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DEVELOPMENT OF THE BUILDING BERTH

In this article the construction of a building berth and technological process of mounting of stabilizers to the casing of model of the rocket by a building slip method is presented.

Keywords: *building berth, mounting of stabilizers, rocket model.*

One of the tasks of rocket modeling is achievement of maximum height of flight. For execution of this task it is necessary to provide steady flight of the rocket that is reached due to increase in an inventory of stability, and also by presentation of more strict requirements to assembly of the rocket. High-quality mounting of stabilizers in many respects influences these factors.

The technology of creation of rocket model is not really difficult, and it includes winding of the casing and cutting of stabilizers made from composite materials. Also it comprises creation of a head part, casing assembly, i.e.

association (mounting) of stabilizers to the casing. Accuracy of execution of each element and their connection together provides reliability of the rocket and its flight. The stabilizer is called an aerodynamic surface, serving for ensuring of longitudinal and directional trim, and in certain cases and for controllability of the rocket. There is a large number of forms and the sizes of stabilizers. The casing and stabilizers from composite materials have thin-walled structure. It is worth marking that the error in case of assembly of the rocket casing carries to demolition of model during its flight. Mounting of stabilizers is executed by two methods:

1. A method of manual assembly when the stabilizer and the casing splice are pasted together without special adaptation, so to speak "on hands",

2. A method of building slip assembly when the casing and the stabilizer are fixed among themselves by the special construction called a building berth. [2, p. 33-34]

Building berth is a platform for construction of any object of the required assembly. Building berth is better known and it is used in shipbuilding, it provides descent of the vessel to water. In a creation of the rocket model the building berth aligns and places stabilizers relatively to each other under a certain angle. Requirements which are imposed on a building berth in the place of a joint of the stabilizer and casing the building berth. Firstly, should provide vertical provisions of combinable details, secondly, should provide that the lower edges of stabilizers laying in one horizontal plane, and thirdly, should provide the given angle between stabilizers.

There is a form of the stabilizer thickness of t (fig. 1) which provides the given inventory of stability. The parametric model of a building berth was developed for this type of stabilizers.

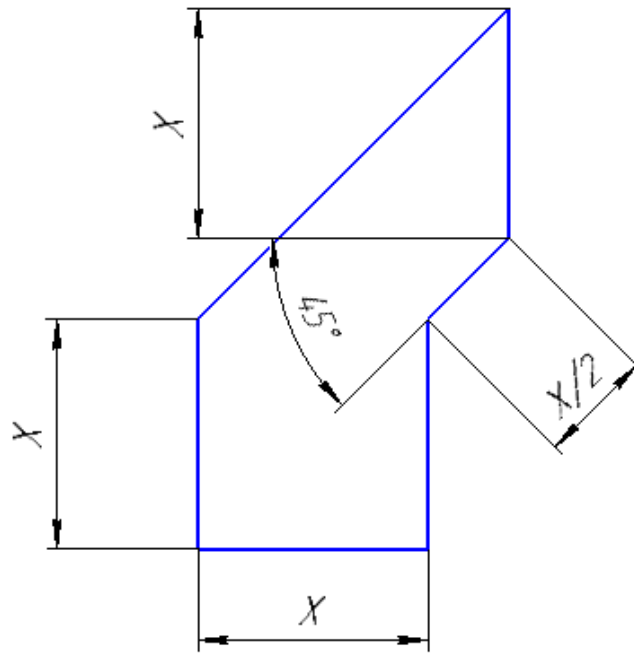


Fig.1 The parameterized draft

The building berth consists of two parts: from the fixing stand (fig. 2) and four grippers (fig. 3). For design process automation a building berth has been parameterized in a packet the Compass-3D. Its sizes depend on the following indices: from an inside diameter of the casing of the rocket D , from casing wall thickness T , from stabilizer thickness t , and from the value of X defining stabilizer geometry. After determination of these parameters, the Compass-3D occurs evolution of the parametric models of a building berth in a packet provided in a figure 2, 3.

