

Acoustic Assessment

Analysis Date: 31st July 2017
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 Performed For: Holy Spirit Catholic Church
 Tests Performed: Reverberation Time Assessment

Description:

An analysis was performed by RNS Acoustics at the request of Holy Spirit Catholic Church to determine the Reverberation time (RT30) and provide recommendations to make speech more intelligible while still retaining music quality. Also included are estimated prices for the solutions outlined in this report.

Findings:

The RT30 is a measure of how long sound remains in a space after the initial source. This could be a hand clap, speech, or music. The longer the RT30, the more difficult it is to understand speech because the words mix together so by the time a new word is spoken, the previous word is still audible. On the other hand, music tends to sound better and more lively as RT30 increases. There is an optimal RT30 for given volumes of spaces as well as activities that will provide enough absorption to make speech more intelligible but not too much that makes music sound dull and lifeless. For Holy Spirit Catholic Church, the optimal RT30 range is between 1.5-2.5 seconds. This is shown in Figure 1. below along with the measured values from the assessment.

REVERBERATION TIME COMPARISON

AS MEASURED VS OPTIMUM LIMITS

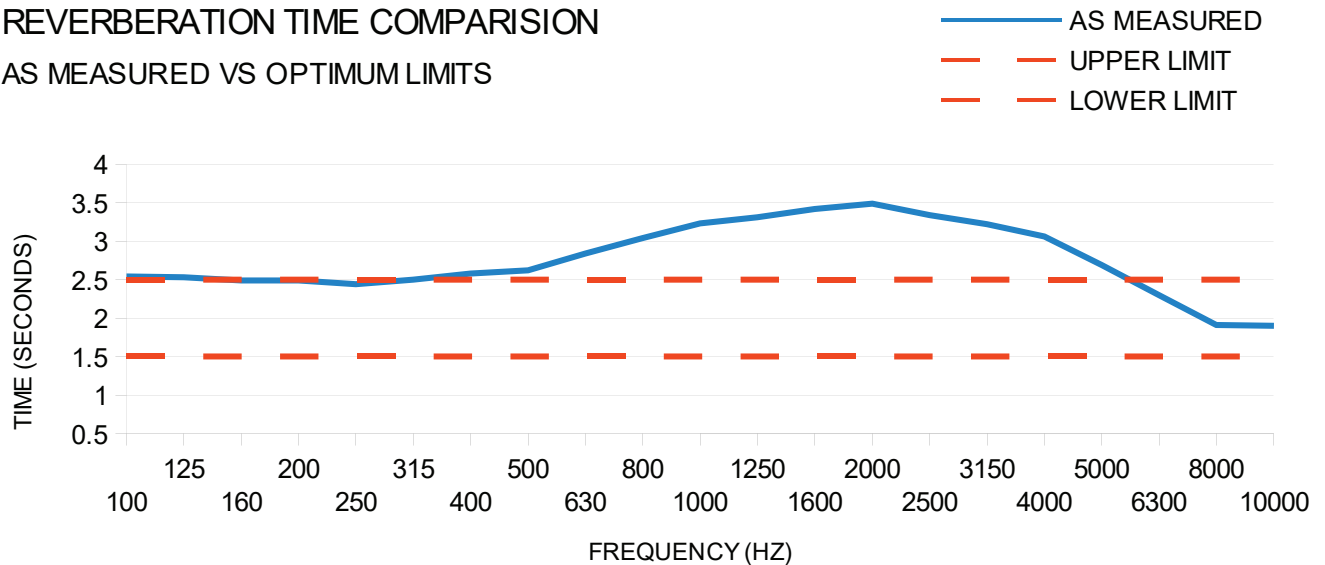


Fig. 1 Measured RT30 vs Optimum Limits

Recommendations:

