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THE MY THEATRE ARCHITECTURE

Summary. The architecture of the theatre is a complex field in wich many problems interlook. These problems require new technology for solution and research on new models. Allareas of contemporary life make similar demands on theatre architecture, they call for greater flexebility in adopting the idea of new multiple – function structure. There are the ideas, this is the spirit behind the work of author. Theatre in Lask, National Theatre in Novy Sad in Yougoslavia, Polish Theatre in Wroclaw. Susspentional space of the stage on the Raylway Station in Wrocław and Opera in Wrocław that are include creative works of author. The origins ideas of author are – multi directionaly auditorium, the system for horizontal scenery changes, acoustic screen theself regulatng acoustic resonator. In 20 last years In Europa mainly old buildings were reconstructed whereas building new ones was limited to exceptional cases. It resulted in tendency to achieve the collision less stage space.

MOJA ARCHITEKTURA TEATRALNA

Streszczenie. Tłem osobistej twórczości na polu architektury teatralnej jest analiza ostatnich 20 lat rozwoju przestrzeni scenicznej w całej Europie. Rewaloryzowano w większości obiekty istniejące, a budowę nowych ograniczano do wyjątkowych przypadków. Wynikiem tej działalności jest dążenie do uzyskania przestrzeni scenicznej bezkolizyjnej. W ślad za tezą z pracy doktorskiej autora, wykonanej w 1962 roku, w której określono granice praktycznej chłonności dla teatrów dramatycznych i muzycznych, dokonano analizy stanu przestrzennego teatrów w ostatnim 20-leciu w Europie i uzyskano potwierdzenie wymienionych w doktoracie wniosków teoretycznych. Przytoczone realizacje teatralne własne to – Teatr w Łasku z widownią dla 400 widzów, Narodowy Teatr w Nowym Sadzie w d. Jugosławii, Teatr o przemiennej przestrzeni scenicznej na Dworcu Świebodzkim we Wrocławiu, Teatr Polski we Wrocławiu i Teatr Opery we Wrocławiu.

The my architecture of the theatre

Modern architecture represents one of the more conservative features of our life. Though many seem to think that it is principally the material available that is responsible for disregard for up-dated problems of regional and city planning.

The approach to problems of function is still grounded in tradition, a tradition that has become petrified in many cases. Architecture is a complex field in wich many problems interlook. These problems require new technology for solutions and reserch on new models. All areas of contemporary life make similar demands on architecture, they call for greater flexibility in adapting the idea of new multiple function structures.

These are the ideas, this is the spirit behind the work of author. The Wroclaw Politechnic Department of Crude Oil and Liquid Fuel Technology, for the Department of the Technology of Plastics and a designe for the State Philharmonic Building in Wroclaw, Theatre in Las, Church in Pakoslawsko, Church in Witkowice, Amphitheatre in Bielsko-Biala, the Central Square in Betchey in Yugoslavia, and the Open Stage on that Square, the National Theatre in Novy Sad in Yougoslavia, Church in Kleszczow, the Circle Schoole in Polanica Zdroj the Polish Thetre in Wroclaw, the suspensional multipurpose space stage for Polish Thetre on the Swiebodzki Raylway Station in Wroclaw, and the Modernization and the development of the Opera Theatre in Wroclaw. That are include creative works of author.

The many national and foreigne competitions- the first prize for Sport-cum-Theatre Szczecin, the first prize for Curch in Czestochowa, the first prize for the Nationl Theatre in Novy Sad in Yougoslavia, the first prize for the Amphitheatre in Londek Zdroj, the first prize for Culturel Centre in Katowice, the first prize for the Central Square in Betchey in Yougoslavia, and the first prize for the Polish Theatre in Wroclaw, that are include honours in national and foreign contests.

To illustrate the point we may take the example of theatre buildings.

The chief feature of traditional theatre is the boxed stage framed by an arch. In this pictureframe with wings and proscenium the action is traditionally staged. The question arises, why do we build so few theaters, cinemas, and concert halls. The answer is that different kind of building is designed for each of these arts. It would be wiser to thinkin terms of more versatil organism, one wich lends itself to many functions. After completing a series of studies on the subject, author developed a new form of auditorium.

The usual stage-front is straight and placed parallel to the rows in the audience so that each viewer looks in almost the same direction. This situation can be improved by introducting the principle of progressive movement or revolution so that the direction of vision can change considerably. An analysis of possible ways of achieving this phenomenon lend to the conclusion that instead of having a movable amphithetre one may obtain the effect by having a stable auditorium but one wich provides visibility from many different angles, Such a stable, multi-directed auditorium is a space so designed that each viewer can obserrve the action from many directions without inconvenience to himself.

Chairs that can be rotated to follow the action enlarge the visible sector and improve the conditions of observation. In this kind of theatre the stage must also have a different designe. The ceiling over auditorium and the stage is constructed of components mounted with lights and each of these components may be lowered and adjusted as desired. This arrangement eliminates the fly lines while at the same time allowing room for operation on the stage, Borders, flies all manner of backdrops and courtains can be suspended at various points from the ceiling because the components are placed at regular intervals of at least 40 centimeters.

Theory and analysis found application in the theatre of Lask near Lodz, designed to 400 spectators. That auditorium with exellent visibility is in all directions, and furnished with excellent visibility is in all directions, and furnished with revolving chairs. The stage, which is curved and extended or panoramic can have several sets prepared at once , in different segments. The spectators simply change the positions of their chairs to view one after the other. The advantages of this kind of auditorium, semi-circularin shape, apart from the obvious economic one, is that it gives each member of the audience a panoramic angle of vision of 180º.

In such an auditoriumit is possible to put on traditional plays as well as to experiment with new ideas, The theatre in Lask can also be used as a cinema and its acoustics provide excellent concert conditions.

The lines of development in modern theatre building designe are not restricted to the above example alone. However many of the new designs of the theatre buildings try to eliminate the box stage and to enlarge to field of observation. Many artists of the theatre have advocated abandoment of the old limitations, notable among whom was the late German stage director Ervin Piscator and the American dramatist Thornton Wilder.

The theatrical space and the directions of its development

Without going into the interdisciplinary nature of the problem we may attempt to classify the characteristic forms of the theatrical space taking into account the formal and conceptual aspect so as to specify and determine the scope of the problem.

The general space of the theatre can be devided into the characteristic functional fundamental, and auxilidary zones.

The fundamental space is the zone of the basic theatrical operations in wich the main theatrical events take place and wich is specially shaped to be the spece of the actor`s performance and of the public¡s reception of it.

The operational zone

One of the auxialiary zones of the operational zone, wich serves the audience, is the sphere of the forecourt destined for the entering audience.

The halls, foyers, and corridors constitute a complementary operational zone.

The complementary zone

In the complementary zone the main theatrical events may take place. Further we may mention the following space which make part of the general theatrical space, and are submitted in their functions to the stage - the cloackrooms for actors, the rooms for rehearsals, workrooms and studios, storerooms and administration zone strictly connected with the general and artistic management.

Without that zone, which decides about all actions leading to the creation of performance, there would not have been any activity in the theatre. It is in fact the managerial zone.

The managerial zone

The fourth zone without which the building of theatre could net have functioned comprises the following elements - the air conditioning space, the space of the heating system, the electrical links of the propulsion system, all sorts of machines , garages , etc, it is thus.

The protection zone

Bearing in mind the essence of the omgoing changes and the progress in the shaping of the theatrical space, we should first of all concntrate our attention on the all concentrate our attention on the operational zone, where the most fundamental theatrical phenomena take place and will continue to do so in the future.

In the history of the theatre, without which it is impossible to analyze the operational zone, there appeared, and there probably will appear, various froms corresponding to the interrelations between the space of the stage, and the space of the auditorium. The classification of those froms should be based on the analysis of the spatial relationship between the stage and the auditorium-Arena, that is the area used for theatrical action and surrounded by the auditorium

- The form of Greek theatre, that is a place of action mostly surrounded by the audience, with one section left, which inthe former case was destined entiraly for people, but wich in this case serves for the construction of the scenery on the backdrop of wich the action is to develop.
- The form of the Roman theatre, wich, similarly to the Greek theatre, make use only a part of the ring surrounding the place of the actionas the auditorium, and which converts the other half of the ring , as large as the first half , into the scenery for the construction of the theatre of the image.

- The kind of the theatre shaped on the basis of a section of the ring, or other forms that produce similar or analigical conditions of the observation of the scenic action. This is most cases the prevalent form of the theatre (and of the operational zones) in the XIX and XXth centuries.
- The kind of the theatre based on the stage that surround partly the auditorium. Such a stage may be described as panoramic, and the auditorium from the above described ones as regards the condition, wich are many different directions.
- The kind of the theatre in wich the stage surrounds entirely the auditorium. It is an example of a spatial stage comparable, as far as the spatial arrangement is concerned, to the arena. but it creates the plurality of directions of observation separately for each fragment of the auditorium.

Those forms are utilized in many different ways, but we can observe a steady tendency towards the creation of theatrical space that would hamper the least the movements of the performers and that would allow f``or the formation of widest possible range of scenic forms, starting with the classical ones and ending with the most avant-gard ones.

In can mention, as an example of solving this problem, the task J was able to carry out being responsible for the construction of the National Theatre in Novy Sad in Yougoslavia. It was a development of my own idea materialized in the theatre in the Polish city of Lask.

The National Theatre in Novy Sad is situated within the precincts of the old town, and its dimentions have been adapted to the surrounding architecture. It has twoseparate operational zones, a classic stage, and a panoramic, concave one. The complementary zone assists separa``tely the box stage and the panoramic one. The panoramic stage, which is a multipurpose one, allows for the following uses:

- the fulldevelopment of the panoramic stage for 400 viewers - the creation of a smaller chamber stage for 400 viewers after the covering of the wings of the panorama,
- the formation of a stage that runs through the auditorium, due to an optional arrangement of the movable segments of the amphitheatre for 300 viewers on the place of action, which ultimately creates an auditorium for 700 viewers,
- the creation of an arena stage due to the surrounding of the place of action by the movable segments of the auditorium wich allows for the formation of an auditorium for at least 750 and at most 1 000 viewers,
- the formation of a concert platform for 700 listeners, through the arrangement of the mouvable segments of the amphitheatre on the wings of the stage,
- the conversion into an assembly rooms meetings.

The above presented example of a panoramic stage is one of the ways of shaping the operational zone as a multi-purpose space which is nowdays described as.

The neutral space in the theatre

The tendencies appearing in our example mowe towards the creation of such conditions in the operational zone, wich is the most essential part of general space of the theatre, asto allow for the continuation of the past cultural achivements of world theatre, without restricting the possibility of further development, progress and experimentation.

Conditions of theatre perception

There are many factors determining the reception of theatre impressions. By the complex of impressions dealt with here are meant vision, hearing, olfaction, sence of touch, and the psychological comfort.

Apart from spatial causes and their influence on perception there exists a set of complecieties that determine the reception of impressions, among others visual and acoustic ones. There are the problems of lights, sound track prowiding, hearing, ventilation, and finally the creating of suitable interior atmosphere. This is the second set of complexities, indispensable in the theatre.

Summing up the above mentioned and several other additional elements we arrive at notions that determine the psychological comfort without which neither the real theatre nor the simple temple could function.

In order to analyse the complex character of these problems one must refer to origin of the theatre.

The first group of spectators forming a ring around the fire and participating in ritual meeting wos the prototype of one of the first spatial theatre forms.

Different reformation that followed showed both various staging forms, as well as still different requairements concerning the set of conditioning complexieties.

The first aspect refers to spatial dependence between the stage and audience and the second one to the conditions of perception in strictly determined spatial relations between the stage and audience.

