Multichamber

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Created: 2025-0

Muffler System

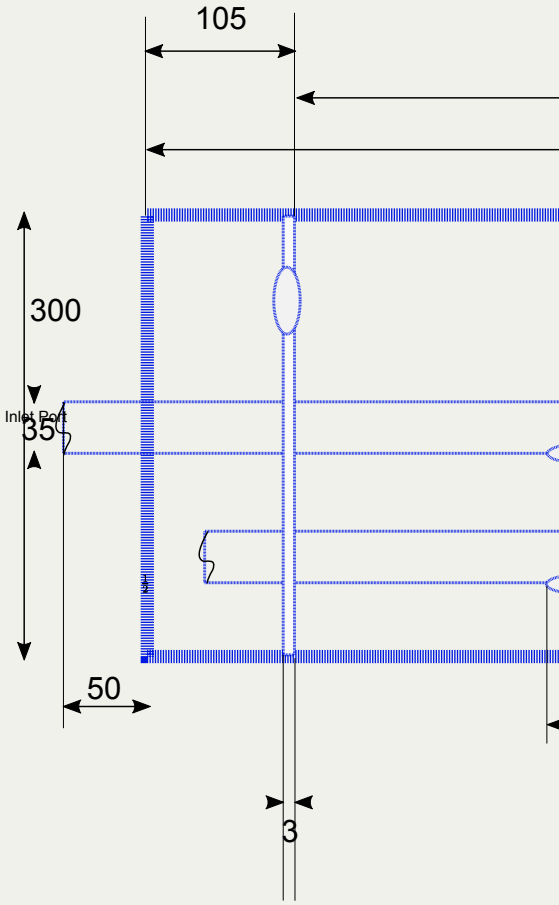
te at University of Kentucky

5-28 Wed 04:40

fler Internal Geometry

Dimen

dimension



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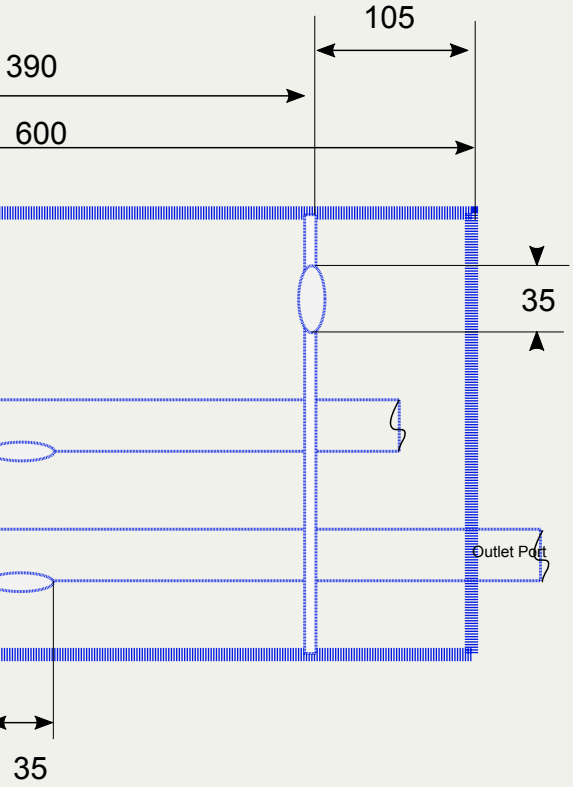
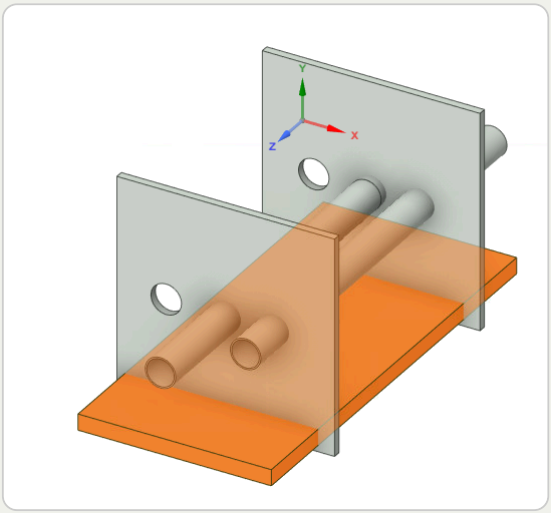
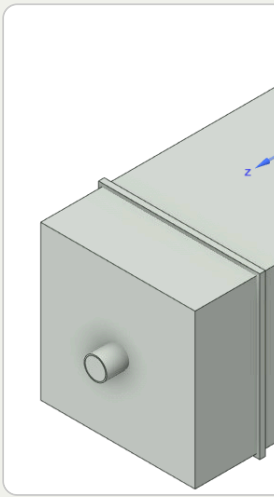
al units in mm



