MANUFACTURING TECHNOLOGY OF SOUND-ABSORBING PANEL MOLD CASTING

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Abstract

Studying sound-absorbing panels for indoor ambient environment noise attenuation aims to improve the noise absorption phenomenon by analyzing the design process of plaster sound-absorbing panel casting molds. The coffered plates, ceilings and upper surfaces made of plaster-α, are dense and compact with a separation surface constructed in various forms that can be spray painted with washable paints, airless, aseptic and maintaining the necessary humidity inside the rooms, properties that make them easier to use for specific work of finishing sound insulation. The coffered self-supporting plates, ceilings and upper surfaces are the most suitable to use where a substantial decrease of the noise level is required, being applied on large surfaces. This study presents the manufacturing technology of sound-absorbing panel mold casting.

Key words: sound-absorbing panels, manufacture, mold, noise

INTRODUCTION

For the mold processing, we used the "Machining Center 550PN" mold processing center, in Italy, and the CNC type 3 Sinumerik produced by Siemens, of the Mechatronics Laboratory of the Managerial and Technological Engineering Faculty within the University of Oradea (Ungur P. A., 2010).

Fig. 1. ”Machining Center 550PN” Processing Center

The following technical characteristics were applied for the processing work:

Roughing-finishing speed: 500-800 rev / min
Advance roughing 30 mm / min

Advance finishing 15 mm / min

The main tools used for processing:

- Reamer for outlining: Ø 6mm, Ø8mm and Ø14mm
- Drill: Ø8mm, Ø10mm and Ø12mm

MATERIAL AND METHODS

Figure 2 presents a few pictures taken during the manufacturing of the Al mold by using the processing center.

Fig. 2. Stages of the manufacturing of the Al mold by using the processing center

The casting material is gypsum: 95% plaster-alpha based and 5% perlite, used for light sound-absorbing and heat-insulating coffered panels:

- Setting time: beginning - 11 min
  end - 20 minutes
- 70% water of normal consistency

The Al mold manufactured through the process described above (Figure 3) is used to create a silicone mask in which the gypsum is to be inserted for the casting process.

The gypsum obtained during the previous phase is cast into the silicone mold, which is enclosed by a wooden frame the height of which is determined by the thickness of the future gypsum panel (Pantea I., 2002).

Fig. 3. The Al matrix obtained by machining by using the MC 550PN center

Fig. 4. The silicone filled Al mold for creating the silicone mold

Fig.5. The silicone mold for gypsum casting

RESULTS AND DISCUSSION

The cast plaster form is extracted from the flexible silicone mold and left to dry for 24-36 hours to harden.

Fig. 6. The plaster cast form

The drying is done naturally by leaving the plaster cast form to dry at room temperature, for 48 hours. Subsequent to the drying, the model is deburred and cleaned, if necessary, and then packaged for protection and transportation (Ungur P. A., 2009).

CONCLUSIONS

In this paper, we presented the manufacturing technology of sound-absorbing panel mold casting. The Al matrix was designed by using a SolidWork 2008 type CAD software; subsequently, a Solid CAM type, CAM software was used for simulation.

The actual processing was done by using the "Machining Center 550PN" processing center, in Italy, and the CNC type 3 Sinumerik produced by Siemens. The casting results were very good, thus representing a viable solution to the manufacturing of Al molds used for this purpose.

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