There are different conditions that must be fultifilled whenstaging a play on the arena than those necessary for a box stage, or for panoramic stage. Both basic requirements and for example the requirements of safety in the theatre are to be obeyed in addition.

Fulfilment of natural conditions

In order to obtain the coditions of perception in the case of an international staging its basic components must be fulfilled.

They are the following:

- Vision. Its components are - the notin of observation limite and vision limits as seenfrom the point of view of biological possibilities of human eye.

- Hearing. Its components are - the notion of sound diapason limits, and the biological possibility of sound perception by spectators.

Such complexities that condition the proper perception as lights, hearing, fresh air, can appear naturally or intentionally. Coming back to the origin of the theatre and analising the example of ritual gatherings of the fire, one may look for the parallels between the light emitted from the fire and sunset, the warmth of the fire, the fresh blow of wind, the masque, jewels, clothes of the shaman on the hand, and lights, air conditioning, actor's clothes and stage properties of the modem theatre on the other. As was said in the beginning, the space of the theatre, and all the elements indispensable during the reception of impressions, i.e. , perception, underwent a certain evolution.

Complementary sets

In the space of the stage and audience there are dependencies wich we may trace, taking into analysis different froms of the stage and audience, particulary cpnsiderning the sets of wich convergent and divergent observation system are characteristic.

One must emphasize the variety of complementary sets improving perception conditions and resulting from the actual spatial formation of the stage and audience This will depand on the way and intensity of interminling between the stage and the audience.

The formation of the audience wich must be suitable for the shape of the stage so that visual and acoustic stimuli coul be received properly is the basic condition for good perception. This will be restricted by the biological possibilities of human eye on the one hand and the assumed kind of staging the play on the other.

Different restriction will appear in drama theatre where mimic is an indispensable element of visual perception, and still different ones in music theatre where actors gestures are assumed to be most important for visual perception.

The problem is only touch here, and the most essential elements of the set wich is complementary for perception will be analyses.

One of them is spatial light that creates a spatial atmosphere. The sound one is the special sound track. The next one is the skillful exposition of those elements wich improve the reception of impressions, and the following one refers to the proper atmosphere in general, by the proper lights we meanhere not only creating the optimal conditions for waching the play but also creating all possible light stage effects.

By sound track providing we mean the fulfilment of natural conditions for acoustic energy to disperse as well as providing sound track for interior of the theatre and the possibility of artificial sound effects obtaining.

The skilful exposition refere to the systems that make the quick reorganizing of stage space possible. These are - the suitable trap system, rotary or movable systems allowing its horizontal changes.

Theoretically it woul seem, that the better stage space equipment. the richer and more optimal staging conditions are. However, these are conclusions drawn from narrow and superficial evaluation.

As we know from experience, each theatre would require different equipment wich would not any inconveniences to stage managers by its localizations on the stage.

Mechanical equipment may by used both for the improvement of staging coditions and in the case of assumed functional universality of the theatre, for the improvement of thetre interior spatial form alternations.

At present this aspect was considered mostly in the case of new building and now buildings and it become crucialsince different theatres are being modernized. However, excessive equipment of theatre interior will turn against, and not for the benefits of the stage manager in general. This is the result of concessions that we make in order to improve suplementary procedures and functional flexibility of the theatre.

Multi directionaly auditorium

In performance - projecting several factors must be taken into account - the distriction of the sound energy coming from its source at the stage, and also possibilities of observation of actors face expressions - on the one hand.

And the situation of the projected actionon the stage - the other.

These aspects are being analysed without considering any limitatin caused by the material spatial structure of theatres.

As it is evident from the commonly known experiments, the perceptive capabilities are the sum of individual feautures each individual In respect to the audio - visual perception.

The front part of the stage is best possible place for situating actors and all the objects focusing the attention of the audience. In the case with one actor, or a small group of actors, we deal with the situation when such action is surrounded by spectators, and the stade by the auditorium.

In the case of larger group of actors, or several, or many groups, if they are to be exposed in similar way, we have to do with the situation when spectators are surrounded by theaction and auditoriumis surrounding by the stage.

A different instance of surrounding the auditorium with the stage appears when producer want to expose several or many image at the same time (simultaneous action).

In both instances the destribution of the sound energy and possibilities of observing actor¡s gestures and face - expressions are favourable for the optimal utilization of these spatial theatrical structures with the benefit of the performance perception. The latter instance of the theatrical space organization when the field of observation is surrounded by the field of action, requires different conditions in respect of the architectonic formof the auditoriumat wich the audience is to wach the stage space cosed by siedes of the obtuse angle close to 180° angle.

When the proper visual conditions at every place of the auditorium are settled, the comfort of the spectator shoul be taken into consideration, wich can be done for example by installing armchairs with swivel seats and stabl backs or simply by instalin-swivel-chairs - it improves the observation of the side parts of the stage (in ex. Theatre in Lask, multipurpose hall in National Theatre in Novi Sad or many functionaly hall in Stockholm - that last designed by Nils Gunnar Nilsson)

This latter type the stage and the auditorium arangement ass the practice shows, does not prevent us from projecting the theatrical space of former type, and also extended up-stage, its stage is panoramic and some part oof the auditoriums is built of movable elements, all possibilities the theatrical space are given at our disposal.

The role of acoustics in the architecture of theatrical interiors

The forming of the interiors of a theatre, a concert hall or an all purpose spectacle. Those decisive ones in the process of evaluation of interiors are:

- good visibility of the stage or platform,
- good audiobility and also,
- the providing of theright kind of air-conditioning.

it so happens, that all the above mentioned elements of evaluation have a cammon basis, found in spatial form of the interior.

For example some analogies between occurances, taking place during the dispertion of the light waves and sound waves cause the result, that in both instances one can use geometry as a too, for analizing the phenomena.

The mathod of geometrical analisis, used in acoustics, is based on earlier developed geometrical methods applied in optics. Also the aerodynamics of the air flow in such an interior depends on the geometrical shape of the space being analized.

We are able to define, with great accourancy , the conditions for good visibility. The conditions for good air conditioning must be obtaine on the basis of previously described technological and functional factors, But good audiobility, the acoustical and functional factors, But good audiobility, the acoustics of interior, cannot be precisely determined before the final inauguration of the interior.

Such a set of conditions caused the matters of acoustics in the majority of realised theatrical interiors to be attendet to during the last stage of architectural interior decorating.

Exceptional are case, where good acoustics conditions were achieved through appropriate architectural and structural forming, where the form of construction and it's elements play a decisive role in creation for good acoustics of interior.

These two possibilities for achieving the objective of good audibility outline the field of activity in the process of building theatres, concert halls or multi-purpose halls. But one must with additional complications in case of regarding the benefits of construction for acoustics.

The other unknown elements are those, wich appear in the interiors because of the energy qualities of materials, as a result of the shape of the space in wich sound waves disperse, on because of climatic conditions, in wich the phenomenta take place.

For simple geometrical spatial figuras, and especially for cubids, it is possible to describe mathematically the interdependence between acoustical pressure, in given point of the field, and also between frequencies at any source of sound placed in point.

For any geometrically irregular shapes of interior with which one deals, in majority oof cases it is impossible to use the theory of waves because of the tremendous build up of mathematical models, wich have to be determined separately for every case (see Witold Straszewicz – „Geometrical Analysis of characteristics of Acoustical Field in Interiors"). Besides all theoretical considerations done so far did not take into account the energy qualities of materials, with wich the interiors are built. But, as practice indicates, the inner resonance of the interior elements being used, tested separately sometimes plays a decisive role in acoustics. Therefore the formerly used presuppositions for forming interior acoustics were not complete, and in the overwhelming majority of cases were based on inti tively collected data ofvarious kinds, magnitudes and size, as they always apper in interdependent sets, and it is therefore imprssible to evalate their usefulness separately.

A form of relations put in such a way could usually be a achieved with the aid of the method of subsequent aproximations. So the spatial form - the interior architecture tries to include those factors mentioned above in a general way - factors, wich decide whether the aim is realized.

Structure - as a tool for architecture and a productor for good acoustics

One of the possibilities with that purpose in view of creating a good theatrical interior is the consideration, of the structure of the roof ower the auditorium, and of the walls which separate the space of the hall from the surroundings, This is a case, when , for acoustical reasons , one is able to use jest especially formed ceilinge suspended from the construction, but when the ceiling of the hall is at the same time the membrane roof. In order for this to take place it becomes necessary to fulfill conditions wich schould characterise an acoustic reverberatior, - in other words the construction schould be flacid enough and resilient enough to reflect and emplify the sound waves in a right and sufficient way.

There is an analogy here, although not based on a straight forward comparison between optics and acoustics, as it is on area of optics wich finds in their category colours and textures and - connected wich them - reflection and absorption of the light waves, There is acoustics an area, too where reflection is connected with passive and active participation of screen , in other words where the energy of sound wave can cause the screen to move. In such a case one would call the screen a resonating screen.

This phenomenon is extremely important, especialy for halls of an all - purpose character, when it is possible to achive different times of reverberation, depending on the energy , wich is enveloped in tn the source of sound, Through appropriately selected proportions and the describing of the phisical parimetres of the reflecting mambranes of the roof surfaces, the strength of sound waves can the designed resonace.

If we can describe the compertment in wich there would be placed the data, determining the desired effecte for the required reverberation, for instance for a drama theatre, with the presupposition, that the source of sound be speach, and for music theatre, presuming that the source or sound would be singing and orchestral sound, we can regard the aim as achived, and the interior can be regarded as an multipurpose one.

Some succesful experiments with a „self – regulating" accoustic resonator which is part of the interior, confirm the hypothesis, that there existe a relistic possibility of achieving interiors, wich are acousticaly verseatile. The desired effect was achieved, too by making an accoustical resonator a part of the overal structure, confirming the allegation about the possibility of using an appropriately formed structure in order to form multi – purpose auditoriums, Both in the former and in the latter cases the aim was achieved by using the method of subsequent, by choosing the apropriate parimetres for a given data compartment, The second case is worth stressing, both from the point of view of the achieved economical effects, and primarely because of the fact of implementing structure for achieving accoustical effects. It consists of three membranes suspended from a spetial triped, and anchored to a frame, wich lies on a wall, sourrounding the theatre hall in Lask.

The appropriately chosen span, weight, thickness and resilience of each of three membranes were the decisive factors in the final effect, wich was the possibility of getting different musical qualities depending on the strength of different sound productions.

Therefore the conclusion, from the examples which were refered to, can be formulated as follows - the use of each resonably, lightweight, flexible, resilient construction, which consists of rightly selected elements, can decide good acoustical conditions of interior. Therefore it is the formshaping factor which is one of the driving elements of architecture.

1. Genesis of stage space development

Contemporary trends in stage space development can be traced on the basis of reports and presentations of leading European architectures specialising in theatre design who participated in the International symposium held in September, 1993, in Wroclaw.

These reports lead to the conclusion that newly designed theatres are nowadays a rare phenomenon. The vast majority of projects are renovations, reconstructions, extensions and adaptations.

2. A chronological order of events in the eighties and nineties in the field of theatre building

The beginning of the eighties saw the completion of the theatre in Tampere in Finland, designed by Mariatta and Martii Jaatinenow. The theatre is fitted with a multifunctional box stage. The City Theatre in Jayvaskyla, designed by Alvaro Aalto, has similar possibilities of transformation, however without the function of a music theatre. The theatre in Lahti, designed by Pekka Salminea, is a dramatic theatre with a wide stage portal and highly mechanised stage floor, which, however, is also a box stage.