In order to decrease the RT30, the volume must be decreased or absorption must be added to the space. Since the church is already constructed decreasing the volume is not an option. There are a variety of materials to choose from that will absorb sound. To achieve the best sound, it is preferred to have an RT30 that is relatively flat with respect to frequency that falls within the range shown by the dotted red lines in Figure 1 above. The chosen material is a rigid fiberglass acoustical panel that is 2' wide x 4' tall and 2" deep. Fiberglass is chosen due to its acoustic performance, longevity and lack of harmful materials. In order to achieve the required RT30 for the Holy Spirit Catholic Church, 86 panels are recommended in the main hall as well as 10 in the left room beside the altar and 4 in the right room. Figure 2. below shows the estimated RT30 in the main hall with 86 panels distributed evenly throughout the space. Also shown is the RT30 if 134 panels were used in the main hall.

REVERBERATION TIME COMPARISON

86 AND 134 PANELS VS OPTIMUM LIMITS

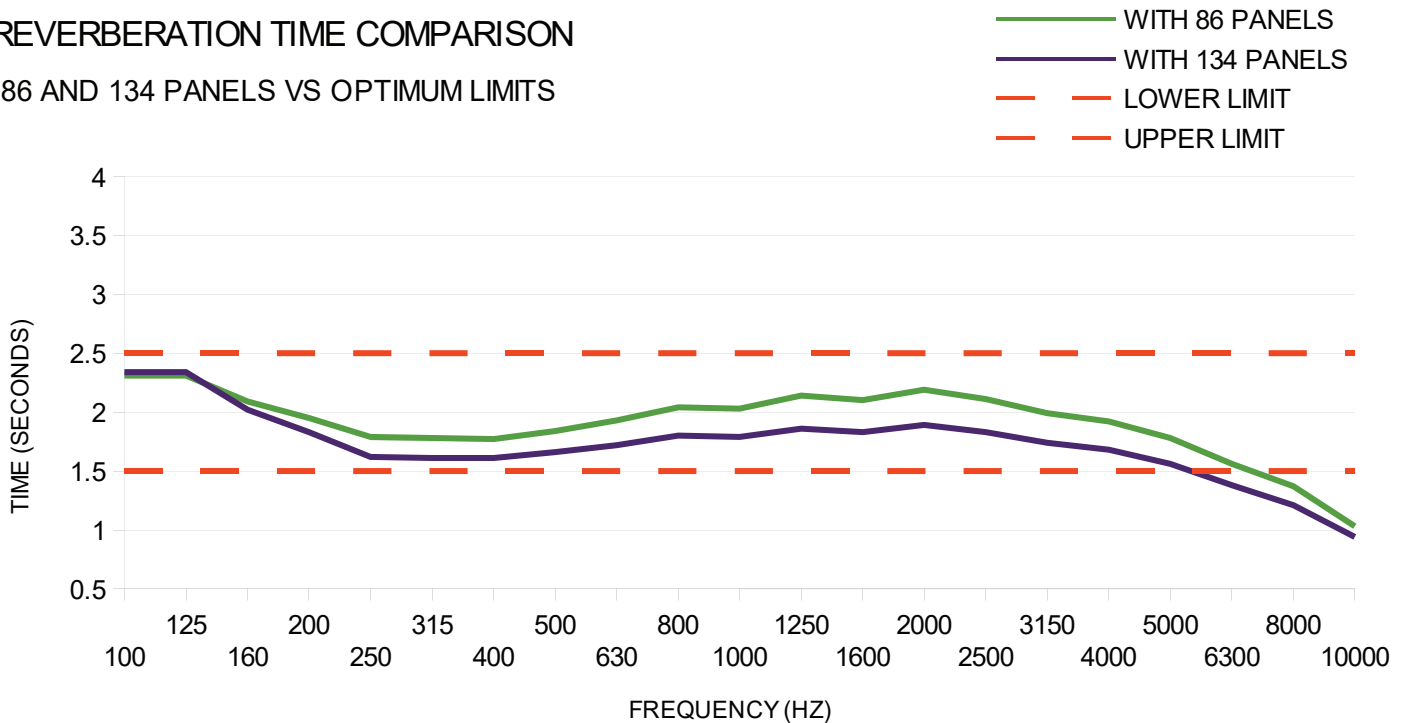


Figure 2. RT30 with 86 and 134 Panels and Optimum Limits

As can be seen above, the resulting RT30 from adding 86 panels to the space lies within the range for optimum reproduction of both speech and music. Also note that adding 48 more panels does not change the RT30 as much as the initial 86.

