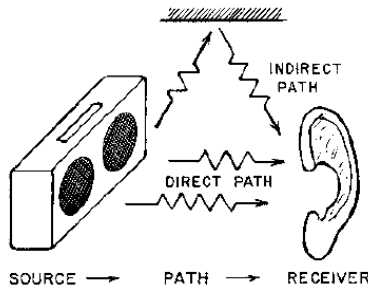
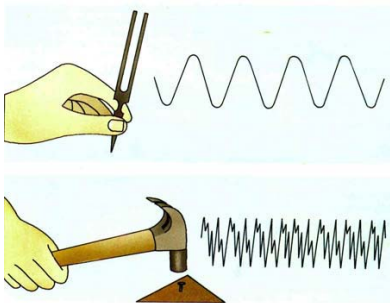


## Industrial Noise Control and Acoustics

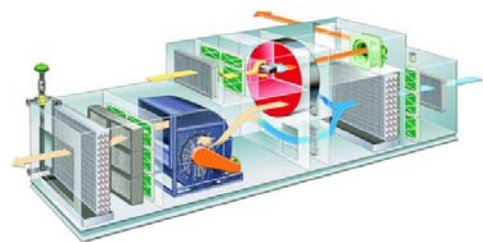
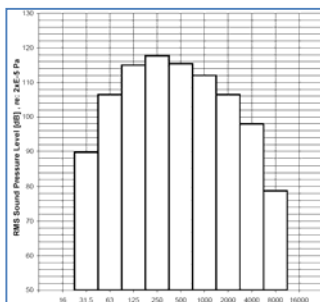
Sound attenuation concepts, sound attenuation materials, design of noise barriers, acoustic enclosures, HVAC ducts, sound splitter attenuators, acoustic louvers and Exhaust silencers



**Full Accreditation Awarded to  
Najah Engineering Consultants LLC**

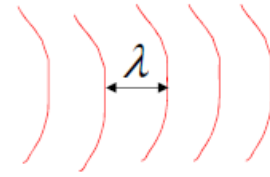
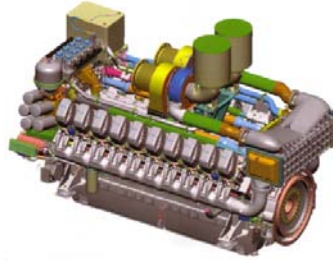


**ISO 3741  
ISO 3744  
ISO 6798  
ISO 140 / ASTM E90  
ISO 7235 / ASTM E477**

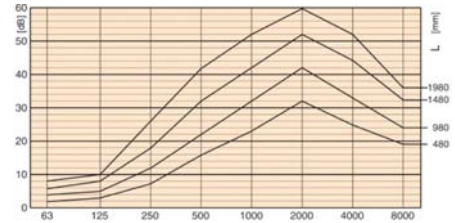
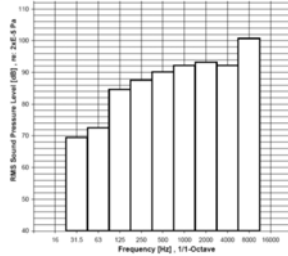


# COURSE LEARNING OBJECTIVES

- Diesel generators noise as a study case
- Other noise sources: Fans, Pumps,...etc
- Sound physics and international regulations
- What is the Decibel (dB)
- Sound octave band
- Sound power (SWL)



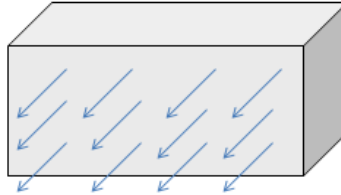
- Sound pressure (SPL)
- SPL data of equipment
- ISO 6798 method
- ISO 3744 method
- Sound A,B,C weightings
- Sound propagation in free field and calculations
- Sound inside rooms and reverberations
- Sound directivity, absorption and reverberation time



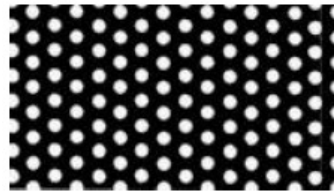
**Sound Propagation in Free Field:**  
 $SPL = SWL - 20 \log r - 11 \quad (dB)$

**Average SPL in Reverberant Room:**  
 $SPL = SWL - 10 \log V + 10 \log T + 13.9 \quad (dB)$

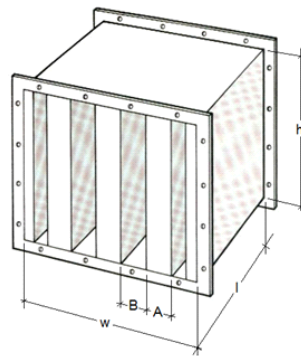
- Sound insulation (absorption, reflection and transmission)
- Acoustic materials types
- Acoustic materials parameters (alpha, TL, SRI, NRC)
- Selection of suitable material for an applications



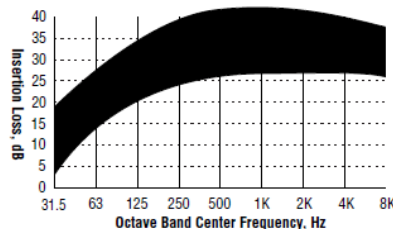
- Perforated sheets acoustic performance
- Noise from inside rooms to outside and calculations
- Acoustic calculation of walls and barriers
- Enclosure wall design exercise
- Rooms and enclosures ventilation and pressure drop calculation