In 1981 the National Theatre in Nowy Sad, designed by Wiktor Jackiewicz, was opened. This theatre has two halls: one with a box stage and the possibility of its transformation roto a music or dramatic theatre, and the other non-portal and multifunctional, enabling to stage various performances from classical arrangements, arrangements for a panoramic stage, for example simultaneous ones, to a ring stage and a spatial stage transcending the auditorium.

In 1983 the Theatre in Taganka was opened in Moscow, modernised according to the project of Aleksander Anisimov, Yuri Cmiedowski and Boris Tarancev. Here on an asymmetrical stage proscenium was constructed, containing on the left side of the proscenium a window opening onto the city (in the literat meaning of this word).

In 1984, in Italy, numerous renovations of historical buildings were carried out, one of the most important being the Ariosto Theatre in Reggio Emilia, which was renovated according to the project of Ivan Sachetti. Also in 1984 the Opera in Zurich was extended with a foyer, a restaurant, additional dressing rooms, a rehearsal room and a stage rehearsal room which is also an experimental studio. In the foyer a new form of restaurant was built including a space far a cabaret. The author of the whale project was Claud Paillard.

In 1986, in Amsterdam, a new musie theatre was opened. The space of the highly mechanised stage was classically shaped according to the project of Han Lijkampa.

In 1988, in Rotterdam, another completely new theatre witki great functional flexibility was opened. The theatre provides conditions for musie or dramatic theatre, and it fis also possible to extend the stage outside the box stage finto the auditorium. This event, however, was overshadowed by the opening of the Opera Theatre in Essen, designed by Alvaro Aalto. The exclusively operatic stage has two side stages and an upstage, and it fis highly mechanised.

In 1989 the National Theatre in Belgrade was extended. The expanded area provides the back stage area witki missing dressing rooms, workshops, a rehearsal room, working and painting rooms, handy store rooms, and a theatre studio - a smalt stage for smalt-audience opera. The extension was designed by Ljubomir Zdravković and Slobodan Drinjakovič.

In 1992 the City Theatre in Hanover designed by Claud Paillard was opened. The author designed a substantially new building, using a formerly existing hall as a museum for the theatre. The newly constructed stage has one side stage and an upstage. The innovative element fis the shape of the proscenium whose arms embrace the first rows of the stalls.

In 1993 a new Opera in Helsinki, designed by Eero Hyvamaki, Jukka Karhunena and Risto Parkkinena, was opened.

The constructions and modernisations mentioned above are accompanied by ideas and plans for the upgrading and extension of theatres all over Europe. These include examples of recent plans of a Circus-Theatre in Amsterdam or The Cultural Centre in Amersfoort, which is being extended with a larger auditorium and stage, according to the project of Onno Greiner.

We must also take finto account Wrocław's aspiration to modernise its existing theatres, an aspiration long expressed in unrealistic plans for constructing a musie theatre, for which a design contest was held In 1974. The contest turned out to be only a theory, just like numerous other undertakings of that time. It fis worth mentioning that a lot more realistic was the idea of modernising the Wrocław Opera House in 1967, according to the project of Wiktor Jackiewicz, under the management of professor Bronisław Kopyciński, as well as the modernisation of the Polish Theatre in 1968, also according to the project of Wiktor Jackiewicz.

In January 1994 the auditorium of the Polish Theatre in Wrocław burnt down. This dramatic situation for the excellent theatre community became a starting point for a search to fmd ways to solve this problem. As a result, a closed contest, with invited participants, for a project of reconstruction and modernisation of the Polish Theatre was held. The contest was won by a project by Wiktor Jackiewicz, which minimised demolition and inh-oduced the so far rarely applied innovation of a mobile plafond

ceiling. It enables flexibility in using the number of seats in the auditorium and free choice of the shape of stage space.

The modern design of the theatre hall in the Polish Theatre in Wrocław fis an unusual one. The flexibility of space in other theatres, like in the cify theatre in Malmö (Stora Teatern) or in the concert hall in Lund, Sweden, requires the application of e.g. the electro-acoustic option for at least two scopes corresponding with two cubic volumes: 4,500 (for an audience of 620) and 6,500 (for an audience of 820). This option meets the requirements of a hall for the spoken word and a hall adapted for musicals, vaudevilles and other singing performances (5.6 m^3/W and 7.9 m^3/W respectively).

Also in Poland the theatre in Gniezno has been reconstructed (the back stage area extended) the theatre in the district of Targówek in Warsaw has been modernised according to the project of Józef Chmiel and the „Kwadrat" („Square") theatre, also in Warsaw, has Been modernised according to the project of Daniel Olędzki. The burnt down part of the National Theatre in Warsaw is being reconstructed according to the project of Józef Chmiel. The theatre in Bydgoszcz, designed by Józef Chmiel is still being constructed; it has Been modernised during the construction. Similarly to other European countries, a number of projects are being undertaken, which, unfortunately, cannot be considered achievements that would mark certam progress.

3. Creativity of the period and its achievements

At the beginning of this brief analysis, it is worth mentioning that the constructed, modernised and extended theatres and halls confirm the hypothesis, formulated at the beginning of the sixties by the author of this study, concerning the limits of audience capacity in the auditorium for particular kinds of theatre buildings. This hypothesis, included in the 1962 dissertation, mentioned possible realistic numbers of viewers in the auditoriums of dramatic and music theatres, as well as concert halls, a conclusion which resulted from the analysis of physical capacities, biological abilities of perception and the assumed limits of profitability. (W. Jackiewicz *„Widownie wielokierunkowe stałe" [„Permanent multidimensional auditoriums"]*, Wrocław 1962 - 1964, a typescript of the doctorate dissertation and, by the same author, *„Realizacja widowni wielokierunkowej stałej" („Construction of multidimensional audżtoriums")*, Kraków 1969, the quarterly *„Architektura and Urbanistyka" [„Architecture and cify planning"]*, PAN).

The 1962 thesis can be confirmed by the analysis of constructions and modernisations of theatres in the thirteen-year period between 1980 and 1993.

In this period the following musie theatres were constructed:

- The Opera Theatre in Zurich with an auditorium for 1116 seats (an extended building),
- The Music Theatre in Amsterdam with an auditorium far 1614 seats (a new building),
- The Opera Theatre in Essen with an auditorium for 1125 seats (a new building),
- The National Theatre in Belgrade with an auditorium for about 1100 seats (an expanded building),
- The Opera Theatre in Helsinki with an auditorium for 1385 seats (a new building),

The following multifunctional theatres were constructed:

- The National Theatre in Nowy Sad witki two auditoriums for 940 seats witki a box stage and a permanent multidimensional auditorium for 379 seats witki a possibility of enlargement up to 679 and 979 seats by attaching segments of the auditorium.
- The City Theatre in Lahti witki the auditorium for 776 seats in the auditorium witki the box stage and 300 seats in the theatre studio.
- The City Theatre in Rotterdam witki auditoriums for 895 seats witki a box stage and 176 seats in the theatre studio.
- The City Theatre in Hanover witki the auditorium for 630 seats. All these theatres were constructed between 1980 and 1992.

It must be emphasised that all the theatres mentioned above, botki music and universal ones, usually have stalls and balconies or boxes, which increase the number of seats, within the scope of 25 metres in dramatic theatres and 35 metres in musie theatres, which confirms the author's assumptions about the limits of botki the capacity of the auditorium and the audience's abilities of perception.

Most of the constructed theatres are theatres with `box' stages or theatres with two stages. Those with two halls usually have a box stage with a large auditorium and a smaller hall - a theatre studio.

It appears that an exception is the arrangement in Nowy Sad, where, apart from a box stage with an auditorium for 940 seats, there is another multifunctional hall of almost unlimited flexibility of space. The permanent multidimensional auditorium in this hall has 379 seats, and the deep stage witki panoramically developed sections enables the enlargement of the auditorium to 679 and 979 seats by attaching segments of the stalls.

In other two-hall theatres, the halls have a similar capacity of between 600 and 1300 seats and a box stage, which results from botki assumptions of the programme and analysis of the capacity. The auditoriums of smaller halls have between 150 and 300 seats. Quite significant is the comparison of the number of seats in the stalls of the theatres mentioned above, in their „large" halls: Nowy Sad: 728, Zurich: 462, Amsterdam: 827, Rotterdam: 595, Essen: 790, Belgrade: 304, Hanover: 468, Helsinki: 750.

For the smaller halls the numbers are the following: Nowy Sad: between 379 and 979, Zurich: 250, Rotterdam: 176, Belgrade: 300, and Helsinki: between 200 and 500.

Of the mentioned constructions, only in two cases can we observe greater spatial possibilities of the halls: in the multifunctional hall in Nowy Sad and the smallaudience opera hall in Helsinki. The „small" halls - the theatre studios of these constructions - for between 150 and 300 seats, ensure formation of the non-portal theatre.

Of a unique shape is the studio attached to The Opera in Zurich, where the corner arrangement of seats is defined by the diagonal possibility of shaping stage space. In these conditions it is possible to conduct stage rehearsals and experiment. The use of the term `stage rehearsals and experiments' here directly refers to theatre studies, and between the lines can be left what we cali physical space resulting from particular limitations. The problem of shaping stage space - as we deal witki hereconsists in overcoming certam physical barriers connected witki the spah and shape of the auditorium, which determine visual and acoustic perceptron as well as fulfilling all the elements connected witki particular stage equipment which includes mechanical, electrical, illuminating and dynamic elements of the stage.

The indicated aspects of this complex problem of the stage space constitute a set of criteria determining the quality of this space. When we attempt to identify the proper set of criteria determining this quality, we conclude that the basic feature characterising such a set will have the possibility to achieve non-collision conditions.

4. Non-collision stale spale

Characterising such space is as relative as deciding which theatre belongs to the most avant-garde group. Such a characterisation will undoubtedly be influenced by the factor of time - the period when the analysed space will take place. The development of the technologies important for stage space determines urany of the „barriers" mentioned above and physical limitations resulting from spatial limitations in stage space.

An attempt to define non-collision on the stage - in stage space - will only be possible during the analysis of all collisions on the stage floor, on the walk or in the construction of the ceiling over the stage and the audience. The stage floor in classical theatres was already appointed witki systems of mechanical slots, which determined the possibilities of perforating the stage fluor or, in the case of an built-in rotating stage, fixed each decoration and setting.

Great flexibility in using stage space was created by attachable systems of rotating stages (in Nowy Sad); witki three rotating stages, the decoration could be changed immediately, even on a panoramic stage. Great flexibility is also achieved by using attachable systems of auditorium segments, allowing for the creation of different forms of the stage and its auditorium (also like in Nowy Sad).

As we can see, great possibilities of creating stage space give theatres the possibility of transforming the arrangement of the stage not only for a particular play, but also within one performance. These trends are supported by modern technologies which utilise the box stage where moving paru of the stalls on an air cushion (in Rotterdam) or the possibility of using the bottom part of the orchestra in order to enlarge the proscenium has become almost a routine.

The walk of the stage, their construction in classical theatres constituted an unconquerable „barrier" and determined the positioning of the stage and its acting area. In contemporary theatres, especially in theatre studios, the acting area is also physically defined, yet it can be easily moved in space surrounded by construction elements. Greater flexibility and smaller collision will be determined by the construction span, that is, the distribution of supporting elements and physical, acoustic and thermal batriers.

Another factor reducing the collision in the creation of stage space or acting area is the shape of ceiling over the stage and auditorium, the distribution of auxiliary mechanical equipment placed therein, electrical, acoustic and illuminating facilities ensuring natural acoustics (acoustic screens - also changeable), as well as electronic facilities creating sound effects.

Generally speaking, this very synthetic set of limitations determines the noncollision in stage space where action is to be created. it is most probabie that the introduction of modern technology may, at least in some theatres, overcome certam barriers and contribute to more flexible utilisation of stage space.