Installation:

The panels should be distributed evenly throughout the hall to absorb sound most efficiently. Wall mounted panels should attach directly to the wall and ceiling mounted panels should be hung down 2-3ft to absorb sound on both sides and increase their absorption rating. Figure 3. below shows a CAD drawing with possible layouts of the panels. This configuration can be adjusted as needed for lighting, aesthetics, etc. The most important aspect is that they are distributed evenly.

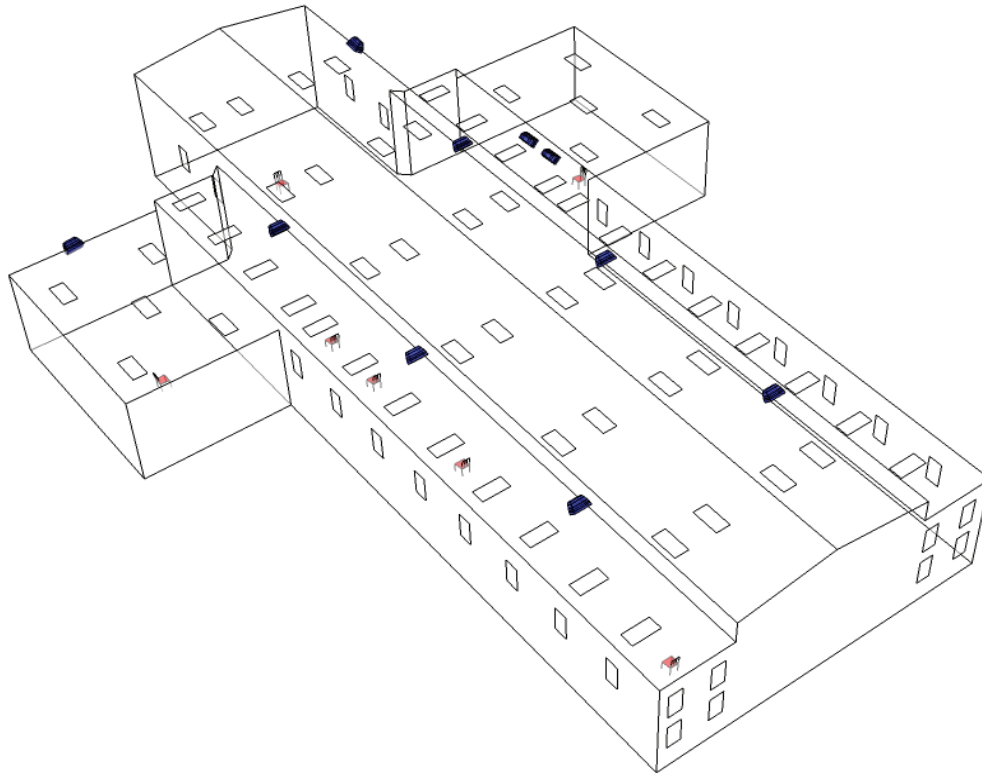


Figure 4. Layout of panels distributed evenly throughout the main church hall.

Estimated Price:

The installation of 100 panels (86 in main hall and 14 in side rooms) is This includes procurement and delivery of panels as well as installation and verification that it meets the required RT30.

If more panels are desired the distribution would be 134 in the main hall and 16 throughout both side rooms. The total price for the installation of 150 panels is

NOTE: Price is dependent on the number of panels desired as well as fabric type/ color.

