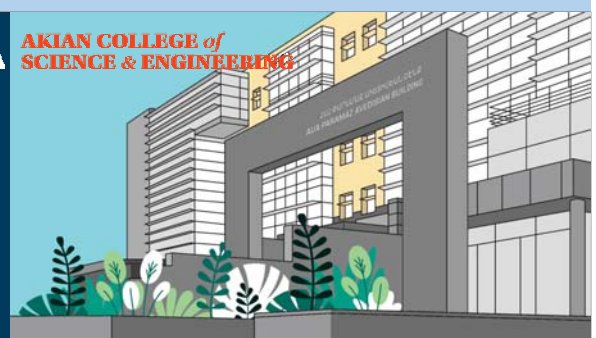


Blow Mold Design for Borjomi Glass Bottle

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Software: Pro/ENGINEER Year:2007



Introduction

This is an international project. A Georgian mineral water company, Borjomi, ordered Byureghavan's "Glass World" CJSC to manufacture glass bottles. "Glass Water" uses modern Italian equipment, and Russian specialists work there as the representatives of the Italian Company. We used a prototype bottle and its sketches to design the blow mold of the bottle - a typical reverse engineering project.

Design of the Master Model

The first step of the project was the modeling of the glass bottle based on the drawings provided by Byureghavan's "Glass Water" CJSC. This virtual bottle (Fig. 2) should later serve as a reference model to design the mold pieces. You can notice that there are many features on the bottle that require the utilization of some advanced Pro/ENGINEER techniques and tools. Some of them are represented in the pictures below:

- ✎ The proud engravings of the Borjomi label are built by projecting the flat geometry of the label onto the surface of the bottle and raising the projected figures by the given height. The sharp corners of the engravings were rounded using an advanced round feature (Fig. 3).
- ✎ The recessed engravings are modeled in two steps: first, an auxiliary model with proud engravings is created just like those for the label, and then the Boolean subtraction is used to get the recessed engravings on the bottle (Fig. 4).
- ✎ The bottom stipples are obtained as a result of patterning the master stipple (the white one). The latter is the result of the skew revolution (Fig. 5).
- ✎ The mouth of the bottle is a combination of a helical sweep and revolution features (Fig. 6).



Fig. 1 Photo of the bottle

Fig. 2 3D model of the bottle

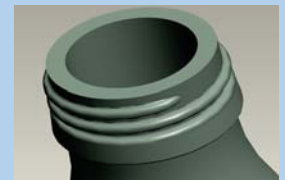


Fig. 3 Proud engraving

Fig. 4 Recessed engraving

Fig. 5 Bottom stipples

Fig. 6 Bottle mouth

Mold Design

We get the mold pieces in the second step. First, we design the workpiece as a whole and locate the bottle inside the workpiece. The bottle is not only important to generate the cavity within the mold but also serve as a reference for parting surface creation. The parting surfaces are then used to split the whole mass into separate mold pieces. Different techniques are used to create those parting surfaces. For the bottom part, the parting surface is obtained by revolution (Fig. 7). And for the side parts the bottle faces are copied and extended to the workpiece boundaries (Fig. 8).

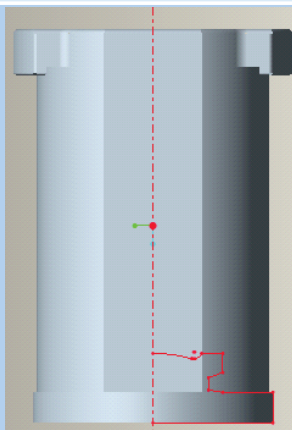


Fig. 7 Creating the revolved surface for the bottom part

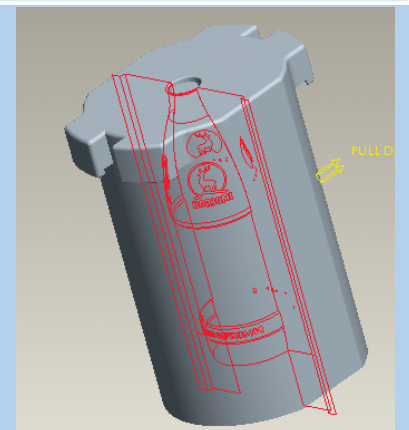


Fig. 8 Copying the bottle face and extending to split the remaining workpiece into side pieces.