A similar situation can be seen as regards laser beatu boxes - as clearly not every theatre in Europe can afford such equipment, let clone poor Polish theatres.

Despite the achievements of technology, space remains the most important part of the theatre. This fact is confirmed by the changeable stage space constructed at the Świebodzki Station in Wrocław. The utilisation of the former waiting hall (later used as a sporu hall) and a part of the adjacent platform in 1994, created unusual conditions for various performances. This unique stage has witnessed a number of successful performances and attracted the interest of distinguished directors. So far, on the `substitute' stage of the Polish Theatre, the following plays have been staged:

`Kate of Heilbron' by Kleist, directed by Jerzy Jarocki,

`The Player' by Dostoyevski, directed by Jacek Bunsch,

`Kant' directed by Krystian Lupa

`Romeo and Juliet' by Shakespeare, directed by Bradecki.

All performances were highly rated and recorded for Polish television.

With reference to the situation in Poland concerning the construction and renovation of theatres, it must be said that apart from the construction of a music theatre in Gdynia according to the project of Józef Chmiel and Daniel Olędzki and its replica in Kielce designed by Daniel Olędzki, where the portal and proscenium are relatively broad, the Polish Theatre in Wrocław was reconstructed and modernised in 1996 according to the project of Wiktor Jackiewicz and the reconstruction of the National Theatre in Warsaw according to the project of Józef Chmiel was completed. The reconstruction of the auditorium and proscenium of the Wrocław theatre limited the number of seats to 750, but simultaneously improved the visibility and audibility. In the reconstructed proscenium the rule of the panoramic proscenium was applied.

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Theatre architecture in Wrocław

Changes which occur with time are likewise in theatre architecture a result of both particular shifts in popular expectations and a reflection of social relations. This is confirmed by the historical legacy as well as by perceptible transformations in our own days.

In the period leading up to and including the nineteenth century only a very small number of secular interiors were constructed in Wrocław, such as the City Theatre, the existing Opera, the 'Leopoldina' University Hall, as well as several less impressive works such as the present gymnastics hall of the Textile High School in Plac Teatralna (Theatre Square), which is one of several concert halls in which Frederic Chopin played. Other interiors which naturally lent themselves to musical performances were of course the city's splendid churches.

However the early years of the twentieth century saw the construction of a series of new concert interiors such as the second City Theatre in 1906 (now the Polish Theatre) and numerous smaller cinema auditoria and cabaret stages. Most of these were destroyed during the carnage of the Second World War, after which the only buildings which were restored were those which complied with the cultural programme established in those days. This meant that three theatres were reopened in Wrocław after the war – the Polish, Contemporary and Jewish theatres – as well as the opera and operetta houses, located in the existing Opera Theatre, and the concert hall in Wrocław Polytechnic.

The reconstruction of the Polish Theatre in 1947 as well as the almost simultaneous restoration of the Opera Theatre, both projects undertaken by Professor Andrzej Frydecki, were sufficient to fulfil the needs of the city's theatre programme in those days, supplemented by small scale performances in the Contemporary and Jewish theatres.

After 1968 the Little Theatre was taken over by the administration of the Polish Theatre. Two new theatrical bodies sprang up in Wrocław at this time – firstly the Mime Theatre led by Henryk Tomaszewski and secondly Jerzy Grotowski's 'Theatre of the XIII Row'. However despite the great pool of theatrical talent in Wrocław at that time – actors, directors and associated art forms like scenery and costume designers – not a single new theatre building was constructed. The one exception was the conversion of the club room of the City Building Renovation Contractors into a concert hall for the State Philharmonic in Wrocław. This single project was carried out because the city authorities wanted to secure the renowned Andrzej Markowski as director of the Philharmonic's orchestra.

Firstly the mime company, operating in the Opera house building, moved to the Polish Theatre and then the operetta crew also left the opera building and began performing in the auditorium of the 'Śląsk' (Silesia) cinema. In spite of changes in regulations, which clearly set out much stricter requirements concerning safety conditions in theatre halls resulting in a reduction in seating capacity, not a single new

theatre building was constructed in 45 years. All theatre groups were housed either in buildings reconstructed after the war, or in converted or renovated existing interiors. The Opera Theatre has been struggling since 1965 with the problems of protecting the wooden rafters above the stage and auditorium against fire. The current writer's proposals in those days foresaw an alternative extension of the Opera building (similar to the projects later carried out in Zurich and Belgrade), consisting of the addition of a full technical section at the rear (something which is still lacking to the present day in the Opera), and also a second opera hall facing Plac Wolnosci (Freedom Square). Those projects differed in the amount of seating offered– the first envisaged 1200 seats with a suitable stage for such an audience while the second idea included a smaller auditorium with 400 seats. The implimentation of one of these alternatives would have allowed the artistic teams to continue their activities and prepare for the full-scale renovation of the main opera building. However neither was carried out as the authorities of those days announced that a large music theatre would be built instead in Plac Wolności in Wrocław. This plan also failed to get off the ground just like many other similar projects in those days.

For 45 years the prevailing policy was one which gave preference to other, 'minor' cities like Radom, Kielce and Lublin where large theatre buildings were constructed. Wrocław belonged to those cities considered to be rich in theatre properties. The 'triple city' of Gdańsk, Gdynia and Sopot was one of the exceptions – a major city where significant theatre development took place such as the construction of the City Theatre in Gdańsk and then the Music Theatre in Gdynia. Both projects were the work of Daniel Olędzki with the creative participation of architect Kadłubowski in Gdańsk and Józef Chmiel in Gdynia.

The crucial turning point in the state of theatres in Wrocław came on 19 January 1994 when part of the lobby and auditorium of the Polish Theatre burnt down, while the stage and backstage areas were protected by the safety curtain which withstood the extremely fierce fire.

In the November of that same year a new theatre was opened in the Świebodzki Station in Wrocław as an answer to the urgent need to fill the gap left after the fire at the Polish Theatre. The stage constructed there created new, previously unheard of performance conditions, but above all it provided the opportunity to continue the superb team work of the Polish Theatre.

At the same time the city saw the modernization of the concert hall in the club room of the City Building Renovation Contractors, which had been converted in a provisional fashion in 1968. This case was a witness to the endurance of temporary improvisation. The contemporary world trend of modernizing old theatres, in which Italy is the leader, has also reached Wrocław. Another building which is to be modernized is the Opera house in Wrocław.

The Polish Theatre

The Polish Theatre, built in 1906, was the second city theatre in Wrocław. It was built at a time when there was a great need in the city for this kind of hall. Bearing in mind other Wrocław buildings constructed around a framework of reinforced concrete, stretched out across a wide span, we can safely say that the framework constructed in the Polish Theatre – a 'Schauschpielhausie' of its day with intersecting arches spanning up to 27 metres – became the prototype for other similar projects in the Wrocław area. These include the Hala Targowa (Market Hall) in Plac Nankera (Nanker Square) built in 1908 with its reinforced concrete arches, and the hall of the century, the existing Hala Ludowa (People's Hall) of 1913 with its superb, world-famous construction of reinforced concrete spanning over 60 metres.

All information concerning the Polish Theatre was obtained from existing fragments of the original documentation, which is in German, as well as from discoveries made during the exposure of a series of building elements during the restoration and modernization carried out during the period from 1994 to 1996. The reinforced concrete construction which was uncovered during this work – all the ribs, columns and plates as well as other sections of the building's structure like sections of floorboard plates – gave ample evidence of the rich possibilities in the usage of such technology. In addition, a further excavation was carried out of the foundation and basement area under the originally designed site for the box office hall (where the main entrance is now situated).

Both the original project and the current modernization confirm the wisdom of the decision concerning the location of the theatre building. The concealment of the reinforced concrete construction under a veil of plaster held in place by nets and lined with layers of foam brick columns has also proved to be an effective solution, or so it seems.

The original theatre hall was designed to hold 1717 seats. In 1936, following the introduction in Germany of new fire safety regulations, a new portal wall as well as a fireproof curtain were added, deepening the stage box by four metres but at the same time shortening the axia of the auditorium. This resulted in worse visibility of the stage for the audience as well as a reduction in the number of seats to about 1200. This same number of seats was preserved by the now deceased Professor Andrzej Frydecki when he rebuilt the theatre in 1945 after the destruction of the war.

Further changes in the building included the addition of sections for administration, workshops, painting, carpentry, metal work, upholstery and tailoring plus a storehouse for furniture and props. These minor improvements in backstage working conditions were carried out in 1970 by Professor Witold Molicki. Twenty four years later fire consumed the house and lobby, which was the reason for firstly the reconstruction and secondly the modernization of the whole building. New regulations, which became obligatory from 1994, greatly influenced the alterations which were introduced during this

reconstructon and modernization. A little earlier a new law concerning fire safety precautions had been passed, which specified the way an auditorium should be organised, including the width of aisles and evacuation routes. This was the uncompromising reason for the analysis which was submitted to the theatre regarding the existing skeleton of the reinforced concrete construction. The geometry of the building imposed strict limitations on the capacity of the hall as well as the visual and accoustic conditions. A total of 746 seats was achieved in front of the extended proscenium or 784 seats with the addition of two extra rows built over the orchestra pit. It is widely accepted that the reduction in audience size is a phenomenon which is advantageous for dramatic theatre, when in our present times 600 seats is considered to be the best number in a large theatre. In the Polish theatre the reduction in the number of seats in the auditorium also resulted in a corresponding reduction in 'people pressure' in the foyer, cloak-rooms and toilets, which is not without meaning in view of our current strict safety requirements.

The period from 1994 to 1996 was crucial for the Polish Theatre for a number of reasons. Firstly, despite the obvious setbacks caused by the fire for both the building and the whole theatre community, the artistic achievements of this period were not only not lost but were in fact magnified due to the cooperation of all the members of this community. This happened when the theatre's artistic team, struggling with problems connected with finding a place to work, received, thanks to the Wrocław Regional Authority, a new acting space in the Świebodzki railway station which offered a rare assortment of alternative stage areas.

This enabled the theatre to attract the best directors in Poland and to put on such stage productions as *Kate of Heilbron* by Kleist directed by Jerzy Jarocki, *The Player* by Dostoyevsky directed by Jacek Bunsch, Shakespeare's *Romeo and Juliet* directed by Bradecki and *Emanuel Kant* directed by Krystian Lupa. All of these productions proved the talents of the theatre's acting team, as well as revealing the enormous potential of the acting space at the Świebodzki station in Wrocław.

The 'Świebodzki' Theatre came into being in only 110 days according to the current writer's project, which is described below, and opened on 27 November 1994 with the premiere of Kleist's *Kate of Heilbron*. The main changes involved transforming the original waiting hall (later used as a sports hall) into a theatre space incorporating part of the platform and surrounding area, plus the side entrance into the station, and areas on the first floor for the actor's changing rooms, duty rooms, sound and lighting managers, as well as on the other side a garret room housing the air-conditioning system, which is still unfinished due to the lack of an essential cooling aggregate.

All of these alterations fulfilled the conditions necessary so that 'the show could go on'. One unforgettable stage effect was the use of a real steam train in the first performance. The success of the theatre productions at the Świebodzki station is shown by the television recordings of *Kate of Heilbron* and currently *Emmanual Kant* as well as numerous glowing reviews.

If the 'Świebodzki' theatre took 110 days, i.e. three months and three weeks, to prepare, then it took 26 months, i.e. two years and two months, to rebuild the Polish Theatre. Experts have also reacted positively to this project, including the widely-expressed opinion that visibility in the theatre is excellent and audibility is significantly better than before.