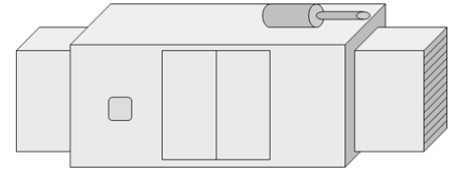
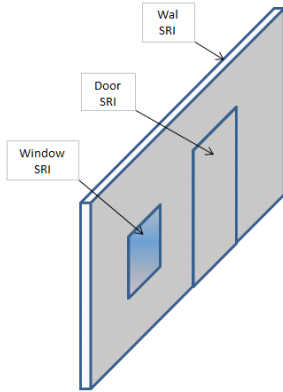
- Rectangular duct attenuators design (sound and pressure drop calculations)
- Rectangular duct attenuator design exercise



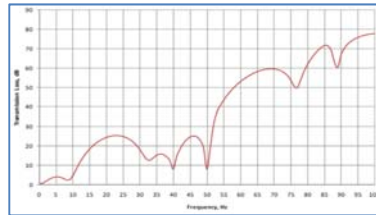
- Acoustic louvers types and design
- Acoustic louvers design exercise (straight blades)
- Exhaust noise design and selection of muffler grade
- Muffler sizing
- Exhaust silencing exercise for diesel generator application



- *Acoustic enclosure design workshop - selection of muffler grade*
- *Acoustic enclosure design workshop - design of walls*
- *Acoustic enclosure design workshop - design of windows and doors*
- *Acoustic enclosure design workshop - design of rectangular attenuator*
- *Acoustic enclosure design workshop - design of acoustic louvers*

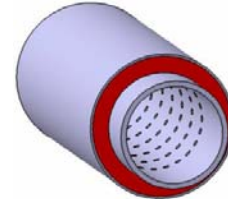
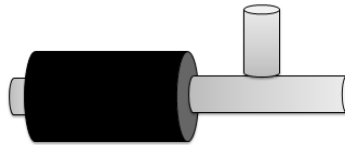
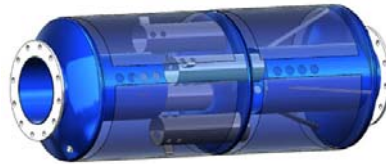


- *Exhaust silencing and insertion loss*
- *Circular Ducts Attenuation*
- *Dissipative Mufflers (absorptive)*
- *Reactive Mufflers*
- *Combination Mufflers*



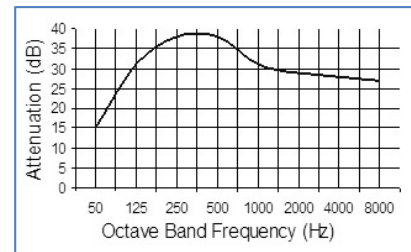
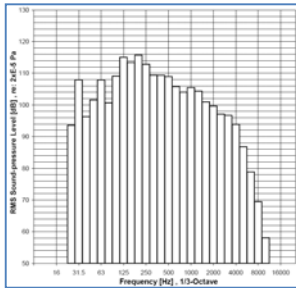
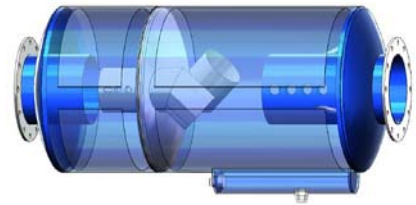
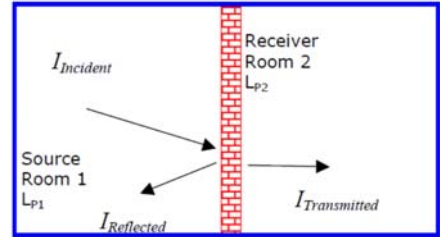
sound transmission, loss, dB										
Octave Band, Hz	63	125	250	500	1K	2K	4K	8K	STC	Wt <sup>2</sup> , lb/ft <sup>2</sup>
Noisshield Septum	21	19	23	35	50	60	68	72	37	9
Noisshield Regular	20	21	27	38	48	58	67	66	40	8
Mill Duty Regular	28	27	28	41	50	57	57	64	43	10.5
Noise-Lock I	25	27	31	41	51	60	65	66	44	9.5
Noise-Lock II and Fire-Noise Lock	27	30	32	41	50	59	67	71	45	10.5

- *Spark Arresting Mufflers*
- *Catalytic Mufflers*
- *Heat Recovery Mufflers*
- *Tuned Mufflers*
- *Active Mufflers*
- *Helmholtz Resonators*
- *Mufflers acoustical performance*
- *Mufflers aero dynamic performance*
- *Design single expansion chamber muffler*
- *Design two chamber muffler*
- *Design of Dissipative muffler*
- *Design of tail pipe*
- *Design of side branch resonator*



# COURSE INFORMATION

<b>Timing</b>	08:30 – 16:00 hrs daily
<b>Lunch</b>	Buffet lunch at 13:30 hrs daily
<b>Coffee Breaks</b>	10:00 – 10:20 and 11:45 – 12:05 hrs
<b>Instructor</b>	<b>Mohammad R. Abdulqader</b> GM of Najah Engineering, Senior Consultant of Power Generation and Industrial Noise Control MSEE, MBA, PMP, Member INCE, ASA, ASHRAE, JEA, PMI, ISA, SEC
<b>Course Hours</b>	24 hours over 16 sessions, each session 1.5 hours = Four (4) Days
<b>Certificate</b>	Course attendance certificate will be issued to all participants who attend at least 75% of the sessions



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