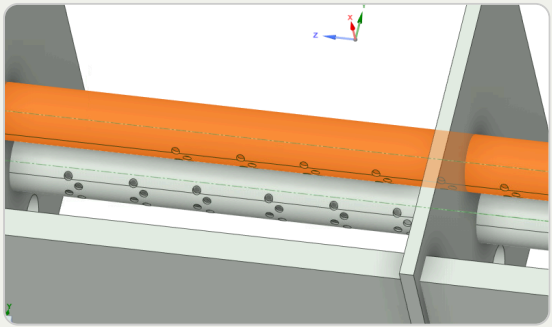


Part 1 — Chamber and Baffle

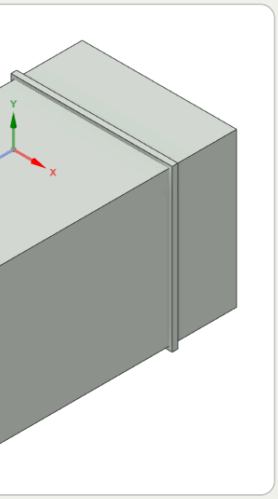


Part 2 — Fl

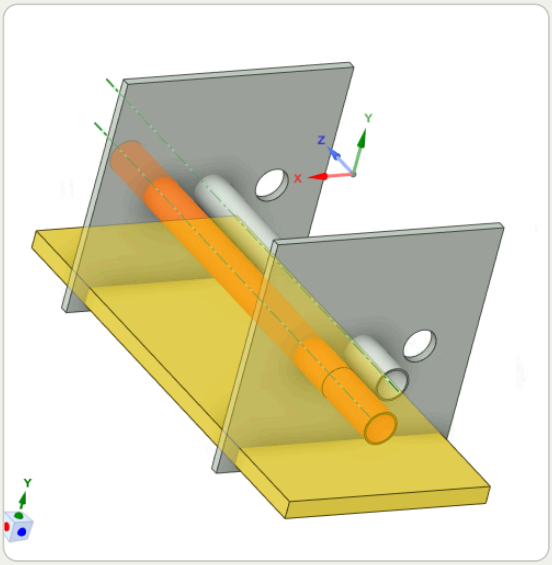
Part 4 — Showing perforates (aimed at fiberglass)



Muffler Subcomponents

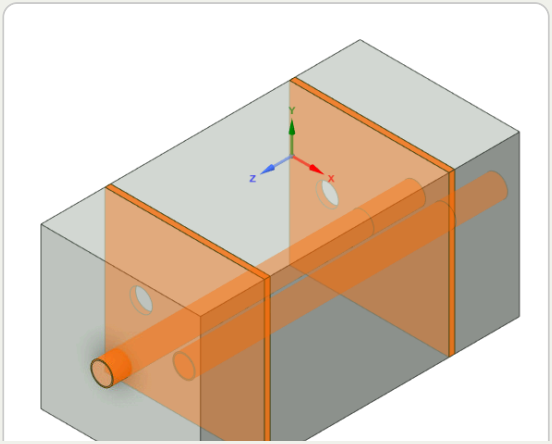


luid domain



Part 3 — Fiberglass Absorbant (gold)