As with every kind of investment, the project had its financial constraints and was put out to tender, which is the main reason why the most advantageous solutions have not always been adopted. For example for the bay windows the Kavneer system was chosen instead of a 'glass structure' and 'ISPO' plaster was used to cover the external walls rather than 'MARRAZZI' ceramic tiles. The electric-accoustic system chosen was more suited to a concert stage than a theatre stage. The seats chosen are very absorptive of sound compared to those stipulated in the project. These are just a few of the details which have affected the final result. The work is still incomplete – there still remains to be finished work connected with changing the flooring on the stage and in the orchestra pit, as well as work on the backstage evacuation routes, with the storerooms, and with the modernization of the air-conditioning system and the technical facilities in the workshops.

The character of the auditorium, completely given over to the contemporary regime and trend for neofunctionalism, has been called a 'true theatre workshop' by such theatre experts as Andrzej Wajda.

An essential change for the staging conditions has been the introduction of a new form of proscenium. The significant widening of this part of the hall has extended its panoramic dimensions so as to embrace the stalls audience within its span. The raising up of the audience has limited its depth under the balcony of the present amphitheatre, which has also meant that those rows which had previously suffered from poor visibility and audibility have now been removed. That space is now used as a cloakroom for the audience.

A further alteration is the new shape of foyer which is arranged on three different levels. The prototype reinforced concrete construction has been highlighted by a floodlighting system using 'ERCO' lights. Another innovation in the lobby is a gallery of contemporary art from the collection of the National Museum in Wrocław.

The crowning decorations of this new interior are the details decorating the buffet area which seem to accentuate the meaning of the various spatial elements.

The Opera House

The Opera House in Wrocław was built in 1842 as the city's first theatre (then known as the Schtadt Theater in Breslau). The man responsible for the project was the distinguished German architect Karol Ferdynand Landhaus.

in 1865 the building was completely destroyed by fire, and the reconstructed theatre designed by Karol Ladeckiego was destroyed by another fire in 1875. The subsequent reconstruction by the architect Karol Schmidt was later modernized in 1896 by Karol Schmidt. This work continued until 1906.

There was at least one more transformation carried out before the Second World War and this was in 1935. After that plans for further modernization were abandoned, and a grand new opera house was planned in Wrocław on the Schpeer scale of those days.

After the war in 1952 the reconstruction of the Opera House following the devastation of the war and post-war periods was completed under the supervision of Professor Andrzej Frydecki. These latest transformations introduced many major and minor functional improvements. However above all they meant subordinate stratifications, in principle, to the original stylistic canon. This is how K. Matuszczyk, the writer of a study into historical architecture in 1979, described these changes - for example the massive colonnade facing Plac Wolności (Freedom Square) constucted according to Professor Frydecki's project. In the opinion of many other experts this is one successful element of this latest in a series of modernizations.

Mr Matuszczyk does not write, however, about certain crucial damage inflicted upon the Opera House in the sixties and seventies. This concerns the destruction, carried out on the orders of the authorities of those years, of original paintings and stucco work on the foyer plafond. This is one of many examples which show their thoughtlessness as well as negligence of works of cultural significance.

The restoration of this paintwork causes many problems, as does the restoration of the sculpted elements in the timpani above the main entrance. There are no records or indeed any trace of documentation concerning these frescoes and sculptures. The changes awaiting this historic building result from the need for functional improvements to the building, allowing it to comply to obligatory fire safety and sanitary regulations, and above all the need to restore the building as much as possible to a level of excellence worthy of the present day.

The external plasterwork including the mouldings, borders and other details all require renovation, as does the paintwork of the plaster. The designs on the mouldings need to be unified by the use of coloured plasterwork. Such intervention is needed because of the erosion which the elevation has suffered. Another essential alteration for the whole building is the removal of the wooden window frames fitted in the fifties which now need to be replaced by new wooden window frames decorated with appropriate period drawings. The same is true of all the internal and external doors. The need for these alterations is a result of the following:

1. The essential restoration of the historical designs.
2. Ensuring acoustic and thermal insulation.

3. Ensuring fire and anti-smoke safety conditions.
4. In the case of new door openings – the necessity to improve their function.

New regulations concerning the right of handicapped people to have access to public buildings have made it necessary to build a slope which will allow such access to the entrance hall and box office area. It has therefore been decided to build a raised ramp from the corner of the module to the building's entrance, at the same time marking the edge of the ramp with rising levels of floral displays leading from the pavement to the arcades and into the building itself. The steps will be rebuilt in line with the three central arches of the central section of the colonnades. In this way a gradient of no more than 3.5% can be achieved, which can also be considered a success in causing the most minimal interference in terms of the aesthetics of the building.

The possibility of building a slope of the minimum required width of 120 centimetres symmetrically on either side of the colonnade has also been considered. This would involve the construction of a barrier as well as significantly limit the public's use of the entrance doors and would inconveniently divide the colonnade between the ramp construction and the passageway. Another possibility considered has been the installation on the premises of a mechanical lift. However like the two symmetrical 120 centimetre ramps this would take up a significant part of the passageway light in the colonnade.

Both the second and third of these possibilities satisfy the requirements for suitable access for handicapped people and they would also cause the least harmful interference with the building's architecture. After the building of drive-in bays for taxis which will comply with both the building's iconography and the demands of conservators, the gentle raising of the area in the colonnades should harmonize with the architecture of the Opera House and echo similar solutions which can be seen in such projects as the Vienna Opera House and Cracow's Theatre dedicated to Julian Słowacki.

Further alterations to the facade are connected with the window openings, which will not allow changes in the form of ceilings that cut across the window space. These should not be visible from the outside as is unfortunately the case at the moment with a considerable section of the area running lengthways along the side facade. Here the building is divided into five levels while there are only three rows of windows, which is as specified after all in the original implimentation of the projects by Landhaus, Ludecki, Schmidt, Nitsche and Frydecki.

It would be difficult to classify as changes the alterations planned for the roof area, where a large number of various ventillation chimneys and other structural extensions are currently situated. The idea is to simply merge most of these chaotically spread elements by extending a plinth in the section of the construction covering the auditorium which is visible above the border mouldings of the building. This alteration is connected with the modernization of the building in a functional and technological sense.

It is also planned to extend the moulding decorations from the staging tower onto the surrounding elements above the border mouldings. This should unify the existing added elements, which are essential for the function of the opera, with the Opera House's architecture.

In the area of the roof it is planned to change the covering, after the reconstruction of the flies, to a fireproof flat roof made from reinforced concrete plates, insulated with non-combustible rock wool and made waterproof by dense (160 kg/m^3) welded sheets of tar. The metalwork elements will be made from sheet copper. Similarly the covering above the auditorium will be replaced with a new construction and new materials. As for the remaining parts of the building, the sections of the roof made from wood will be replaced by fireproof reinforced concrete plates and sealed with green welded sheets of tar. In the parts of the building which are in contact with the ground, the concrete parts of the ground course will be completed with sandstone elements.

The pavements around the Opera House from the building to the kerb will be replaced by granite slabs. At the crossings, the edge of the kerb will be lowered to a height of only 5cm above the street level. This is the height required for access for handicapped people.

The external illumination will be carried out with regard to the details and modularization of the building. It is planned to introduce three different phases of lighting:

- special events
- premieres
- ordinary times

The illumination of the facade up to the border mouldings around the Opera House will include the highlighting of the window modules, and each individual portico, the arcades and columns, the terrace and the figures of the four muses placed on the balustrade above the border mouldings. Above the border moulding, it is planned to illuminate the extension of the staging tower and the auditorium. From the rear of the building, from the direction of Plac Wolności, the columns, baluster barrier, border mouldings and staging tower will be lit up.

The flooring of the arcades will be composed so as to continue the compositional lines to be found in the entrance hall, and also be echo the vaulting of the arcades.

The entrance hall with the box office and customer enquiries office is enclosed on four sides by doorways leading to, on the longer side, three entrances from outside and on the opposite side to two entrances to the foyer and stairs. On the shorter walls there are two doorways leading to the cloakrooms. In the centre of two walls there will be a niche in which the conserved muses will be exhibited, one an original example and the other a reconstruction. To reflect the existing border with floral motifs near the entrance doors to the foyer, a similar border will be created around the entrance to the cloakrooms as well as around the box office and the entrance to the customer enquiries office. The

plafond in the entrance hall is divided by steel girders into three sections with a decorative fire guard. It is essential to safeguard the building from destruction by fire in under an hour.

The 'SPOTLIGHT' illumination system will be used, with spotlights highlighting the rural motifs on the walls and plafond. The muses will be lit up individually. The doors will be replaced and decorated with period designs. The illustrations on the new doors leading to the cloakrooms will match those on the foyer doors. The designs on the marble floor will also reflect those on the partition of the plafond. The floor will contain three different colours.

The cloakrooms will be arranged symmetrically on either side of the entrance hall. The marble floor at the partition will echo the rhythm of the girder on the plafond. The walls will be lined with 'ALSECO' or 'ISPO' plaster in a colour scheme determined by the interior decoration scheme. The interior is surrounded by mouldings which continue over the door and window openings. On the ceiling, as in the entrance hall, there is a decorated steel girder fireguard. The 'SPOTLIGHT' lighting system will accentuate the tectonics of the interior. The cloakroom counters will be made of marble echoing the flooring. The bases of the benches will be composed also to echo the marble floor as will the counter flaps. The coat hangers will involve a series of brass hooks on brackets with individual hangers in the cloakroom.

Opposite each of the shelves there will be a fitted mirror with a brass frame and columns shaped in the secession style of the nineteenth century. The passageway from each cloakroom into the foyer will be through doors leading to the staircase and up to the mezzanine level of the foyer or by ten fan-shaped stairs down to the foyer level on the ground floor.

In addition, for the benefit of disabled people, there will be on every side of the cloakroom hall a free standing lift to every floor of the foyer, except the top floor. The lifts are constructed of specially reinforced glass joined together by brass with panels containing details in the secession style from the end of the nineteenth century and with polished glass crystal. Brass handles will be fitted to the walls and to the central part of the lift construction. The fan-shaped staircase is to be made of marble. In the walls surrounding the fan stairway there will be recesses, made of light coloured marble according to the details presented in the interior decoration scheme.

The floor of the foyer interior is to be covered with a parquet floor mosaic embedded in concrete (an extremely fireproof material, covered by oakwood stuck with water-based glue to this base). The patterns on the floor will reflect designs from the ceiling sections and ribs. The wall dividing the foyer from the auditorium will be covered with fireproof silver wallpaper (with glass fibre) in the pattern of small diamonds.

The wall opposite will be covered with a single coloured plaster (ALSECO or ISPO). The celling section, with its old drawings on the vaulting with a convergent design on white plaster with segments of the ribs highlighted, is necessary because of fire cover. The shape of the closed segments of the ceiling section is connected with the covered endings of the steel girders.

The lighting which highlights the historic tectonics of the interior is fitted on the walls under the ribs together with double fittings at the central meeting point of the hall wall. The panelled oak doors are completed with the frames decorated according to historical drawings. It is necessary to replace the flammable material on the corridor floors with an inflammable material. As far as the solid staircase construction is concerned, 90% of the wooden stairs, which have survived for over 100 years, are now worn out. New stairs and banisters have been designed which will be completely covered with two-toned marble. A hand-rail will be attached to the wall and full banister. In the foyer the hand-rails will be fixed on the wall as a form of protection for the mirror covering of the walls. All levels of the foyer will be fitted out in the same way. There will be disabled toilets on the ground, first and second floors.

The entrance area in the toilets will have wash basins covered in marble, a feature which will be reflected in the mirror coverage on the walls. The other walls will be covered with tiles, different on each floor, in colours to match the style of the interiors. It is planned to incorporate a cornice and various patterns at the height of the top of the doors. The panelled oak doors of the toilets will be illustrated with designs referring to the doors which lead into the auditorium, but will be more modest in style.

