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The acoustic properties of the lecture hall of the Faculty of Building Services in Cluj-Napoca

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Abstract

The present paper deals with the study of the acoustic properties of the Lecture Hall belonging to the Faculty of Building Services in Cluj-Napoca; the hall is dedicated to both teaching activities and used as a national and international conference venue; complex measures to ameliorate the acoustic features of the hall are also envisaged. After performing the acoustic measurements and processing the data found, it was found out that the reverberation time was not situated in the standard range limits and that several measures to improve the hall acoustics were required. The paper presents several proposals to improve the acoustic properties of the hall and a costs analysis of these solutions. The acoustic properties of the hall were determined in accordance with the Romanian standards that are in full agreement with the European norms.

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Keywords: Acoustic measurement; acoustic comfort; Lecture Hall acoustic; reverberation time; acoustic rehabilitation.

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1. Introduction

The present paper deals with the complex study of the acoustic properties of the Lecture Hall belonging to the Faculty of Building Services in Cluj-Napoca, Romania (Fig.1). The hall is dedicated to both teaching activities and used as a national and international conference venue.

Fig. 1. Faculty of Building Services: (a) Main façade; (b) Lecture Hall viewed from the outside; (c) Lecture Hall viewed from the inside.

The building body where the hall is a part was erected between 2005-2007, when the entire Faculty of Building Services was modernized and renovated. Though relatively new, until now no concern for the acoustic properties was given.

The aim of this paper is to draw attention upon the importance of such investigations that are necessary when erecting halls with high levels of acoustic properties. The acoustic properties of the hall were determined in accordance with the Romanian standards that are in full agreement with the European norms.

The Lecture Hall is rectangular in plane, with a footprint of about 260 m^2, the length of 17.65 m, the width of 15.80 m and a maximum height of 8.10 m. The single floor building body where the hall is situated has a structure made with reinforced concrete frames and filler brick masonry. The ceiling is false, made of gypsum panels where lighting bodies and air conditioning air intakes are situated; the windows are with PVC joinery and heat insulating double glazing. There are 311 seats in the hall where lectures, national and international conferences are held permanently. The entrance to the hall is made from a central lounge connecting the area with other bodies of buildings belonging to the Faculty of Building Services.

2. Evaluation of internal acoustics

2.1. Measurement Equipment

The measurement process involved the observance of the requirements in [1]. For the measurement purpose, a high performance acoustic chain was used, built by Brüel&Kjær Company. The equipment used for acoustic

Fig. 2. Images from the acoustic measurements in the Lecture Hall.