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Numerical Simulation of Plastic Deformation Process of the Glass Mold Parts

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Abstract

In our present days numerical simulation became an important tool of engineering. Numerical simulation methods allow quantitative examination of the complex processes and phenomena in the general area of physics and also provide an insight in their dynamic evolution and even can become important tools for the discovery of new phenomena. In essence, the numerical simulation transfer important aspect of physical reality in discrete forms of mathematical description recreates and solves the problems on computer and finally, highlights issues that the analyst required. This modern numerical method approach, attacks the original problems in all their details on a much larger platform with a much smaller number of assumptions and approximations, in comparison to traditional methods. Transposition of the physics problems in the virtual space, governed by the force of computers, numerical simulation - as scientific approach - is becoming increasingly interesting for many fields of research. Basically, by means of numerical simulation are addressed fields such as mechanics deformable solids, fluid mechanics, aerodynamics, biomechanics, astrophysics. Numerical

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simulations follow a similar procedure to all the scientific approach, which consists in going through several stages, as follows: the phenomenon, the physical model, mathematical model, discrete model, and coding, numerical solution. In the plastic deformation of metals are involved, besides the mechanical properties and some thermal properties because even if the process is applied in the initial state to a cold material, along the process changes occur because of friction between materials and tools and transformation of plastic mechanical work into heat. Basic mechanical properties of the materials are underline through characteristic diagrams of materials obtained in simple tests of traction and compression. These tests were carried out in the Polytechnic University of Bucharest, Romanian Research & Development Institute for Gas Turbines COMOTI, Institute for Calculating and Testing Aero-Astronautic Structures STRAERO, SC UPS PILOT ARM Ltd, and Asachi Technical University of Iasi. To achieve the major objectives of the numerical simulation of the technological process of cold plastic deformation, are incorporated into the physical model three types of surfaces: cylindrical, conical and profiled. The sizes of the initial geometry were established in accordance with the basic dimensions of processed products by this method. For delimiting surfaces to be machined, the addition of grip (the tail) has a reduced diameter. Geometric models provide strength and rigidity needed for safely and accurately processing technology of cold plastic deformation. Geometric models and specimens which had been subjected to tensile tests, compression and hardness were made in the Glass Factory, Chisinau, Moldova.