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ACOUSTIC SECRETS OF THE LICEU

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SUMMARY

Since this 31st of January, the world of the Acoustical Culture has lost one of its most representative spaces.

All the people who know this theatre (artists, personalities, specialists, employees, audience,...) have now a special feeling about this building and they conserve memories, writings, drawings and even secrets about its acoustics.

Our contribution could be to let hear again these resonances.

ANTECEDENTS

On April 12, 1844, the "Filantropic Dramatic Liceo Society" was created, to realize a theatre of opera with a great capacity (3500 seats).

The theatre was built on the sites of an old Trinitarian Fathers' convent and adjacent houses, due to the lack of sites in Barcelona before its enlargement (Cerdà's "Eixample").

Oriol Mestres designed the primitive "Liceu", that opened on April 4, 1847.

Fifteen years later, a first fire destructed the building (April 20, 1862), leaving only the part near the Rambla and the structure of the room.

On January 31, 1994, another great fire leaved the theatre in almost the same conditions.

ARCHITECTURE

According to I. Solà-Morales himself, charged of the reconstruction, another shape couldn't be imagined, because, in this limited site, a modern opera would only contain 700 seats.

A wide wall -more than one metre of thickness in the main floor- define the horseshoe-shaped room ("alla'italiana"); its interior is a truncated oval, surrounded by a perimetric corridor.

An excellent acoustic isolation is so provided, essential in such a noisy neighbourhood.

The proportions of the room are something greater than the ones of the Scala theatre, but the stage size is shorter than in comparable theatres, because of the limited site; the lateral walls are not parallel and the lateral chapels of the old church were conserved : they seem to help in providing good acoustic conditions on the stage.

These considerations show how the particular site of this theatre determined the most original characteristics of the room, even with acoustic influences.

In spite of important defects (difficult acces, lack of security, necessity of shops and flats expropriations for the enlargement of the stage), this environment provides to the Liceo an unrivalled esthetic.

ACOUSTICS

Among the other characteristics of the construction supposed good for acoustics, most of the amateurs and professionals emphasize about the fundamental use of wood and about the numerous cavities existing under the stage and different parts of the room.

This last assertion, that comes from the great exit of the quasi mythical italian model, is not obvious.

For exemple, a periodist talked about the good acoustic result due to the cavity under the orchestra pit.

That is doubtful and the Rocha's conclusion seems more logical : this cavity, he says, causes a strong absorption in the bass tones, resulting deficient in all the room the bass balance.

To judge the acoustic efficiency of such structures, specific investigations and measurements would be necessary.

Because of the numerous absorbent surfaces, like seats and tapestries, especially in the main floor of the room, the reverberation is very low; the 500 Hz reverberation time value, without spectators, c. 1.3 s. in the main floor and c. 1.5 s. in the fifth floor.

RECONSTRUCTION

To help in the reconstruction, they dispose of the plans of 1861, numerous photos, detailed plans realized five years ago by A. González-Raventós and A. Millán-Gómez and precise acoustic descriptions.

Before the fire, the architect I. Solà-Morales had projected some modifications :

- To enlarge the stage.

The existing stage (23 m. of height, 25 m. of width and 16 m. -8 more in the centre- of depth) didn't allow to perform various operas; for exemple, the stage height of a modern theatre is 10 metres greater.

In the project, the existing surface would be multiplied by 4.5 : the stage would grow from 460 to 1909 m².

- To construct a subterranean "foyer", under the pit. Finally, the total theatre surface would grow from 9313 to 21191 m².

- Not to modify the room : the number of seats -more then 3000- was judged sufficient.

Burnt the room, the project must now incorporate it; the pit inclination will be aumented, to improve the visibility; the high floors seats will be improved too.

The two main risks of worsening the Liceo acoustics, and then the two things to care, are :

- the volumes and materials modifications in the stage space.

- the fact that the new construction norms do not allow the use of materials equal to the old ones, in spite of the excellent acoustic results due - as most of the people say- to the numerous wood surfaces existing in the old Liceo theatre.



