 according to the world standards (ISO 898-1: 2013) and to reduce energy consumption and production cost (up to 20%) due to withdrawal of tempering operations and hardening final products that makes the technology competitive in the world market.

### Intellectual property rights protection

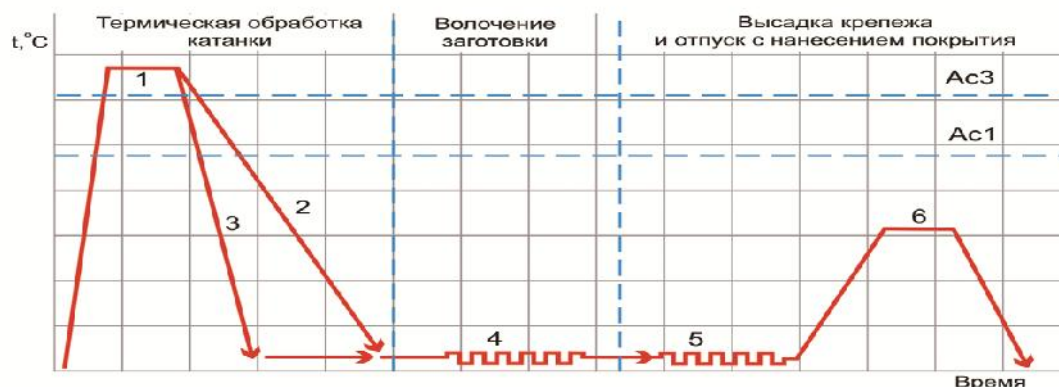
Three patents for the utility model registered in Ukraine.

### Market demand

The demand for threaded products with the strength level 8.8 and 9.8 is hundred thousands of tons.

### Availability of the technology

Technology parameters have been designed. Industrial testing has been conducted in PrJSC "Dneprometiz", a batch of bolts with the strength level 8.8 and 9.8 has been manufactured.



The scheme of TMTT-technology production of high strength threaded products

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