The 'SPOTLIGHT' lighting system will be classical in character. The toilet cubicles will be fully carpeted with a special flushing system in the lavatory pans. There will be special panels on the floor in a contrasting colour to the walls. The ceilings will be covered with NIDA GIPS and GKFI panels in a grid system.

The auditorium includes the greatest number of historical elements of special value, which need to be protected and preserved. The first group of elements are those which need to be reconstructed as they are partly damaged (for example the chipped carvings on the plafond and walls and cracked plaster which require strengthening or replacing etc...). The second group of elements are those which have been replaced at various times by elements which are of no historical value (for example the wallpaper, lighting fixtures, carpets, armchairs, doors etc...). In this way the acoustic conditions in the hall were spoilt and the fire safety conditions threatened.

The orchestra pit has been changed by moving its back wall under the stage floor, thus enlarging the area of the pit. The levelling of the edge of the proscenium over the pit means that a great part of the pit can be opened and that the edge of the pit and the proscenium meet exactly when the pit is closed and the proscenium extended. A lifting device has been installed in the part of the pit which is situated on the edge of the orchestra opening. The flooring in the stalls has been changed for a fireproof

covering made of reinforced concrete plates and has been designed in a step-like gradient so that there is good visibility in every row.

The floor covering made of oak parquet panels will be laid directly onto a concrete base (the oak-wood will be prepared with a guarantee of inflammability and non-toxicity). The seats will be made of steel with fire-resistant material and hard backs made of beaten sheet metal covered with fireproof or inflammable baize (prepared on a fibre glass base).

The seating arrangement: the first row is to be 150 cm from the edge of the pit and after that each row will be 95 cm further back from the row in front of it. The seats will be of a folding style, which will be no wider than 25 cm when in an upright folded position, thus allowing access between the rows of no less than 70 cm in width, providing the access required for a maximum number of 40 seats in a row.

There will be four door openings in the stalls, where the first four rows include 110 seats. For the other 192 seats there will be two more door openings, and a 150 cm wide aisle. On the remaining balcony levels the number of seats will not exceed 150, which determines the aisle width at a maximum of 120 cm. Furthermore, for two door openings, 90 cm wide doors are sufficient. In lighting terms the balcony floor will be covered just like in the stalls with reinforced concrete on a steel grid fixed on a monolithic ceiling. The floor will be covered with panels made of heat-treated oak-wood.

The lighting of the auditorium will consist of illuminating the interior from a hidden point, thus highlighting the architecture and artful design of the interior. The 'SPOTLIGHT' system will highlight the stylistic features of the interior.

The development of clasical methods of forming theatrical auditoriums

On the basis of completed concert halls and theatree one can state, that there do exists thechnical conditions for the introduction of chanhges in the existing systems of forming good acoustics.

Besides the forming of interior, a maningful influence on the matter of good acoustics, is imprinden by the architecture decorating - the method of designing details and choosing of materials. This last factor becomes especialy improtant after introdusing limitations in the utilization of imflamable materials, of which the majority was traditionally used for the decorating of acousticaly sound interiors. Therefore presently there is aroused a necessity of searching for new designs which would make it possible to use non - inflamable materials.

A solution of this problem is given , for example , in an inventive designe on „An acoustical self - regulating screen", which allows the utilization of non - inflamable materials, too.

One can learn about the effects of implementing that design in such buildings as the Concert Hall of State Philharmonic in Wroclaw, the Theatre in Lask, the National Theatre in Novy Sad in Yougoslavia, the Hall in the Ligonia Centre in Katowice , the Polish Theatre in Wroclaw. But the above mentioned exales could Be devided in two groups in the first one, one would consider buildings, built acording to traditional methods - it is in cases , where the interior were added in to the construction system - for example the Philharmonic Orchestra Hall in Wroclaw, two Halls of National Theatre in Novy Sad, the Concert Hall n the Ligonia Centre in Katowice , and the one Hall in the Polish Theatre in Wroclaw. In the second group one would list the Theatre in Lask.

The difference between the two groups lies in the fact, that the first can characte rised by the utilization of an acoustical self regulating screen, while in the second group there was used, besides such a screen, also an acoustical resonator which was formed through the appropriate adaptation of structural membranes of ceiling for acoustical purposes in the interior.

The second method is described in the chapter on „The construction as a tool and productor of good acoustics".

The first group, inwhich the already mentioned halls belong can be characteriesed by good acoustics in all quoted examples - and one should try to find out the reasons for the ocourance of that phenomenon. There are no doubts in connection with the presuppositions and the selection of materials in the halls of State Philharmonic Orchestra building in Wroclaw, (non inflamable plaster), the two halls in National Thatre in Novy Sad in Yougoslavia, where there were chosen and used clasical materials, like timber, but there remain come doubt in the fact of the utilization of metal sheets in the hall of Ligonia Centre in Katowice, where such - screens were made of steel sheet and the lasest of the designs in that group, in Polish Theatre in Wroclaw, where such - screens were made of glass sheets.

One should therefore analyse that halls, because It is a seriuous departure from the so far used traditional methods of forming auditoriums. The diference lies in the already mentioned utilization of metal and glass sheets for the screen, and this is, too, where certain advantges as well as some shortcomings are hidden.

Generaly speaking we deal here with an instrument, wich has been quaite tuned in yet, and wich requires some adjusting processes and some finishing touches.

The hall in the Ligonia Centre has been traditionaly formed, on the plan of a rectangle, of which the longer side have been differently out on three levels through which operation there was achived the effect of a slightly building shape of the auditorium. The building of the side walls caused the narrowing towards the platform. The vertical section of the auditorium has been amphitheatricaly shaped, and thie ceiling line falls cascade - like from the back towards the platform, ending up on the back wall of the platform with a basis serface.

The side walls, upto the hight of 2,5 m. are made of steel sheet panels, colored with an artificial leather material colored in green. Above that walls are made of chip panels covered with oakveneer and from two cascades, handing above the wall. The chip panels are placed on slats. The back of the sceleton of the walls is covered with non - inflamable material, which creates a system of sealed resonating spaces. On the other hand the slab and the wall behind the platform are made of steel sheet panels, stiffened in especially designed channels, in wich there are hidden the lights and air conditioning.

Just the same in the Polish Theatre in Wroclaw, the hall has been traditionaly formwd, on the plan of a very lardge sector. The hall have a tree levels, the ground - floor , the amphitheatre and the balkony. All acoustics reflectors on the ceiling are made in glass.

Through the bending of steel and glass sheets and the stiffaning in the channels, one formed a resonating membrane with very high natural resonance, Being a wall wich gives a resonance of 500 Hz we deal a hall, in wich the highest and lowest frequences are well audible, yet there is a lack of the hight kind of audibility for the middle range sounds.

In the present acoustical situation the auditorium belongs to those very highly selective ones, with high qualities for radio recordings, but it does not have a full sound for the whole amphitheatre. There are areas in the hall, where listening to some orchestral groups during concerts is difficult. It applies especially to cellos and double - basses and partially to percoussion instrument.

In seems , that an explanation should be sought in the position of the orchestra which was „pushed to the wall at the back of the platform, because of the too shallow depth of the platform. Therefore the first correction, which improved the sound conditions, is the deepening of the platform, through the liquidation of two first rows of seats.

The next phase concerns the double basses and cellos and their weak audibility in some place in the auditorium. The reason seams to lie the wrong angle of position of the screens above the platform, which were made as situated horizontaly instead of slantwise, against the back wall in it 's inclined part.

The improvement of sound was achieved through the drawing our the orchestra towards the auditorium, but it seems, that the audibility could be improved still further by creating a bias element on the background of the green part of the back wall bahind the platform.

It the desgn for the Ligonia Centre one finds a contribution towards the development of the clasical method of where the interiors must be modernized. (The example the Polish Theatre in Wroclaw is).

Grate system of stage space lighting (patent)

Up till now the stage space was lighted by means of parmanetly fixed light platforms and also by means of parmanently fixed footlights and reflectors, Such solutions requaired spacial equipment providing light sources that would permanently include the whole stage space, Such lighting was hasenful to scenery , and vice versa - hanging scenecy formed obstacles for light streams coming from reflectors.

The aim of the invention is to eliminate excessive light sources and excessive electric power consumption. This aim has been achieved due to light grate localized over the stage on an optimal height. According to the design the grate consists of the system of stage reils along wich taps, trucks, swiches, and pantographs can more. This grate allows toight any area of the stage space by means of a limited set of reflectors, the position of wich can be changed, according to one s needs. Due to its great flexibility as the light source localization is concerned this system does not limit the dimention of the stage portal, and can function in an arbitrary space. It supplies a great variety of use and it can be used particulary to light halls with universal assignment.

The use of grate system of stage space lighting requires the instalation of single rails, along which tape and truch that serve to mount the sources of light can move They can change their position, The role of the trucks is to guarantee the changes of reflection. The role of the pantograph system guarantees the changes of the reflector height. in order to change the position of the reflector they must be disconnected from the sochets of the electric network and suitable thyristors and connected again to the new electric network sochets and the same thyristors, after their position has been changed.

The system for horizontal scenery changes (patent)

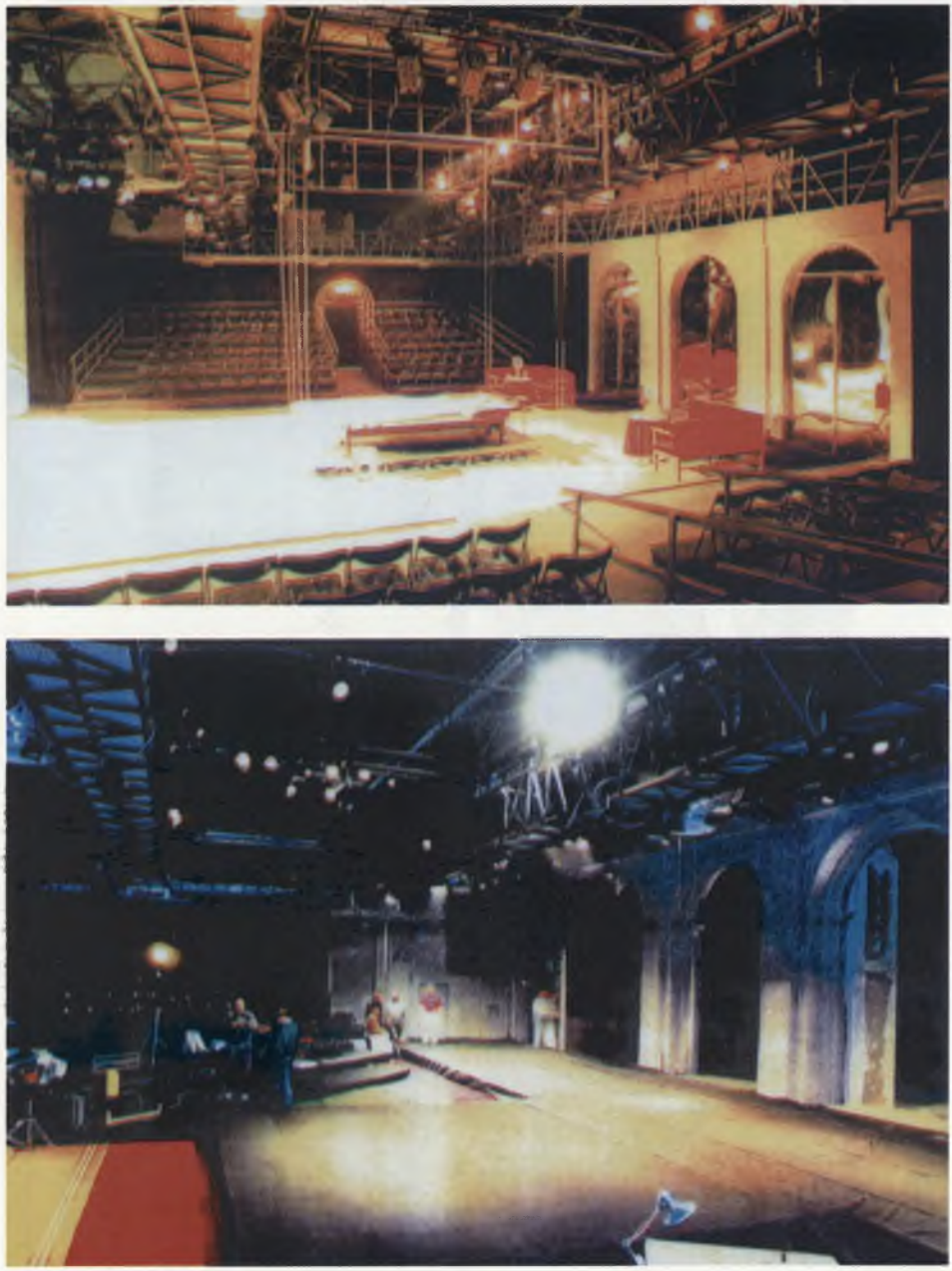
So far the scenery changes have been performed by hand and this involved the construction of every spatial element of the scenery on the stage. In the classical theatre the changes of the scenery are performed vertical ly using elevators on which hanging scenery is pinned up , This in turn involves the necessity of constructing additional mechanisms by means of wich the scenery could by changed vertically, Apart from this, the necessary store space must by supplied, where the elements of hanging scenery could be kept and this in turn involvers fire hazard.

