

Problem:

A marine customer had to reduce the NOx emissions of a quad engine ferry utilizing a selective catalytic reduction (SCR) system. The SCR catalyst and housing would replace the existing silencer, and the customer needed to verify that noise levels would remain the same.

Solution:

STEP Combustion performed a sound attenuation analysis of the existing silencer and proposed catalyst assembly to determine the anticipated changes to the noise characteristics.

Results:

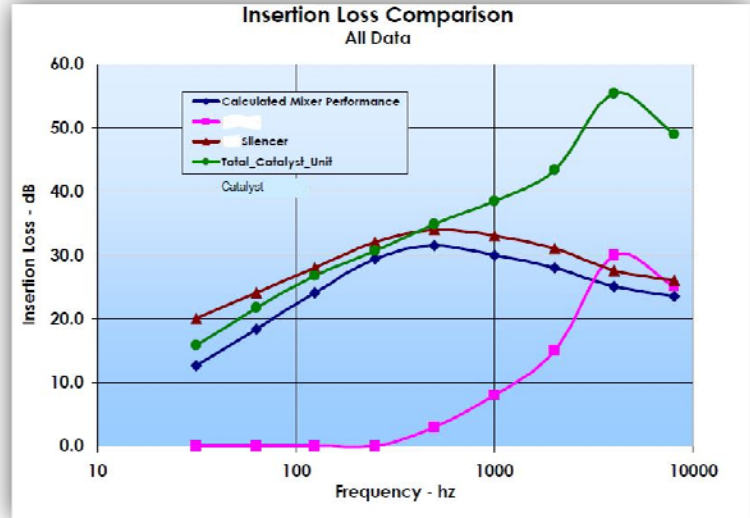
STEP analyzed the performance of both the existing silencer and the new SCR housing for sound attenuation characteristics. The catalyst was analyzed in three distinctive sections including: forward mixing chamber, catalyst section, and rear outlet. Each section was evaluated for sound attenuation

(Insertion Loss) over the audible frequency range (see Figure 1). Based on the sound attenuation characteristics and engine sound power output a composite, total sound power output curve was calculated (see Figure 2).

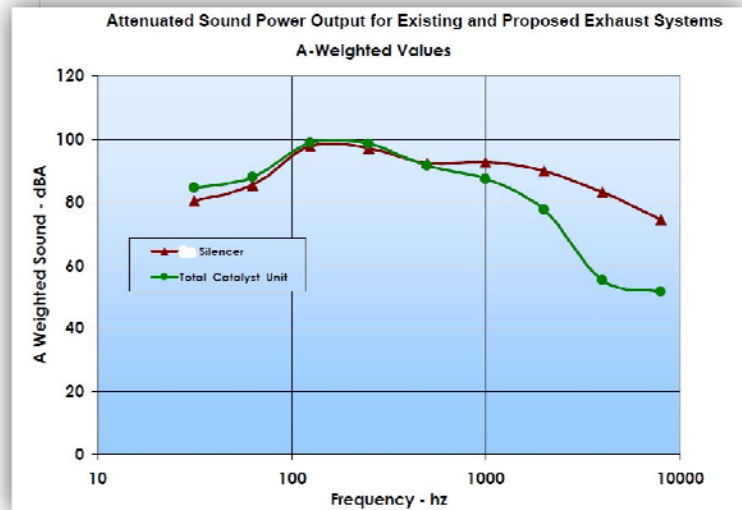
$$L_o = \sum_{i=31.5}^{i=8000} 10 \cdot \log_{10} \left( 10^{\frac{W_i}{10}} \right)$$

**Figure 2 - Sound Power Output Formula**

It was ultimately determined that the sound power output characteristics of the SCR would closely match the original silencer performance and specifications, and not result in a significant increase in engine noise levels.



**Figure1 - Insertion Loss Comparison**



**Figure 1 - Attenuated Sound Power Output Comparison**