Part 5 — Final Assembly View



Simulated Transmission Loss (0–1000 Hz) by a

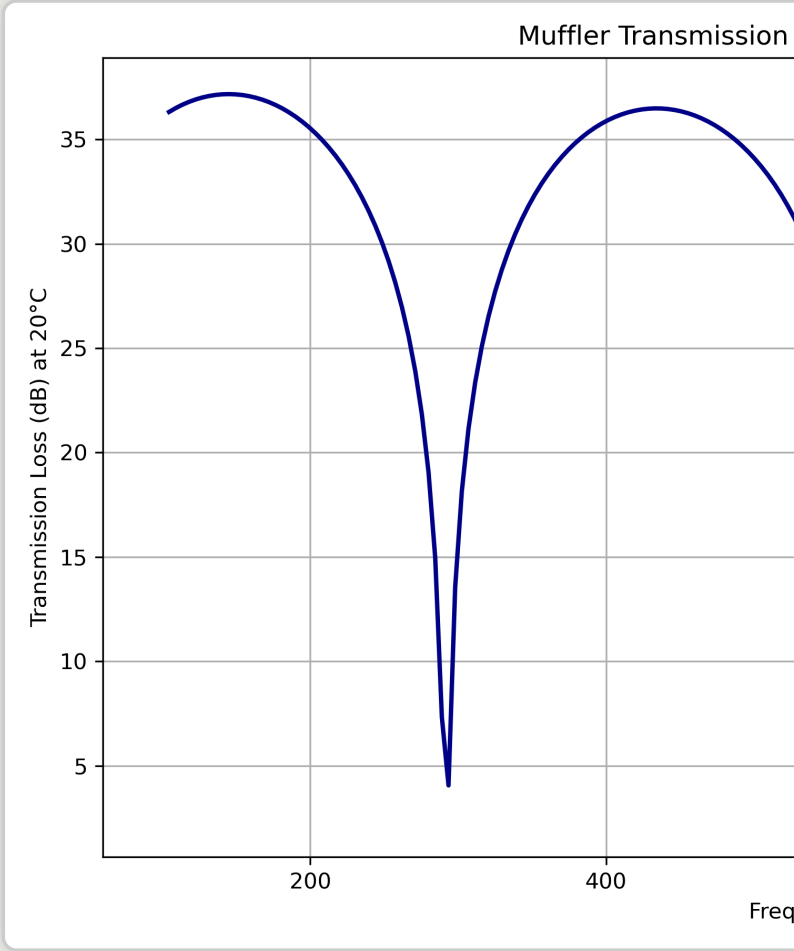
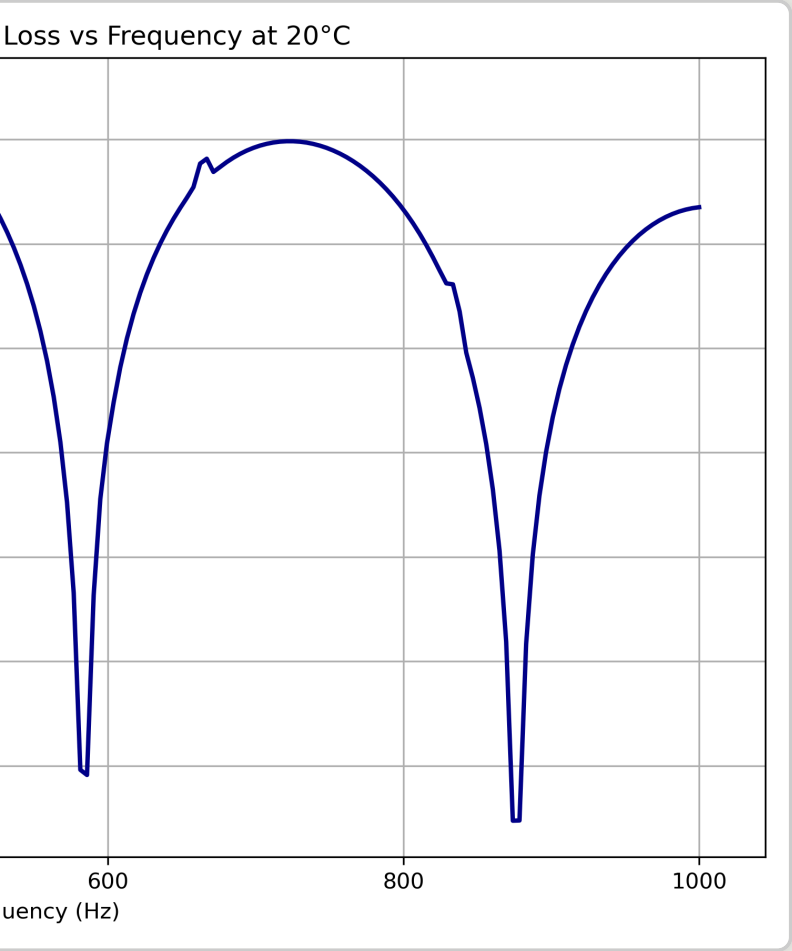


