

Pipe Organ Basics

This is an edited portion of an article prepared by Stanley Scheer, Vice President of Casavant Frères organ company in Saint-Hyacinthe, Quebec. Participants in the June 2002 Interfaith Forum on Religion, Art and Architecture conference had the opportunity to tour the Casavant Freres facility and learn about pipe organ building first hand.

Organ Building: A Fluid Art with Deep Historical Roots

The very first pipe organ was constructed around 250 BC, making the organ the oldest keyboard instrument in existence. Obviously much has changed since that date, from the original hand pumping to present-day electric blowers, as well as new developments such as the application of solid-state technology. However, throughout the organ's long history the basic principle of producing sound continues to be wind flowing through metal and wooden pipes.

denominational worship practices in planning for a truly successful instrument.

Acoustical Considerations

In planning for a new instrument it is especially important to review all of the aspects of the building into which it will be placed. Although some people may view an acoustical evaluation as primarily important for the organ and choir, one of the most important benefits of such studies is to provide an environment that encourages and supports congregational participation in the singing of hymns and liturgy of the church, as well as addresses the clarity and propagation of the spoken word. While it is easy to play the role of amateur acoustician, it is strongly suggest that a professional person with a demonstrated successful track record in church acoustics be engaged to address these important issues. Other than providing an excellent space for music and the spoken word, the true value in having such advice is to avoid costly remedies for problems that become apparent only after the building is completed.

When churches are contemplating physical changes to an existing building or construction of a new worship space, it is important to realize the impact of the physical structure on all sounds generated in the building. It is common to think mainly of reverberation when the term acoustic is used, and while this is an important aspect of acoustics that support and enhance the worship experience, there is at least one other area that is vital to the success of both the spoken word and music. Modern-day construction methods that allow walls, ceilings and floors to be built with lightweight materials, are not necessarily conducive to the best musical results. This is especially true for bass sounds, the energy of which can be absorbed by thin surfaces, which absorb rather than reflect sound energy back into the space. Therefore interior surfaces should be as hard and solid as possible. Where frame construction is employed, two layers of drywall five-eighths of an inch thick, glued and screwed together usually are recommended as the minimum wall thickness.

The earliest organs were mechanical action organs (sometimes called tracker organs) where the connection between the key and the valve under the pipe is by direct mechanical linkage. In the latter part of the nineteenth-century interest grew in making instruments bigger to fill ever-larger churches and spaces such as municipal halls. The creation of larger instruments, coupled with increased wind pressures required to fill a huge cubic volume of space made demands upon the playing action that resulted in an increasingly heavy touch. In order to find a solution to this problem, builders tried various combinations of pneumatics and electric mechanisms, some of which were more successful than others. The systems that found more accepted application included: tubular-pneumatic, the Barker lever, and electro-pneumatic action. Of these systems only the latter remains today as one of the more universally accepted and applied types of electric action.

The choice of using a mechanical action organ, or an electro-pneumatic or electric slider chest organ (both employing electricity) should be based upon a complete understanding of their differences in order to select the one that best suits the needs of a particular situation. It is important not to assume that the differences between one action and the other will result in monumentally different costs in the long-term maintenance. Indeed sometimes one is presented as being virtually maintenance free with the other extraordinarily expensive. As with most things, the quality of materials and workmanship is the most important element in determining the longevity of an instrument.

Just as easily as one can see changes in church architecture and the visual liturgical arts, there are comparable changes in the style of organs throughout history. Besides period changes that mirror the major musical stylistic periods such as Baroque, Classic and Romantic; there are also nationalistic styles that grew from the musical expression of a particular country and even regions within a given country. In the twentieth century, especially following the Second World War, organists became more and more aware of these stylistic differences and began to request that they be incorporated into instruments built in North America. The result is that there are a number of choices that can be made today with regard to having an instrument reflect a particular style or period. In addition to these stylistic differences an organ builder must consider the acoustical setting and musical requirements of

Another important aspect to the success of both speech and music is to have a quiet environment in which to hear. Extraneous noise from outside the church, i.e. traffic noise; or noisy heating and air-conditioning equipment will compete for the listener's attention or result in the need to boost the sound output level of speech and music to a higher level. Mechanical noise from system motors and fans should be isolated from the building, and the ductwork designed to provide an adequate supply of air without air turbulence, which can be caused by too small ductwork or poorly designed diffusers.

Carpet and floor surfaces

We strongly recommend that the floor in the area of the organ and choir be covered with a material that is hard and reflective. This is desirable in order to provide a surface where sounds can mix and blend before traveling into the nave (assuming the organ is not located in the nave). Such a surface is important not just for the sound of the organ but also for the choirs that sing in this area. By having a reflective, rather than absorptive surface, individual choristers are able to hear other singers better, which assists in achieving a better ensemble blend amongst the individual singers and sections. Since all singing benefit from such surfaces we would recommend similar treatment of areas throughout the church to encourage congregational participation in the sung and spoken parts of worship.

Where to Begin

One of the most important steps any church can take if they intend to place a pipe organ in a new building is to select the organ builder early enough in the architectural design phase so that the builder can work with the

acoustician, liturgical consultant, architect and persons from the church building committee in the planning of the building itself. Bringing the builder on board early in the process can save time and money in assuring that the necessary space is available and that the organ is placed in the best possible position in the structure.

The following questions need to be addressed in considering the selection of any organ:

- 1. How will the organ best contribute to the total liturgical environment?**
- 2. What is the desired sound or "playing action"?**
- 3. Where will the organ be placed?**
- 4. How much room is needed for the organ?**
- 5. What does an organ weigh?**
- 6. What about the organ blower and its location?**
- 7. What about temperature and humidity control?**
- 8. Might the organ come into contact with water?**
- 9. How long does it take to build an organ?**
- 10. What happens when the organ arrives at the church?**
- 11. What is the initial cost of the organ?**
- 12. What is the cost of regular organ maintenance?**

Quality in a pipe organ is best measured by the instrument's longevity and reliability, its architectural integration into the building, and its tonal cohesiveness and distinction. Superior quality results when all the elements have been artfully integrated.

Stanley Scheer

An array of additional information on pipe organs, including no less than 24 pipe organ builders and a multitude of photos, is available at the web site of The Associated Pipe Organ Builders of America www.apoba.com