Fig.1 : 1861 fire

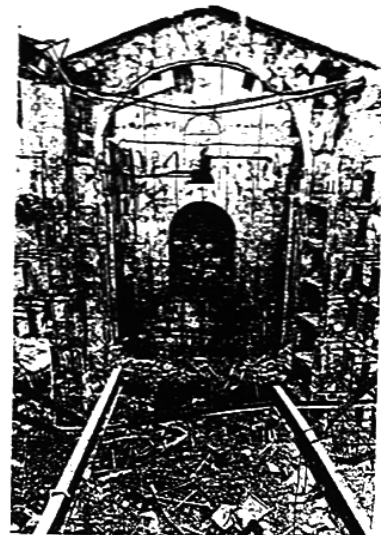


Fig.2 : 1994 fire

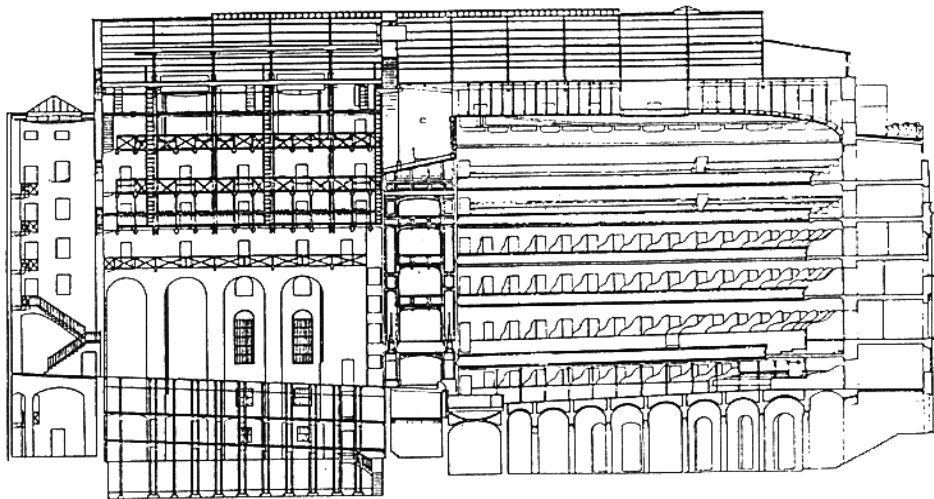
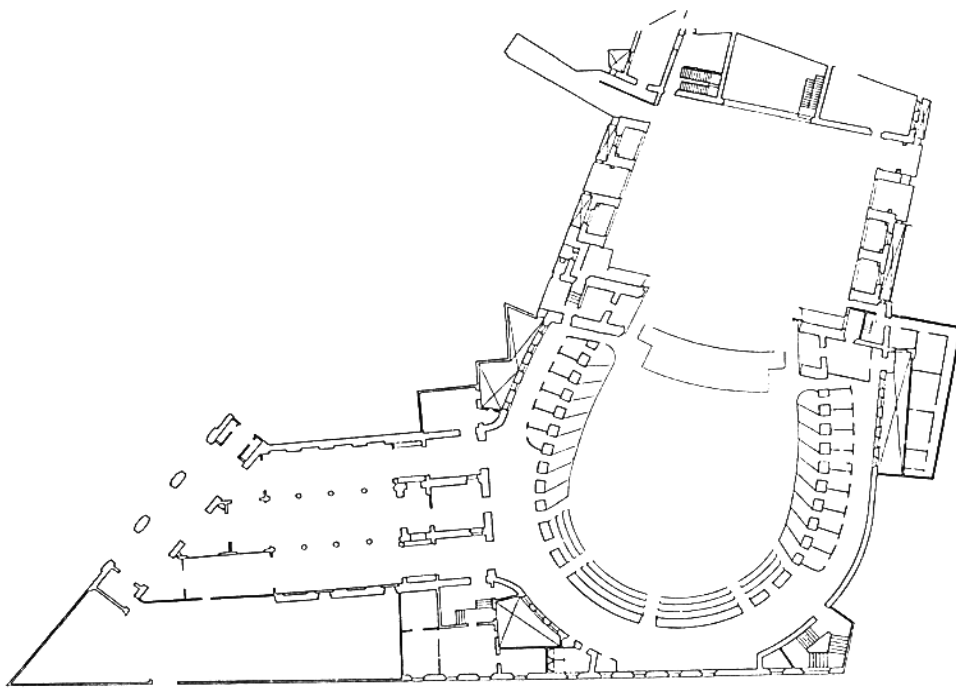


Fig.3 : Ground plan and longitudinal section

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