Figure: Transmission Loss curve of the m

mulation

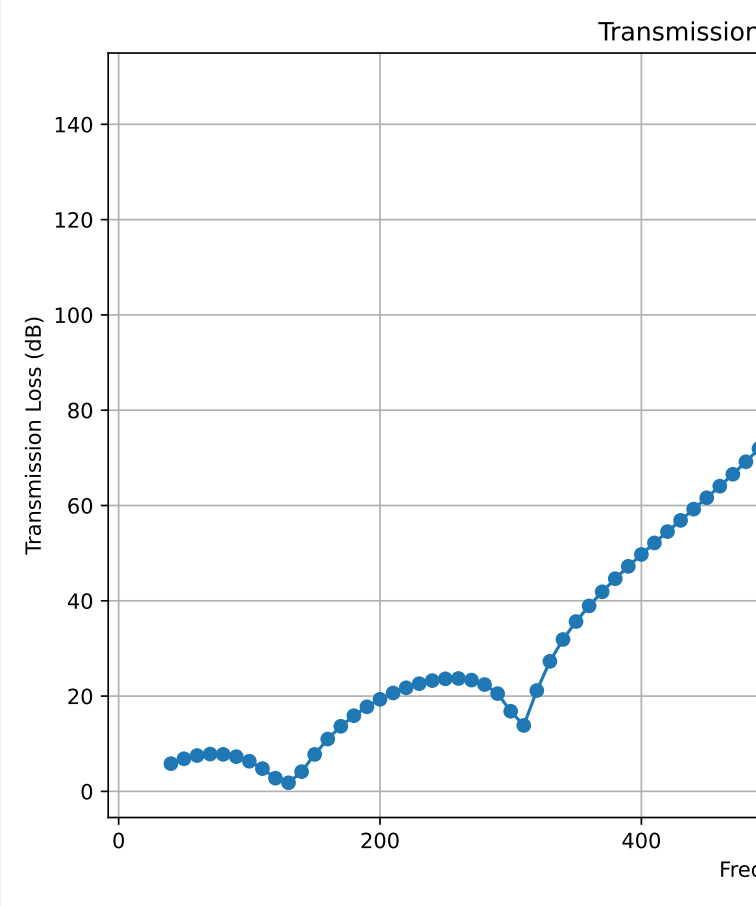
approximating muffler walls as fluid at 20 deg C



uffler between 5 Hz and 1000 Hz at 20°C.

