2021-xxx
October 1, 2021

Mr. Customer name
CustomerTitle
Customer Company
Customer Address Line 1
Customer Address Line 2

ANSI National Accreditation Board
ACCREDITED
ISO/IEC 17025
TESTING LABORATORY

Subject: **Results of Oberst Bar Vibration Damping Tests of xxx Bars**
Customer Company Purchase Order No. PO
Kolano and Saha Engineers, Inc. Project No. 2021-xxx

Dear Mr. Last name:

At your request, Kolano and Saha Engineers, Inc. (K&SE) conducted Oberst bar damping tests to evaluate the damping performances of xxx samples that you provided. Each sample was tested at three different temperatures. This made a total of yyy tests.

This report includes the following:

- Letter
- Figure 1
- Tables 1 through x
- Exhibits 1A-xA; 1B-xB

Test Samples

The samples are described as below:

			Measured Data		
Sample No.	**Sample Description**	**Sample Type**	**Thickness (mm)**	**Surf. Density (kg/m^2)**	**Test Temp (^{o}C)**
S1	Sample Description	Extensional	XX	X.XX	20, 40, 60

Measured thickness and surface density information is provided for the samples only i.e., without steel bar and for "**information purposes only**".

Test Method and Measurements

Measurements were made in accordance with SAE Standard J1637 JUN13, "*Laboratory Measurement of the Composite Vibration Damping Properties of Materials on a Supporting Steel Bar",* as much as possible. Kolano and Saha Engineers, Inc. is accredited by ANSI National Accreditation Board (ANAB) to perform this test per ISO/IEC 17025.

The nominal dimensions of the test bars were: mounted free length 200 mm, thickness 0.8 mm, and width 12.7 mm. Figure 1 shows a schematic of the test setup. Measurements were conducted at three different temperatures of 40°F, 80°F and 120°F. These temperatures are different from what is mentioned in the standard. This was done based on a simple decision rule.

Tests were made on a fixture to measure various modes of vibration that were generally between 100 Hz and 1000 Hz for each test bar using a random signal. The resonant frequency and the half power bandwidth frequency (frequency difference between 3 dB downpoints from the resonant peak) of each mode needed for composite loss factor (η_c) computation was read directly from a Pulse Multi-Analyzer System Type 3560. Any deviation from this procedure, if applicable is mentioned in the tabular data sheets. A complete description and calibration records of the instrumentation used are on file with K&SE. It should be noted that not always the 3 dB down points on both sides of the resonant frequency were measurable. In such cases the "n" dB down point method was used wherever possible per SAE Standard J1637.

The precision of measurement by this method, based on 95% confidence limit, is greater than sample to sample variation. The repeatability of tests made of identical samples at K&SE is expected to be higher than the coefficient of variation of 20% for a laboratory, as mentioned in the SAE Standard.

<u>Results</u>

The results are presented in tabular form in Tables 1 through x. These tables also show the interpolated composite loss factor values at 200 Hz, 400 Hz, and 800 Hz for each temperature. These values are based on linear interpolation of two sets of data points where the frequency and the loss factor information are provided in a logarithmic scale, per Equation 3 in the SAE J1637. Should it not be possible to interpolate data, then it is extrapolated.

The exhibits provided at the end of the report are grouped as follows:

- Exhibits 1A through xA show the measured composite loss factor values at each resonant frequency for each temperature.
- Exhibits 1B through xB show the composite loss factor values with frequency for each mode. Please note that the frequency corresponding to a mode will be different from temperature to temperature and from test bar to test bar. Therefore, the results presented this way may not be comparable with each other. However, this presentation shows the smoothness of the curves and the trend of the performance.

Mr. Customer Last Name, we appreciate this opportunity to be of service to Customer Company. Please contact us should you have any questions. We look forward to working together again.