The system for horizontal scenery changes presented here consists of the system of rails, suspended to the grate over . This allows to change the hanging or suspended scenery horizontally and this does not require any structure over the stage and provides much broder visual field from the hause, width of the stage portal is not limited either , Besides, the trouble - making and dangerous (becaouse of the fire hazard) storing of the scenery within the stage space is avoided. The system of single rails must be distributed in such a way that the requaired amount of tracks could take different and independent positions in time.

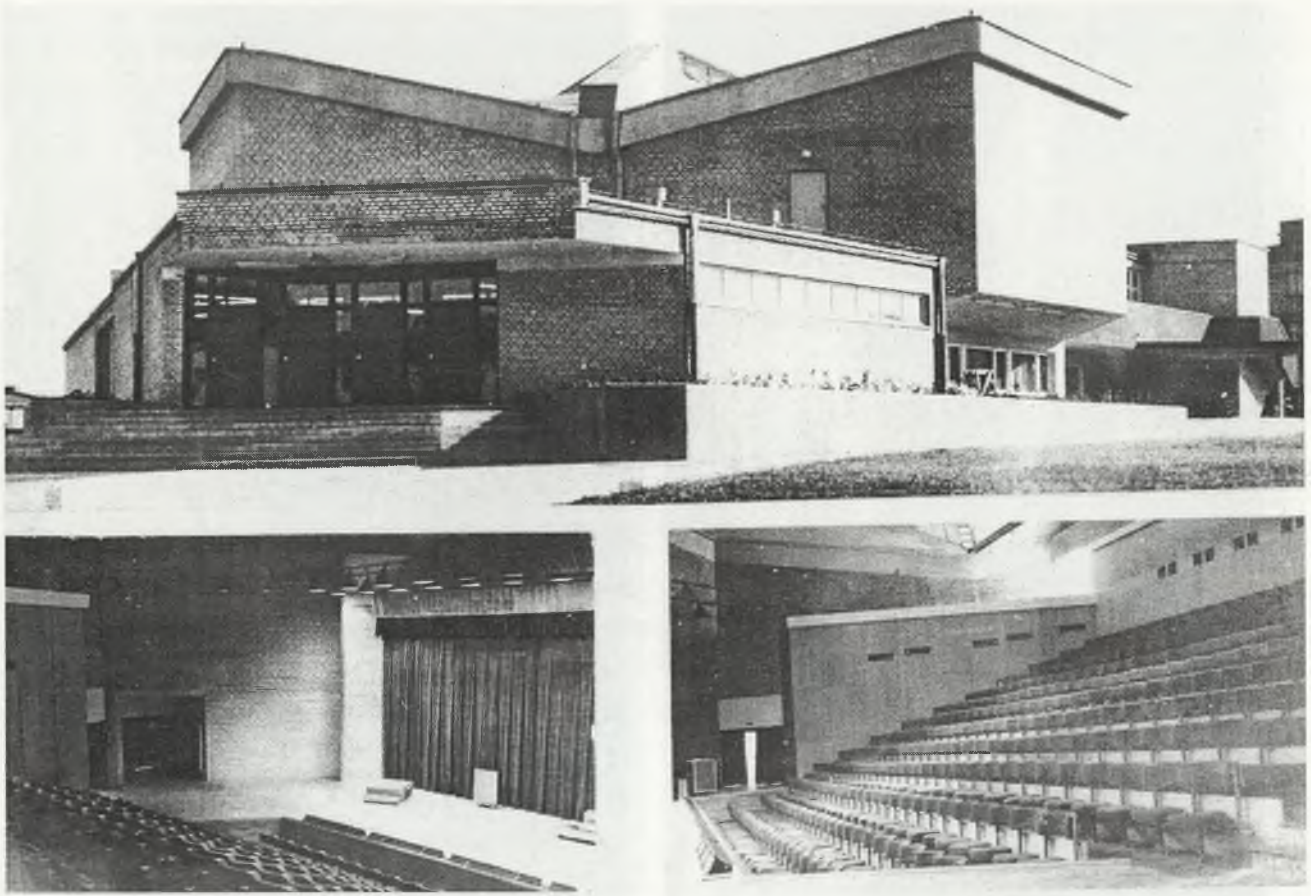
The task of the truck element is to catch the hanging scenery in one or several points, lift it to the required height and transport it to the arbitrary place on the stage or to the neighbouring rooms, The task of thetruck is to transport and set the elements of stage lighting. Single rails, wich foren the route for the truck with the topdetermine the direction of movement in one axis.To achieve the direction on the second axis, swiches are used, and they allow to change the localization of other trucks, no matter whesher other trucks can be found on the rail or not.

Acoustic screen (patent)

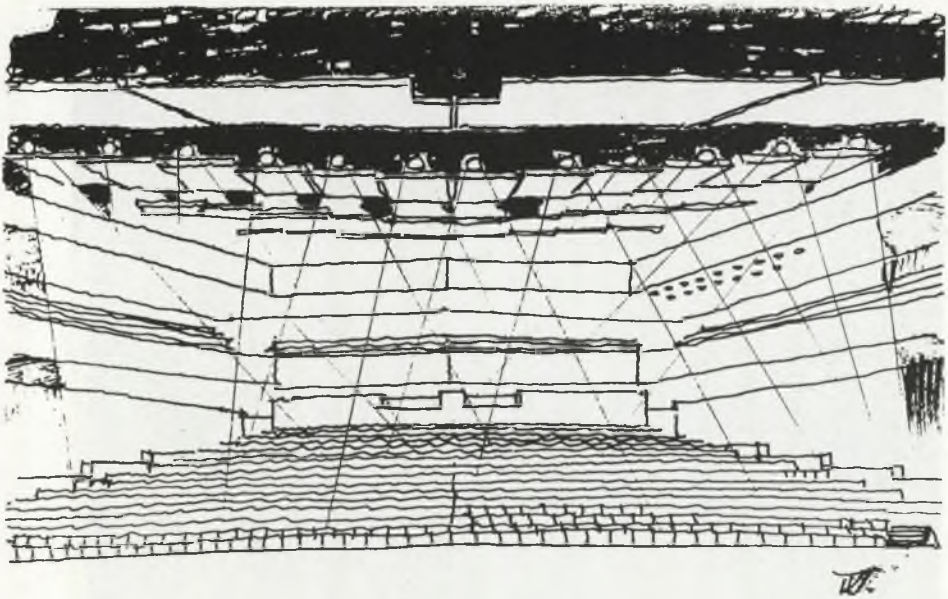
Single or reproducible acoustic screen can be used with hauses requiring good acoustic conditions and particulary with hauses of universal assignment. The solutions applied so far, in the cases of the interiors requiring good acoustic conditions has introdused permanent screens that produced one kind of reverberation and one tone quality - or reverberation and tone quality change by means of rotation, The former limit the possibilities of making full use of the interior and the latter are too complicated in the sense that they require the complex control system , whenever the change of using the given interior is taken into consideration. Thie aim of the invention is achieve the intended acoustic effects using permanent screens instead of complicated rotational screens. This aim has been achieved due to the



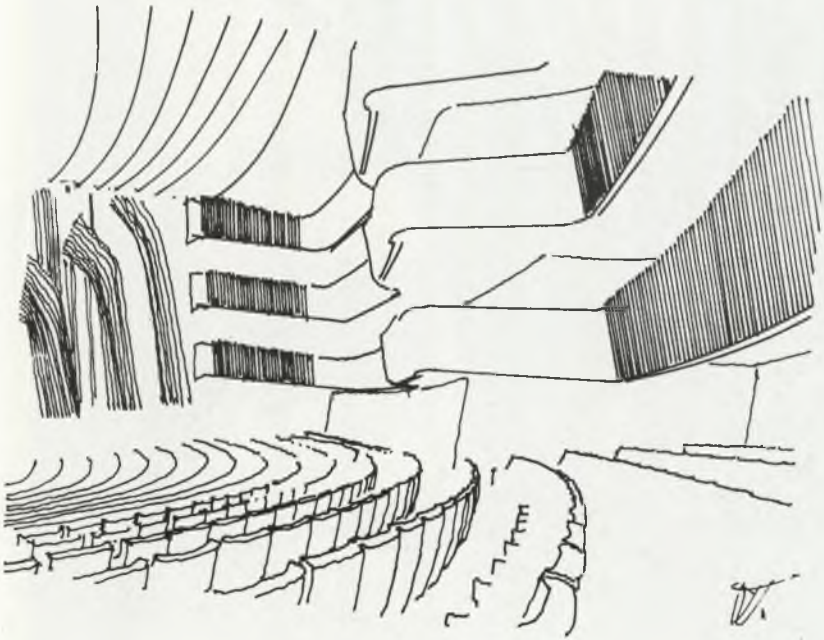
Rys.1. Teatr na Świebodzkim we Wrocławiu (W. Jackiewicz)