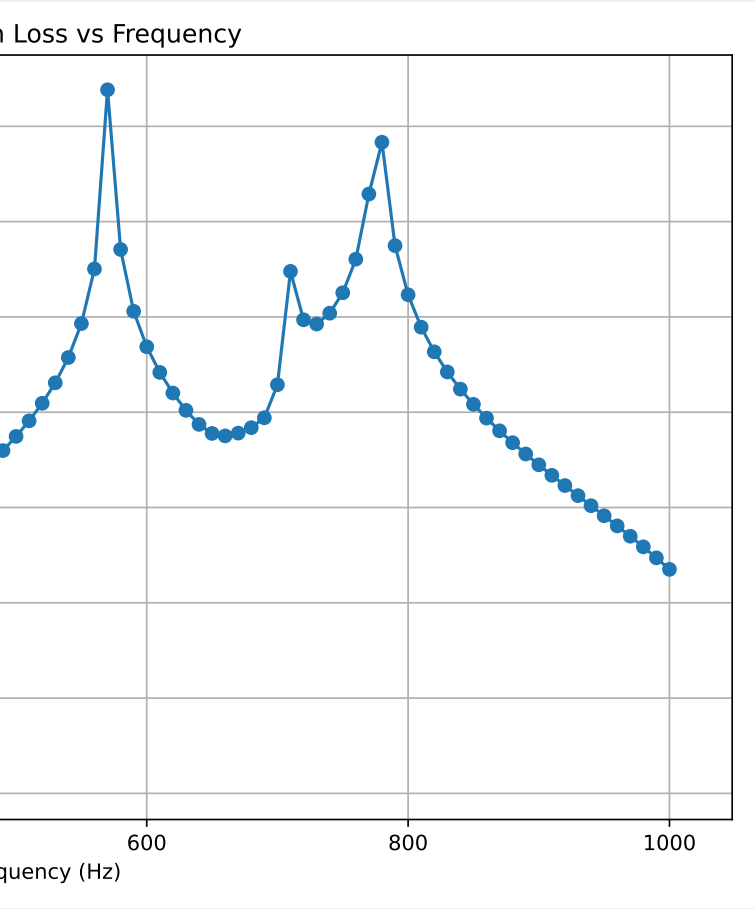
Simlab Si

Simulated Transmission Loss



imulation

s (0–1000 Hz) Simlab model



SIDLAB Model

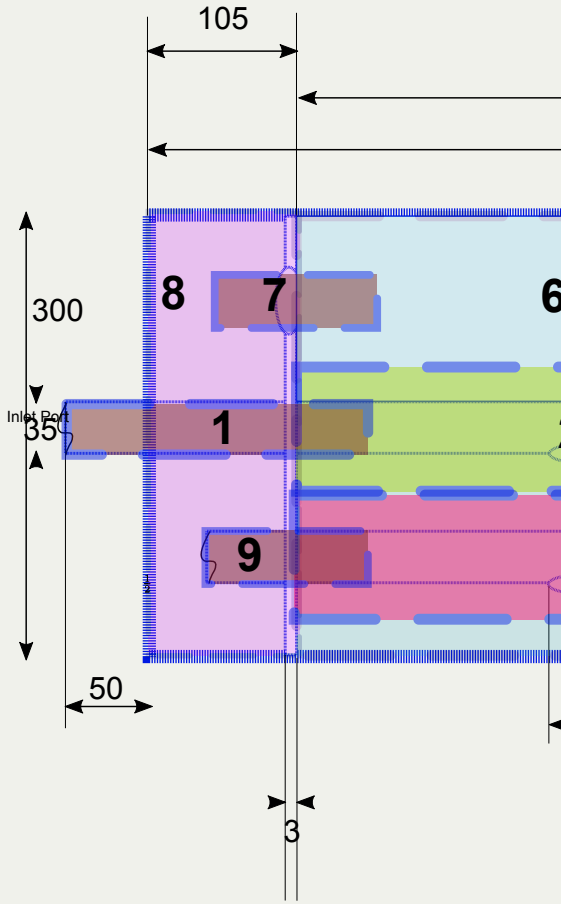
- **File:** `Mark3Sid.zip`
- **Created with:** SIDLAB 5.1
- **⬇ Download SIDLAB File**

le Download Center

ANSYS Simulation

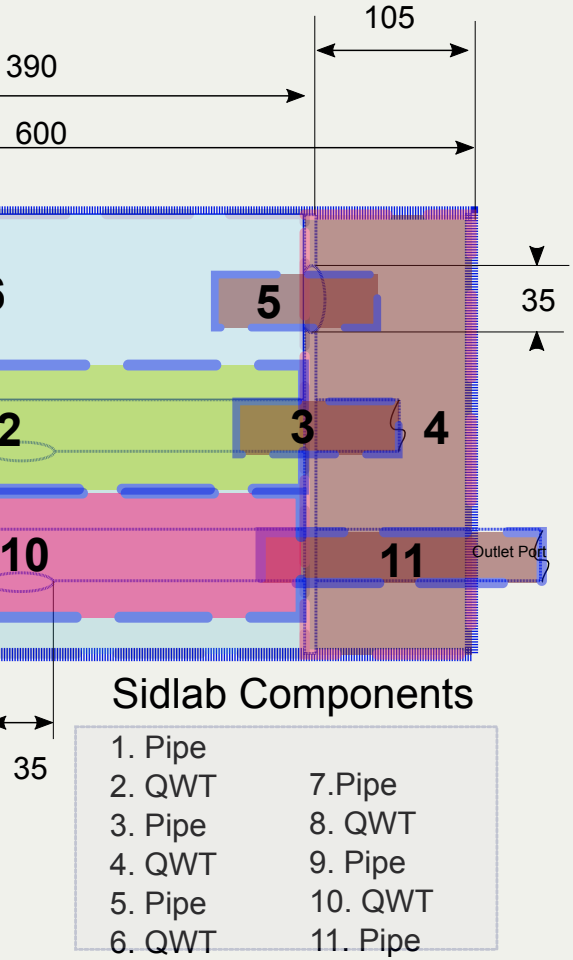
- **File:** `Mark-I-MDF-clearned-data.wbpz`
- **Created with:** ANSYS 2023 R2
- **⬇ Download ANSYS File**

