ACÚSTICA 2000

TECNIACUSTICA MADRID • 2000

VISIBLE ARCHITECTURE, INVISIBLE ACOUSTICS: A NEW TECHNOLOGY FOR AUDITORIUM DESIGN

PACS REFERENCE: 43.55.Fw

Daniel Commins[1]; Luis Conde Santos[2]; Miguel Lopes[3].
1 Commins Acoustics Workshop
15, rue Laurence Savart. F-75020 Paris, France
Tel: 33 1 47 97 17 02, Fax 33 1 47 97 17 42
E-Mai: comminsacoustics@compuserve.com.
2 Absorsor, Taguspark
Núcleo Central, 269, Lisbon, 2780-920 Oeiras, Portugal
Tel: 351 21 421 45 25, Fax 351 21 421 35 55
E-Mail: luis.absorsor@taguspark.pt
3 Absorsor Norte
R. Eugénio de Castro, 300, sala 219, 4100-225 Porto, Portugal
Tel: 351 22 605 29 90, Fax 351 22 605 29 91
E-Mail: miguel.lopes@absorsor.pt

ABSTRACT

This paper describes how a new absorptive seamless material can be used in the design of auditoria and concert halls so that the acoustical systems necessary to achieve the proper response are invisible. This principle has been applied by Architect Alvaro Siza for the design of the Serralves Museum auditorium: the absorptive and the reflective materials cannot be distinguished; loudspeakers and other devices are also invisible.

INTRODUCTION

Many types of materials have been used in rooms to provide the absorption that may be needed to adjust the response of the room to its function: speech, theatre, music, and so on. Architects often complain that the appearance of absorptive materials are in contradiction with their architecture or that they restrict their freedom of creation.

It is true that perforated or fissured materials may be too present and therefore may devalue the architectural qualities of the room.

Over the years, some techniques have been developed to avoid this and to provide continuous surfaces with a significant absorption coefficient. In most cases, these surfaces are rough; often they are rejected by the architects.

To remedy this, a new material has been developed which, in spite of its seamless and continuous surface, shows an absorption coefficient of around 0.6 over the full musical frequency range. The genesis of this material has been explained at Acústica 98 in Lisbon (1) and at the 2nd European Acoustics Association in Berlin (2). This material has been baptised “Alvaro” and is commercially available.

THE SERRALVES AUDITORIUM

The 280-seat Serralves Auditorium, that was inaugurated in January 2000 in Porto, Portugal, is an example of the acoustical design of a room, which is to be used for conferences, projections drama, classical concerts and jazz, that had as an essential objective to avoid spoiling the architecture.

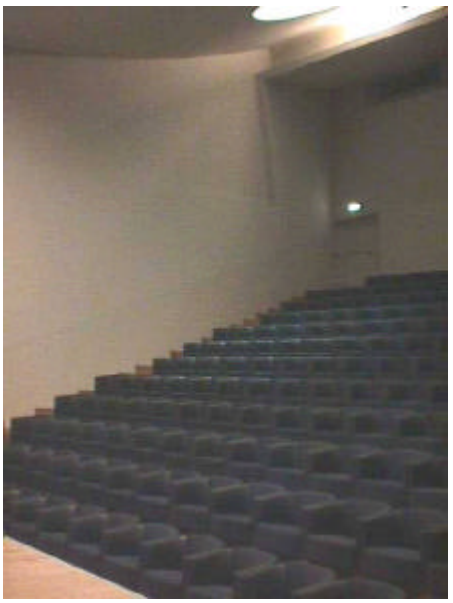
Auditoria built in the second half of the twentieth century are suffering in many cases from poor aesthetics. The elements required for good acoustics are usually pasted upon the architecture instead of being smoothly integrated into it. In the case of the Serralves Auditorium, such a rough method was obviously discarded since the result would have been incompatible with the architecture of Arq. Alvaro Siza.

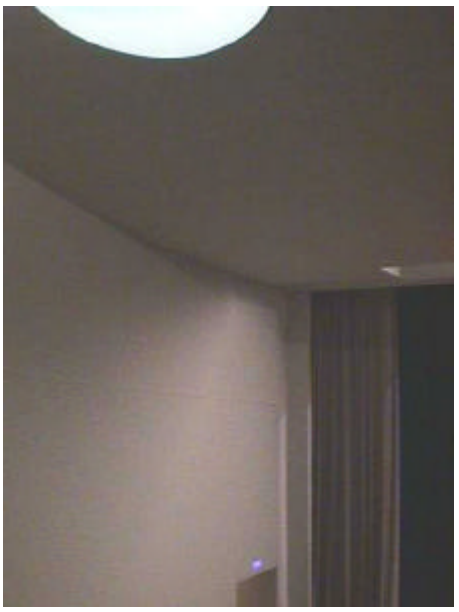
The first picture shows the experimental patchwork built to demonstrate that a uniform surface can in fact hide several components, some reflective, some absorptive.

As one can observe when entering the room, the details that are driving the acoustics are not visible. They are not artificially hidden either. In fact, this result is due to two main features: the shape of the room, which is totally functional, and the use of a new type of surface, which can be, at will, absorptive or diffusive[1]. When observing the walls and ceiling, one can make no distinction between the various components. At last, aggressive objects and perforated surfaces have been eliminated. Even loudspeakers, needed for activities calling for amplified sound, have been imbedded in the sidewalls and are not noticeable either.

The criteria that have been used in the design are not usual either by today's standards: reverberation time is longer than usual but, with the approach followed in the design, one can achieve good clarity and high intelligibility, together with genuine musical quality. Again, this is due mainly to the shape of the hall, which has been optimized with the help of models. Consequently, speech and music both find in this auditorium excellent conditions. As one will easily observe, intelligibility is such that, for most speakers, artificial reinforcement of the voice is not necessary.

As far as one knows, this type of design has been used for the first time in Porto. Already, plans are being drawn to use similar principles in other auditoria.





P.S.: This work has been completed with the collaboration of Absorsor and with the support of the Fundação Serralves.

REFERENCES

(1) Luis Conde Santos et al., Acústica 98, 14-16 sptember 1998, p 399 – 401.
(2) D. Commins and F. Wilhelmi, 2nd convention of the European Acoustics Association and 137th ASA Meeting, Berlin, March 1999.

[1] This technology, developed with the support of the architect, is now commercially available under the name « Alvaro ». Alvaro is a product of Wilhelmi AG in Lahnau, Germany, www.wilhelmi.de