Name

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My Music Discussion

The evolution in music industry production owes the advancement in science and technology. For artists only know how to play the instrument however, how the instrument is designed and manufactured is none of their concern. Like other industries such as aeronautics, automobile, robotics, etc. music too, has been benefitted from the advancement in engineering. When we talk about engineering, mechanical engineering comes on the top of all the engineering disciplines. Mechanical engineering is a discipline that is termed as the mother of all engineering. Its application stretches from small scale industries to mega industries. The whole process of manufacturing and production owes mechanical engineering. In this paper, we will evaluate the role of mechanical engineering in the music industry. Besides, the relation between the music industry and mechanical engineering will also be addressed in this paper.

**Discussion**

The question that most of the people come across is; how does science helped music to evolve? The answer to this question can be well comprehended by tuning of sound. Had there been no science or particularly no physics, the tuning of sound and musical instruments would not have been possible. Besides, without mechanical engineering, the manufacturing of musical instrument wouldn’t be possible either (Hopkin). Following sections will relate mechanical engineering and music industry production.

Fundamentals of engineering design and acoustics are inflexible for the design and development of musical instruments. Statics, dynamics, fluid mechanics, and mechanical vibrations are also pivotal for the development of musical instruments. The design and performance of musical instruments owe both; mechanical engineering and music sciences. Statics and dynamics are important for the structural design of the instrument (Zappi, et.al). However, the basics constraints in designing musical instruments are related to fluid mechanics, mechanical vibrations and acoustics (Ishida and Torii). The basic restriction in the development phase are:

* Loudness: The first constraint is the loudness. As the area of a vibrating body impacts the loudness of the sound, so the designers must design the vibrating body with suitable dimensions and material (Cavaness, et.al).
* Wave motion: The second constraint is the motion exhibited by sound waves. engineers and designers must visualize the interaction of sound waves with each other. The interaction of sound waves is also a mechanical phenomenon.
* Tension and Sound: Tension in the strings play a vital in the tuning of some of the musical instruments. By changing the tension in the string, wave patterns and frequency changes which affect the resulting tone. Moreover, the material and dimension of the strings used also affect the tension which subsequently impacts tuning.
* Doppler Shift: Designers must have while designing the musical instrument. Doppler shift signifies how the frequency and amplitude of the sound wave will change as instrument and listener move relatively. From a design point of view, designers have to cater for the minimum and maximum frequency of the sound during doppler shift.
* Visualization of Nodes: Visualizing the behavior of air for designing wind instrument is very important. Fluid mechanics is the subject that deals with the analysis of fluid. So, the mechanics of air in the wind instrument must be known before the designer undertake the drafting of musical instrument. The behavior of air will impact all the parameters such as the frequency of the sound, its loudness, its pitch, and its amplitude.
* Analyzing Vibrational Modes: Vibrational analysis is also important for the designing instrument. Without analyzing vibrational modes no designer can design a good musical instrument.

Following the design, there comes a manufacturing phase. Several techniques exist in manufacturing technology that may help the manufacturing engineers to build the instrument according to the design. Manufacturing engineering must have a sound knowledge of sheet metal working, machining, molding, casting, etc. Some of the instruments might require machining of the raw material, some might require molding and casting operations and some instruments may ask for sheet metal (Ryan). The role of mechanical engineering will remain pivotal for the development of musical instrument.

The performance of the instrument solely depends upon the design of the musical instrument. The performance of the instrument may be impacted if the constraints are not addressed properly during the design phase. All the constraints aforementioned are mechanical in nature. So, the music industry cannot be separated from mechanical engineering. The physical acoustics of some wooden instruments, string instruments can also play a great role in improving sound quality and playability of the instrument. So, modes of vibration are so much important in this regard.

The role of mechanical engineering in the music industry production is not confined to the design and development of instruments. The effect of certain mechanical parameters can also be studied to relate mechanical engineering with the music industry. For instance, the temperature can impact the instrument' s sound in several ways. However, the intensity of this impact may vary from instrument to instrument. In the case of the Violin, the friction between the bow and strings will be reduced in the presence of warmer air (Cavaness and Cavaness). The friction change will affect the sound quality of the violin and musician will be required to improvise accordingly. Another example in this regard could be Piano, if the temperature and humidity are high then it results in the swelling of the bushings (Hopkin). The bushings will increase the time delay i.e. the time between when the key is hit by the artist and when the string is hit by the hammer. In this way, a musician will experience sluggishness.
**Conclusion**

The importance of mechanical engineering cannot be downplayed in the music industry. The design phase is the most critical phase during the development of the instrument. Any loophole in the design will affect the performance of the instrument. Also, during the manufacturing process, engineers must be very careful while selecting the type of material and type of manufacturing operation for a particular instrument. Music industry depends upon mechanical engineering and if mechanical engineering is separated from the music industry, the music industry would come to its knees.

Works Cited

Cavaness, Jack D., and Deanne E. Cavaness. *Body for Stringed Musical Instrument*. May 1998.

Hopkin, Bart. *Musical Instrument Design: Practical Information for Instrument Making*. See sharp press, 1996.

Ishida, Tadayuki, and Katsuhiko Torii. *Acoustic Control System for Electronic Musical Instrument*. July 2005.

Ryan, Joel. “Some Remarks on Musical Instrument Design at STEIM.” *Contemporary Music Review*, vol. 6, no. 1, 1991, pp. 3–17.

Zappi, Victor, and Andrew McPherson. “Dimensionality and Appropriation in Digital Musical Instrument Design.” *NIME*, 2014, pp. 455–460.