Sincerely,

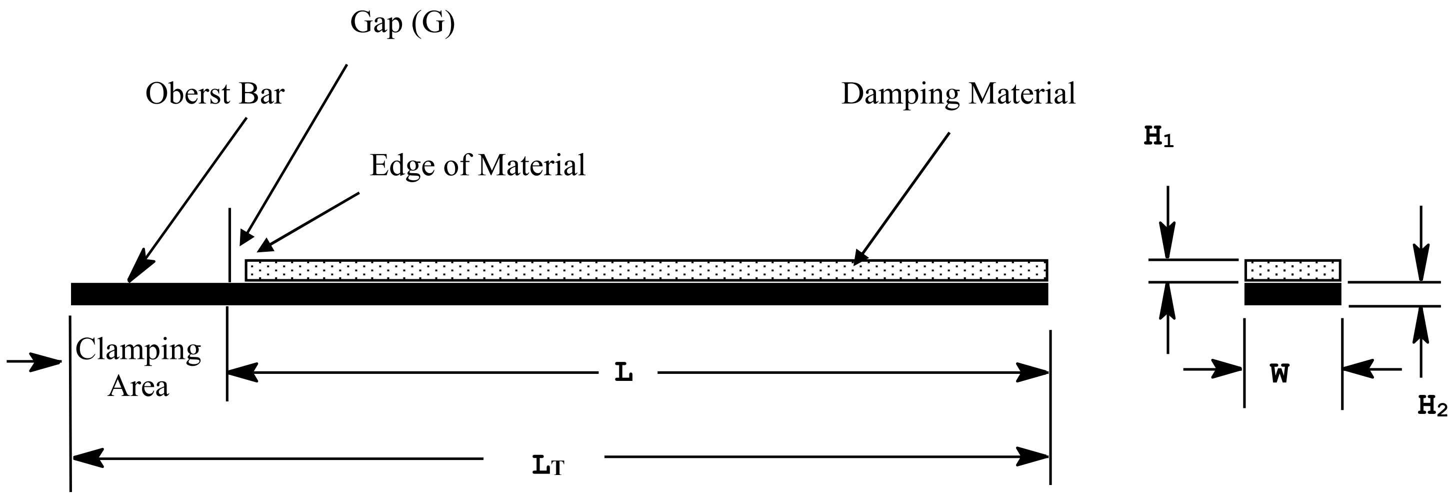
KOLANO AND SAHA ENGINEERS, INC.

K&SE Person's Signature and Title

FIGURE 1

A TYPICAL TEST SAMPLE FOR
OBERST BAR DAMPING TEST

Typical Oberst Bar without Roots



LEGEND

L	=	Free Length of the Oberst Bar: 200 mm This is also the Length of the Damping Material
L_T	=	Total Length of the Oberst Bar
W	=	Width of the Oberst Bar: 12.7 mm
H_2	=	Thickness of the Oberst Bar in the Vibration Direction: 0.8 mm
H_1	=	Thickness of the Damping Material

NOTE

The damping material should not touch the clamping mechanism or the test fixture. The gap (G) between the clamping device and the material should be less than or equal to 0.5 mm.

The damping material included extensional and constrained layer dampers.

Table 1

DAMPING RESULTS FROM OBERST BAR TESTS (SAE J1637)

Tests Conducted for: XYZ
Sample Manufacturer: XYZ
Sample Description: S1:
Cure Cond: NA