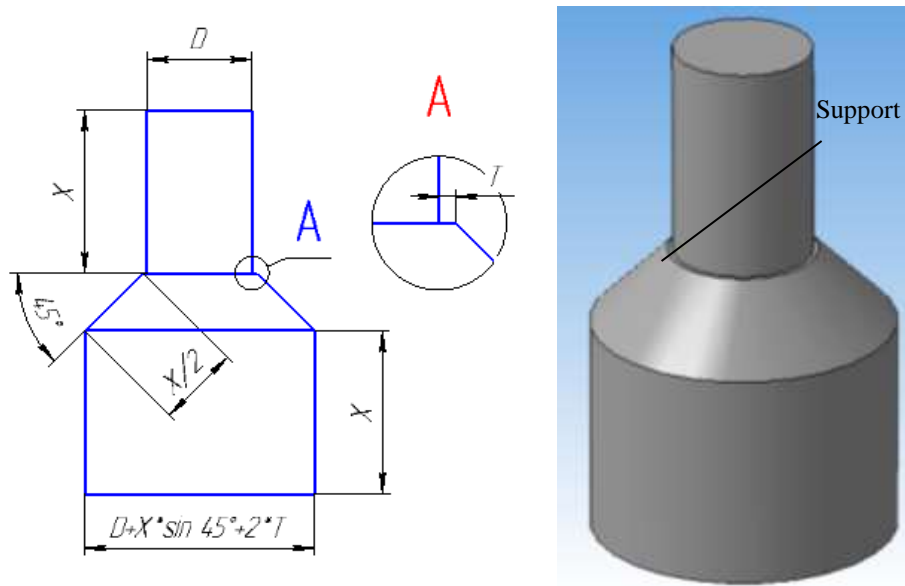


fig. 2 Fixing Rack

a – the parameterized draft, b - model in the Comp

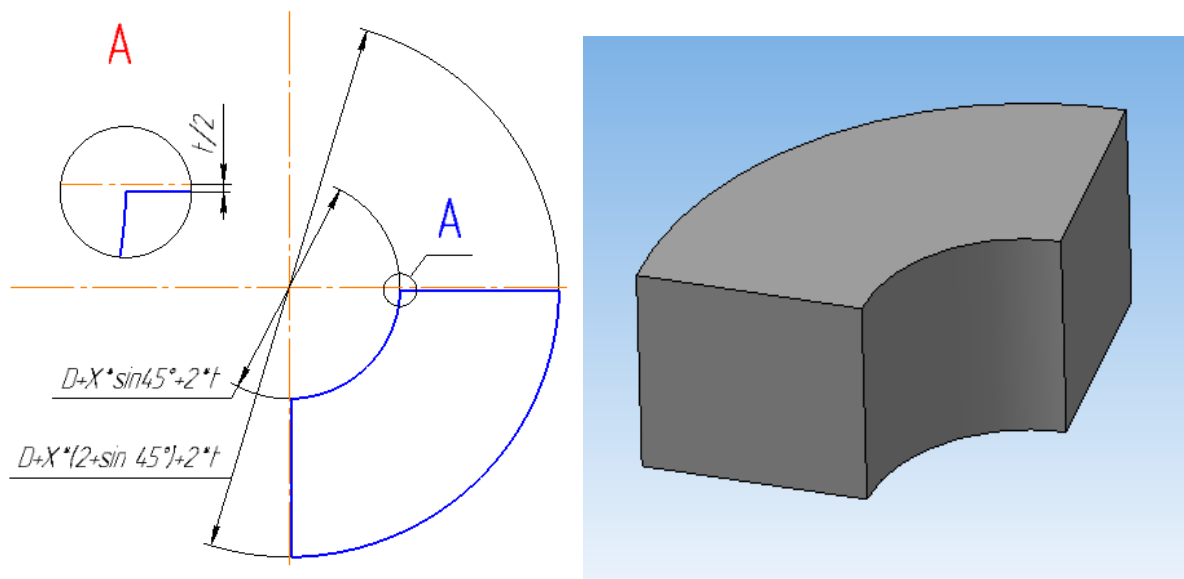


fig. 3 Gripper

a – the parameterized draft, b - model in the Compass-3D

Then on the received model, the drawing is created, and elements of a building berth are made on the milling machine with numerical program control, for more exact manufacture of details. [1, p. 45]

In case of direct mounting of stabilizers, the casing of the rocket is set on the fixing stand against the stop (fig. 2, a). Behind that, there is a stand to put grippers, notches where stabilizers are inserted in between formed. (fig. 4)

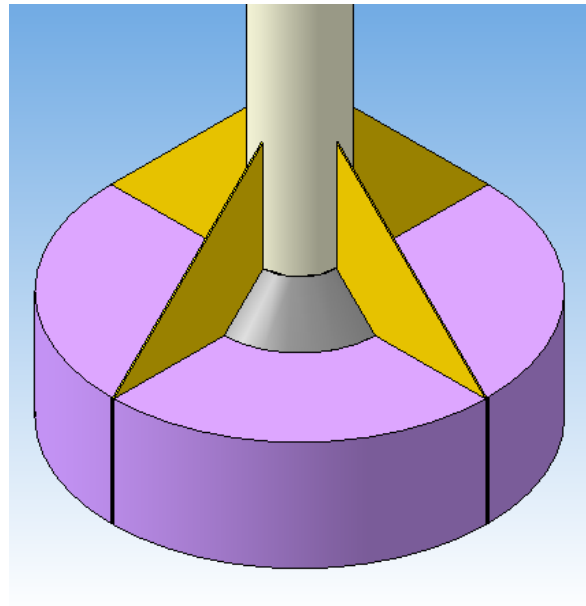


fig. 4 Mounting

After fixing of all construction, to the place of a joint of the stabilizer and the casing of the rocket the glue is created on the basis of a cyanoacrylate ester with adding of a carbonate of sodium. Owing to a setting of glue the permanent connection.

Thus, the parameterized building berth model allowing to create direct glue joint which provides the given relative positioning of stabilizers among themselves is developed. Glue joint gives the ability to refuse fixing connections that simplifies assembly and balancing of the casing of the rocket model made from composite materials.

In the long term, there are plans in development of the universal building berth which will be suitable for any sizes of stabilizers and diameters of the cases.

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