dimension



mponents

al units in mm

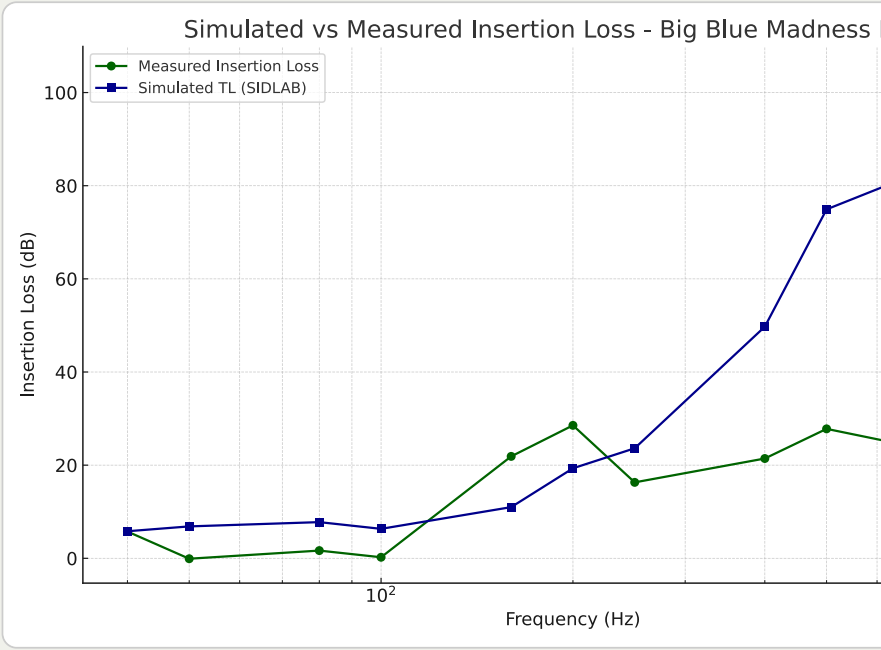


Sidlab Components

1. Pipe	
2. QWT	7.Pipe
3. Pipe	8. QWT
4. QWT	9. Pipe
5. Pipe	10. QWT
6. QWT	11. Pipe

Simulated vs Measu

Measured vs Simulated TL



ured Insertion Loss

Insertion Loss Explanation

Insertion Loss (IL) quantifies how much sound is attenuated when a muffler is added to the system.

General formula:

$$\mathrm{IL} = 10 \log_{10} \left(\frac{P_{\text{baseline}}}{P_{\text{muffler}}} \right)$$

Because our data is already in decibels (dB), this simplifies to:

$$\mathrm{IL} = \mathrm{Power}_{\text{baseline (dB)}} - \mathrm{Power}_{\text{muffler (dB)}}$$

Refer

Cited

1. Munjal ML. *Acoustics of Ducts and Mufflers*. 2nd ed. W
   https://doi.org/10.1002/9781118443125
2. Dokumacı E. *Duct Acoustics: Fundamentals and Appli*
   Press; 2021. ISBN: 9781108840750. https://doi.org/10

Note: These references are foundational texts in muffler a
schematic development, an

ences

Works

Wiley; 2014. ISBN: 9781118443125.

ications to Mufflers and Silencers. Cambridge University

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nd duct acoustics and were consulted for system modeling,
d transmission loss analysis.