Results:

Figure 2. below shows the comparison of the predicted and measured results with 134 panels installed in the church. As can be seen the measured results match the predicted very closely.

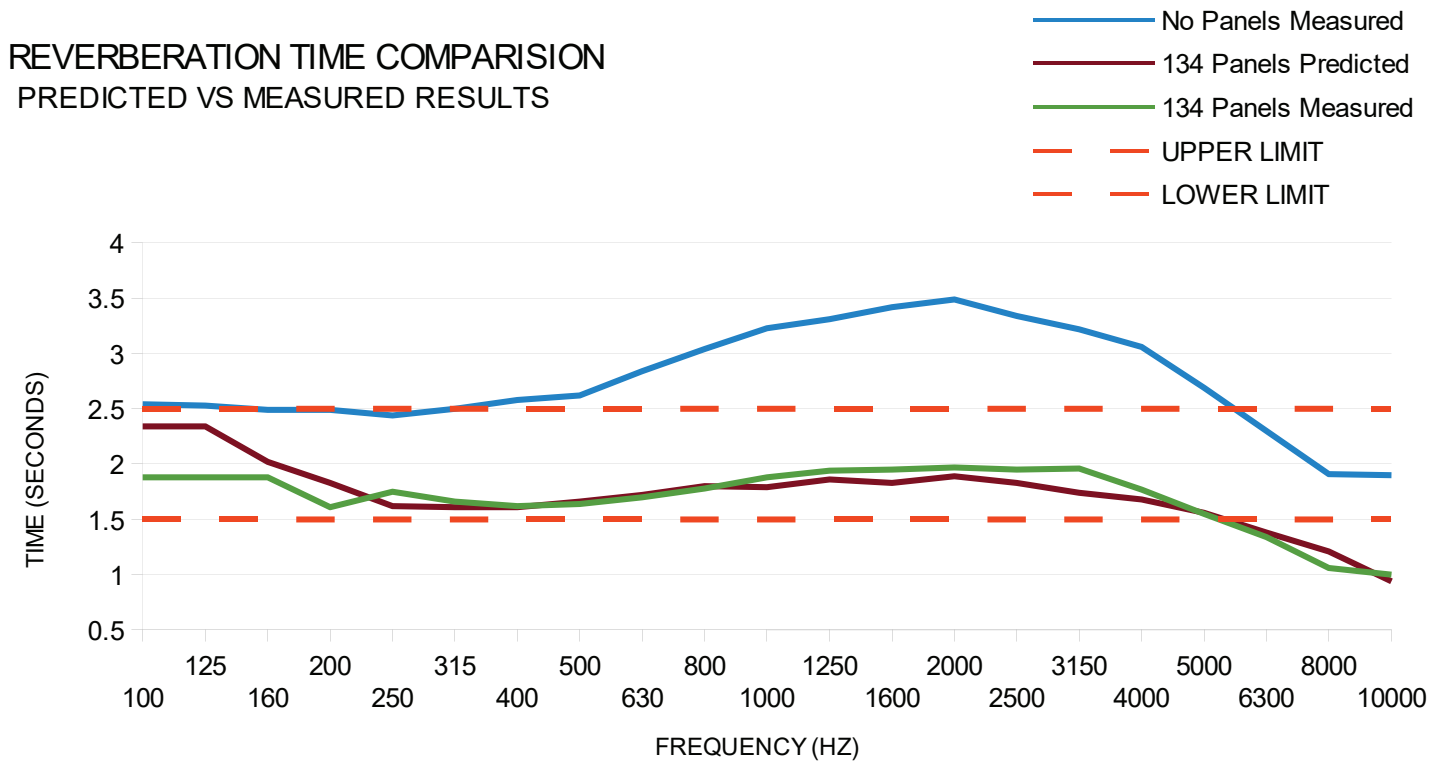


Figure 2. Measured vs Predicted Reverberation Time