Rys.2. Teatr w Łasku – W. Jackiewicz



TEATR NOVI SAD



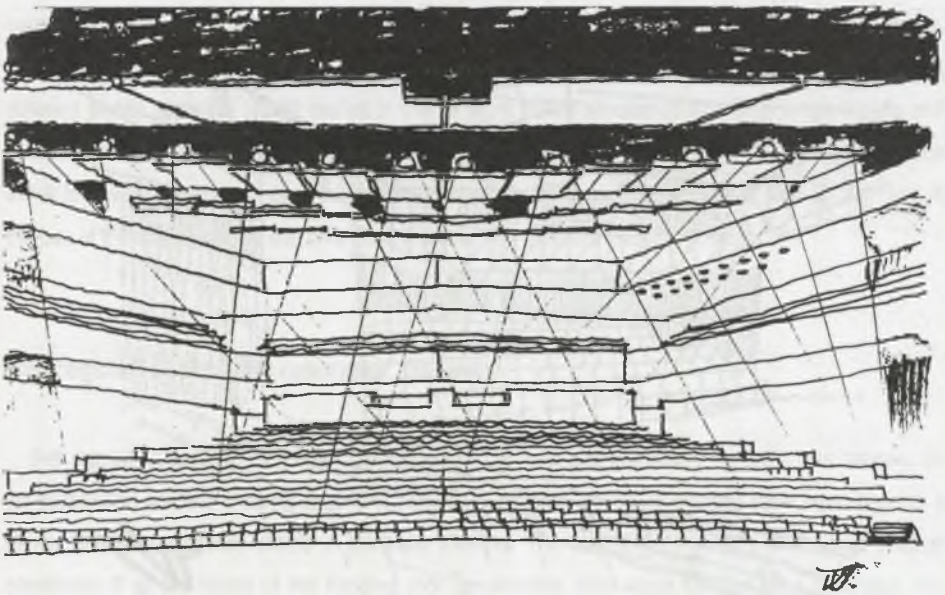
OPERA ESSEN

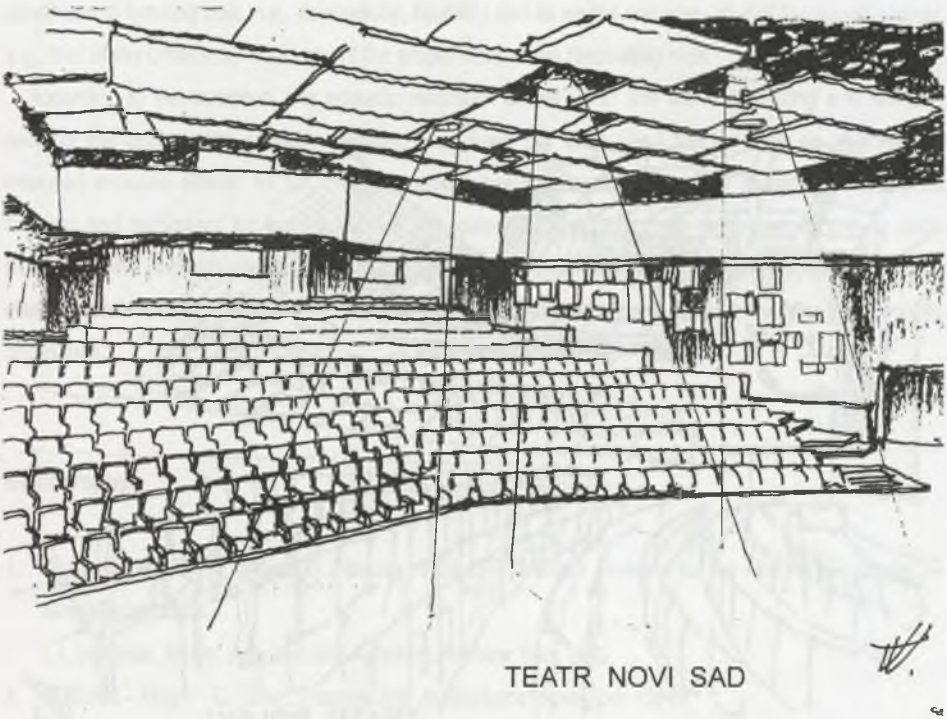
Rys.3. Teatr Nowy Sad i Opera w Essen

Rys.4. Teatr Nowy Sad d. Jugoslawia – W. Jackiewicz

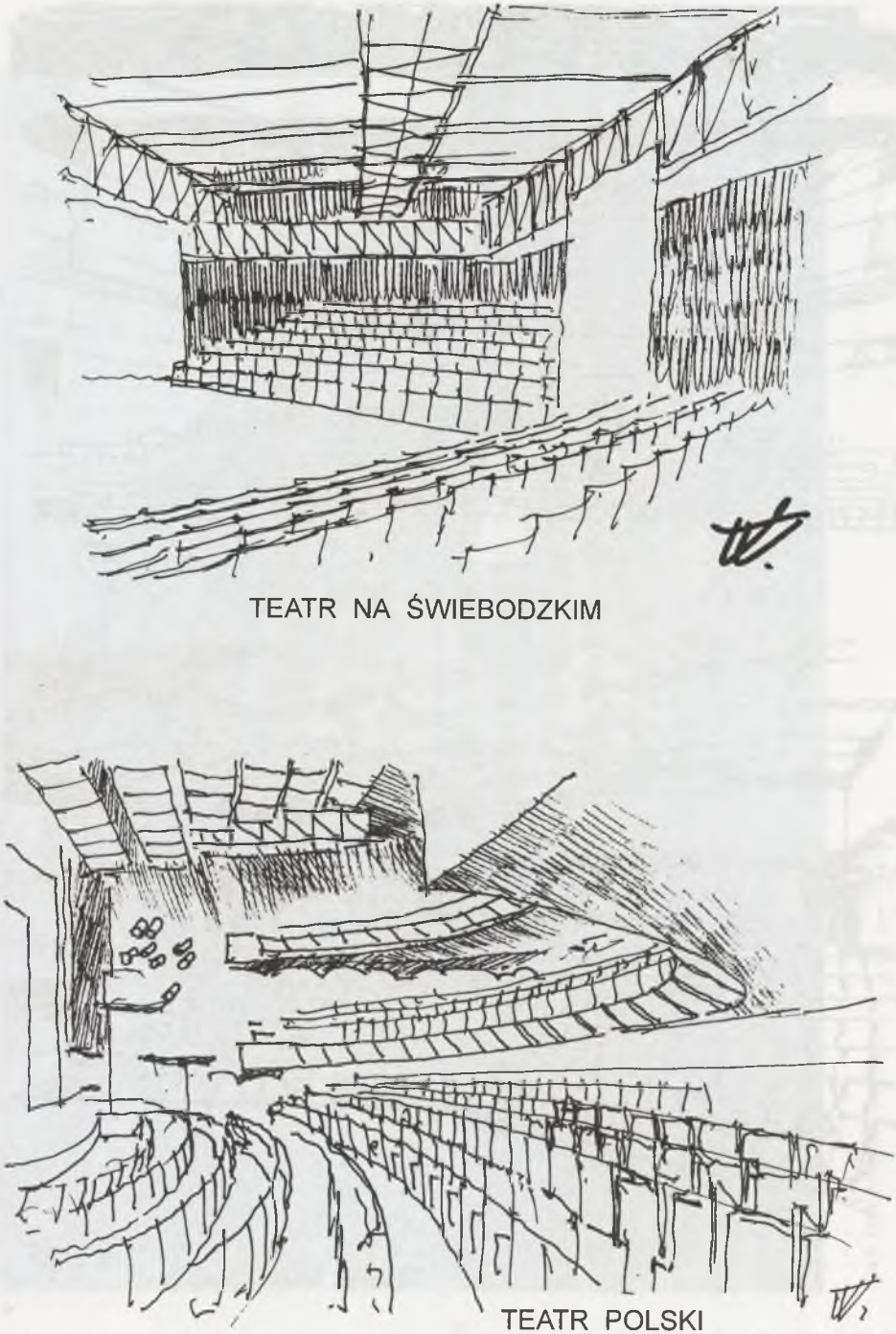
Rys.5. Teatr Nowy Sad

Rys.6. Teatr Polski – W. Jackiewicz





Rys.7. Narodowy Teatr Nowy Sad d. Jugosławia – W. Jackiewicz



Rys.8. Teatr na Świebodzkim i Teatr Polski we Wrocławiu

construction of the permanent screen with a single support control suitable weight, materials and shape, This control depends on the change of support conditions from loose suspension in one or more points, different elastic supports, to stiff frames in one or more points simultaneeusly. Both single frames and screens and sets of screens can undergo control by means of support chang This change can refer either to any of the screens or to the whole set of screens The benefits that arise from all this refer to the use of the hause , where this invention is applied, for different acoustic purpose.

Self regulating acoustic resonator (patent)

Self regulating acoustic resonator is assigned for my halls and particulary for the a tree hauses, So far suspended screens - ceiling or different kinds or especialy designed housing have been used to a chieve definitive acoustic effects in particular interiors. The aim of the invention is to select phisical conditions of all the layers of the hanging roof construction, that would function as a resonator, the reflecting screen or resonators of reflecting screens. This aim has been achieved by the use of phisical conditions of housing coat , i.e., its elasticity, flexibility and its weight and size, so that the sound energy, e.g., that of the orchestra, could cause the proper work of the resonating coat.

According to the invention, the acoustic resonator allows us to use the constructing and isolating parts of the coat as the acoustic element. They have not been used for the purpose of achieving intended acoustic effects so far, Hanging roofs used as acoustic resonator assigned for different interiors and particulary for theatre hauses with universal assignment are composed of one or more isolating layers and they possess the selected weight, material, form and span that provide the required elasticity and flexibility. Whan these conditions are fulfilled the roof will produce the required acoustic resonance.

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Omówienie

Tłem osobistej twórczości na polu architektury teatralnej jest analiza ostatnich 20 lat w rozwoju przestrzeni scenicznej. W całej Europie rewaloryzowano w większości teatry istniejące, a budowę nowych ograniczano do wyjątkowych przypadków.

Analizując osiągnięcia z minionego okresu od 1980 roku do 2000 roku w rozwoju budownictwa teatralnego, można śmiało stwierdzić, że teza pracy doktorskiej autora z roku 1962 znalazła potwierdzenie. Tak ze względu na przydatność funkcjonalną, określonej granicy chłonności dla różnych grup teatrów: dramatycznych i muzycznych, a także uniwersalnych, jak też przesłanki ekonomiczne, które w coraz bardziej znaczny sposób dają się zauważać w Europie. Przytoczone

własne realizacje teatralne, jak Teatr w Łasku, Narodowy Teatr w Nowym Sadzie w d. Jugosławii, Teatr na Dworcu Świebodzkim we Wrocławiu o przemiennej przestrzeni scenicznej, Teatr Polski i Teatr Opery we Wrocławiu. O oryginalności rozwiązań świadczą zastosowane projekty wynalazcze – w Teatrze w Łasku zastosowano widownię wielokierunkową stałą z fotelami o obrotowych siedziskach i scenę reliefową panoramiczną umożliwiającą symultaniczne iscenizacje.

W Narodowym Teatrze w Nowym Sadzie w d. Jugosławii zastosowano rozwiązanie przemiennej przestrzeni scenicznej i widownię dla 370 widzów z możliwością powiększania dla 600 widzów, poprzez nawożenie mobilnych segmentów widowni dla dodatkowych 300 widzów. Widownia w sali dużej ze sceną pudełkową o szerokim otworze scenicznym dla 950 widzów. Sala charakteryzuje się też rozwiniętym panoramicznym proscenium.

Teatr na Dworcu Świebodzkim we Wrocławiu, z widownią mobilną dla liczby nie większej niż 300 foteli z przestrzenią sceniczną przemienną.

Teatr Polski we Wrocławiu z widownią dla 750 widzów i szerokim panoramicznym proscenium. W Teatrze Polskim zastosowano rozwiązanie wynalazcze rezonatora akustycznego samoregulującego polegającego na wstępnym sprężeniu szklanych ekranów. Podobne rozwiązanie zastosowano w sali koncertowej WOSPR i TV w Katowicach wg projektu autora, z tym że ekrany akustyczne wykonane zostały ze sprężonej blachy stalowej.

Ostatnią w chwili obecnej realizacją teatralną autora jest częściowo zrealizowany projekt modernizacji Opery we Wrocławiu. Projekt modernizacji uwzględnił przebudowę strefy sceny i zascenia, wbudowanie dwu kondygnacji garderób, pogłębienie zascenia poprzez wykorzystanie możliwości przestrzennych, rozszerzenie otworu w tylnej ścianie sceny, co pozwoliło uzyskać nową przestrzeń dla inscenizacji.