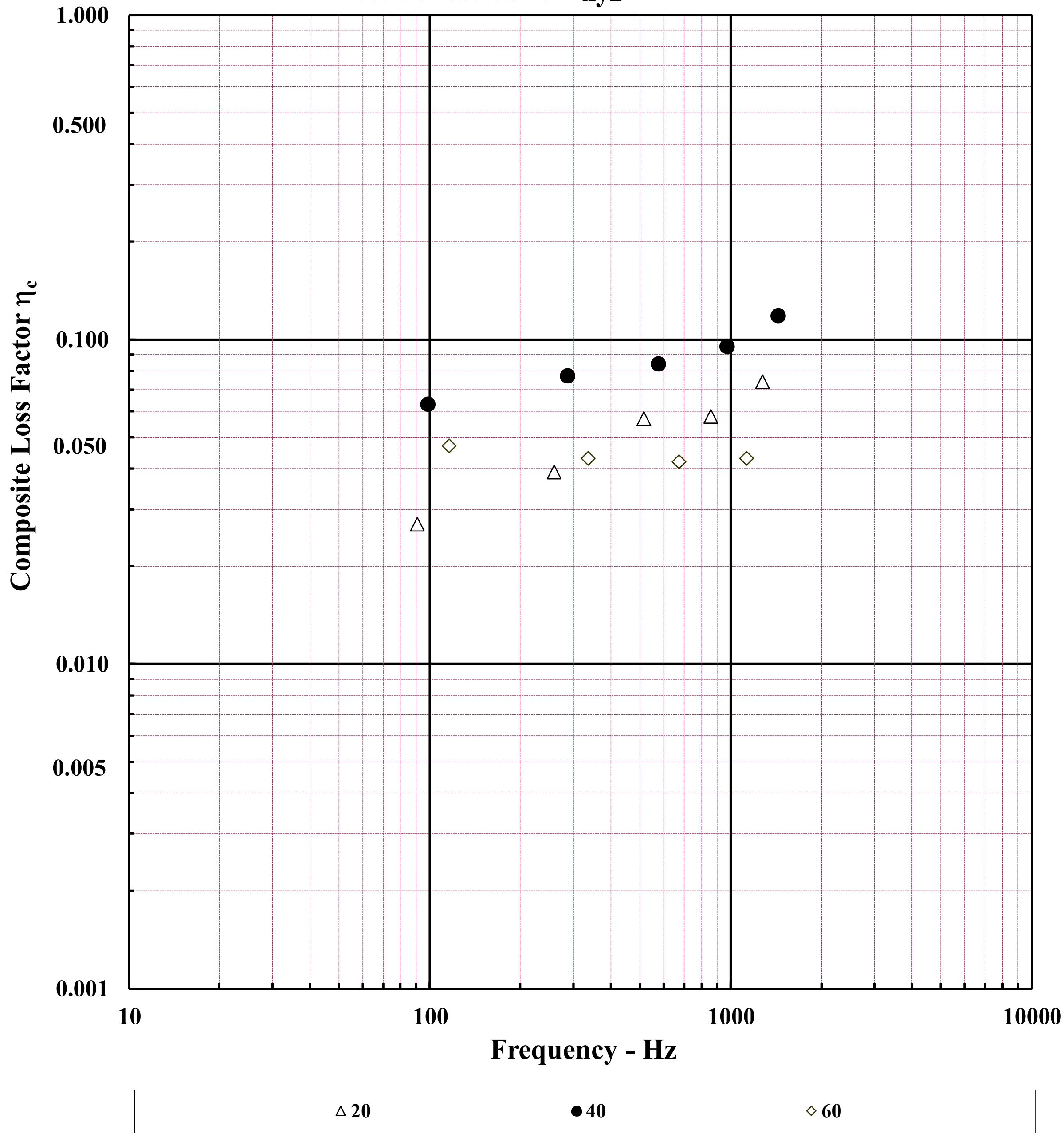
Sample Type: Extentional
Classification: Bar 200-xxx

		Manf. Data	Meas. Data	Steel Bar	Units
Sample Information	Thickness:	N/A	eee	eee	mm
	Surf. Dens:	N/A	yyy	yyy	kg/m^2
	Density:	N/A	zzz	zzz	kg/m^3
	Free Length:	N/A	aaa	aaa	mm

TEST TEMPERATURE	**Measured** MODE	RESONANT FREQUENCY f_c (Hz)	COMPOSITE LOSS FACTOR η_c
20 °C	2	91	0.027
	3	259	0.039
	4	515	0.057
	5	858	0.058
	6	1278	0.074
	Interpolated	200	0.036
		400	0.050
		800	0.058
40 °C	2	99	0.063
	3	287	0.077
	4	576	0.084
	5	973	0.095
	6	1440	0.118
	Interpolated	200	0.072
		400	0.080
		800	0.091
60 °C	2	116	0.047
	3	336	0.043
	4	675	0.042
	5	1132	0.043
	Interpolated	200	0.045
		400	0.043
		800	0.042

COMPOSITE LOSS FACTOR OF A MATERIAL AT 20 °C, 40 °C AND 60 °C FROM OBERST BAR DAMPING TESTS

Test Conducted For: **xyz**



Sample Description: S1:

Meas. Sample Thickness: aaa mm

Meas. Sample Surf. bbb kg/m^2

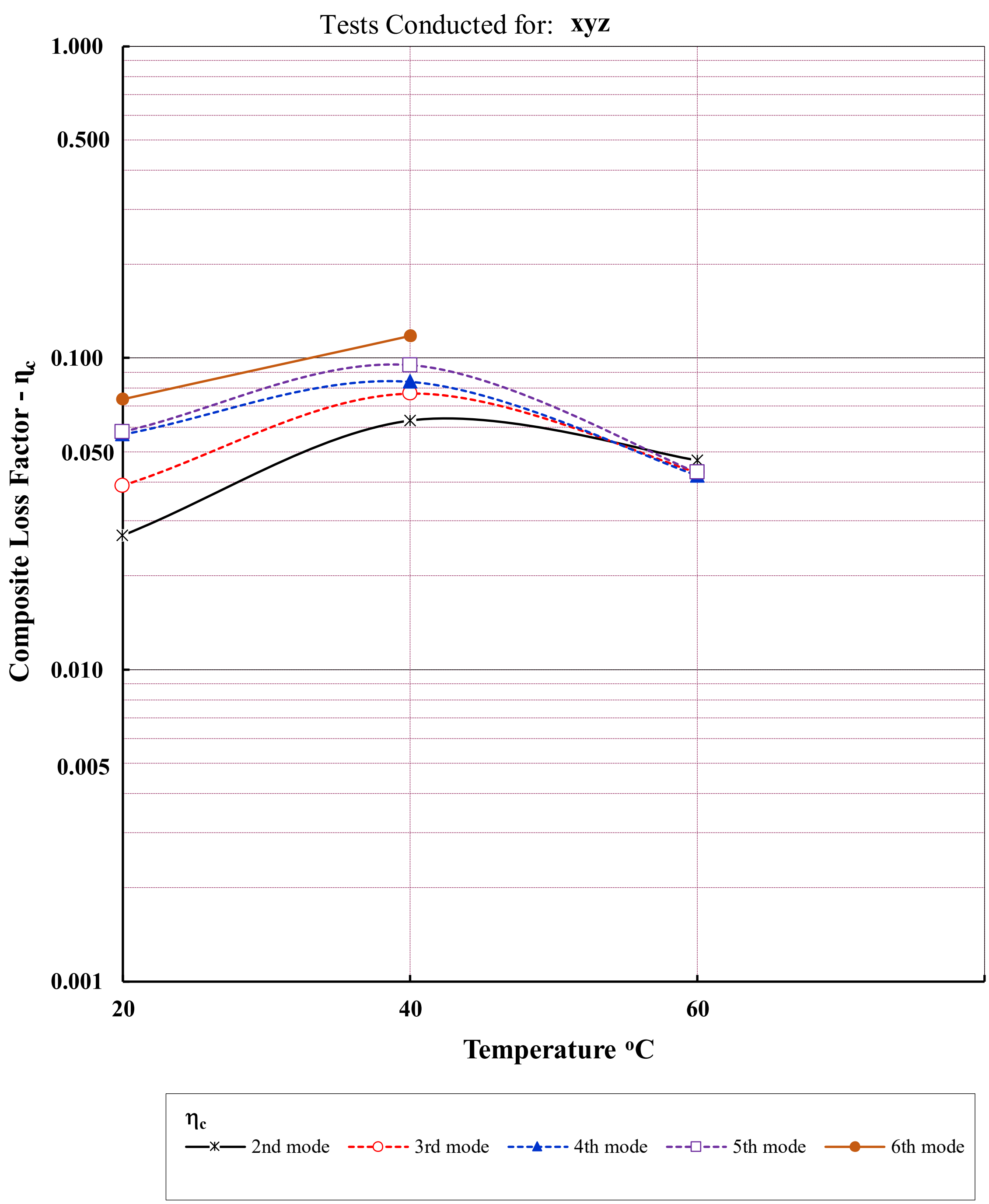
STEEL BAR - Free length 200 mm, Thickness 0.8 mm, Width 12.7 mm

Refer to Data Sheet for more Information on Materials

TEST PROCEDURE PER SAE J1637

COMPOSITE LOSS FACTOR WITH TEMPERATURE

Tests Conducted for: **xyz**



Sample Description: S1:

Meas. Sample Thickness: aaa mm

Meas. Sample Surf. Den: bbb kg/m^2

STEEL BAR - Free length 200 mm, Thickness 0.8 mm, Width 12.7 mm

Refer to Data Sheet for more Information on Materials

TEST PROCEDURE PER SAE J1637