

CASE STUDY

United States of America

Blachford Inc. Automotive NVH Testing

Automotive

PULSE™, Transducers, Calibrators

Formed by John Blachford in 1995 in West Chicago, Illinois, Blachford Inc. focuses on the development, production and marketing of noise control, vibration damping, and floor systems materials to OEMs in the off-highway, heavy truck and recreational vehicle markets.

A new, state-of-the-art acoustics laboratory was commissioned in September, 2003. A PULSE data acquisition and analysis system is extensively used for a wide range of NVH testing applications.

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50 Years of Technological Innovation

H.L. Blachford Ltd., as the company was then called, was established in Canada in 1921. In 1956, the company began to manufacture and market acoustic insulation materials.

Rapid success in Canada led to extensive exports to the USA and an American company, H. L. Blachford Inc. was formed in 1960, based in Troy, Michigan. H. L. Blachford Inc. was eventually sold to Stankiewicz GMB who, in turn, later sold its interest. A new company, Blachford Inc., was formed in 1995 by John Blachford in West Chicago. H. L. Blachford Ltd. continues to sell noise control materials in Canada.

Fig. 1
Blachford develops and markets a wide range of products for noise control and vibration damping, and floor systems materials

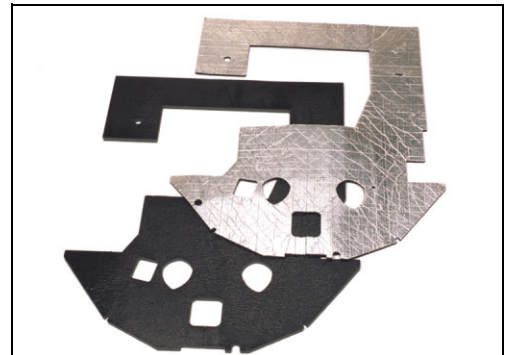
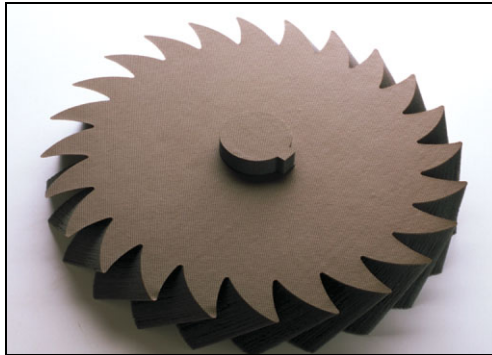


Fig. 2
Blachford's new acoustic laboratory was commissioned in September 2003. It extends to some 6800 sq.ft (632 m²)



Within the transportation industries, Blachford's core expertise lies in the development, production and marketing of noise control, vibration damping, and floor systems materials to OEMs. These include sheet materials, spray-on coatings, mouldings and die-cut parts and represent about 40% of the company's turnover – the remaining 60% are chemical specialities for a variety of industries.

The company has about 250 employees at its facilities in the US and Canada. There is a special focus on noise and vibration solutions for the off-highway, heavy truck and recreational vehicle markets. Blachford's customers include such household names as Caterpillar, Kenworth and Bluebird.

With about 100 employees, most products are manufactured in the company's West Chicago facility although the Canadian plant at Mississauga produces large quantities of rolls, sheet materials and die-cut parts.

Acoustic Testing Facilities

Fig. 3
Charles Moritz is Blachford's Acoustics Engineering Manager

In 1967, the company constructed an acoustics laboratory next to its facility at Troy, Michigan. But H. L. Blachford Inc. was eventually absorbed by another company and the new Blachford Inc. did not have access to the acoustics laboratory.

NVH Expertise

Charles Moritz is Blachford's Acoustics Engineering Manager. He has a B.Sc. in Aerospace Engineering from the University of Cincinnati, a B.A. in music, and a Master's degree in acoustics from Penn State University. Charles has worked at Blachford for seven years.



State-of-the-art Facility

Fig. 4
Although the anechoic room is large enough to accommodate a full size truck, it can be effectively sealed against the influence of exterior noise sources



Charles explains, "Because we don't work within the passenger car market, the new acoustics laboratory was specifically designed to carry out testing on commercial vehicles such as heavy trucks. The final plan included a semi-anechoic room with a cut-off frequency of 100 Hz, large enough for engineering development on vehicles up to 12.2 metres long, a work room capable of accommodating them, a 200 m³ reverberation room and transmission loss suite with 1.2 m × 1.2 m horizontal and vertical opening, a 2.4 m × 2.4 m large samples/component test suite,

small sample test room, control room, conference/jury test room and office accommodation".

The new NVH technical and R&D centre facility totalling 6800 sq.ft (632 m²) was commissioned in September, 2003. It can accommodate Class A trucks with a three-axle tractor (cab) unit and buses up to 40 ft long.

Charles continues, "Our new facility is unique in the US and is, we believe, one of the largest of its type. The semi-anechoic room floor can absorb up to 22 000 pounds per axle and vehicles with an engine size up to 600 hp".

The dynamometer, built by Mustang, is a passive dyno, that is, the required load can be applied to the drum. Both 46 inch and 60 inch wheelbases can be accommodated.

Accreditation

Blachford is accredited to QS 9000, ISO 9001 and the new laboratory is working towards ISO 17025.

R&D

Fig. 5
A specially designed duct provides cooling air for the engine. The system has a capacity of up to 40 000 cfm and is very quiet.

There are also exhaust extraction facilities with a capacity of 6000 cfm.

Charles continues, “Our goal is to develop new and efficient and cost-effective noise control solutions for our existing and new customers. Our aim is to predict noise and vibration parameters that will result from the use of a solution, and to then verify the performance in our lab. Generally, our customers ask us to make specifications. We are one of the world market leaders in our area and we regard our relationship with our customers as a long-term partnership.”

“We have a strong focus on recreational vehicles, and in this market there is a large spin-off from the passenger car industry. Demands for reductions in noise and vibration parameters and increased vehicle comfort are driven by the market. NVH characteristics are now an important product differentiator and quietness indicates quality. Sound quality is a big issue.”

Charles continues, “Other markets, such as off-road machinery and buses, tend to be driven by legislation. We want to hit our NVH targets in the most cost-effective way. We have a very wide product range but we don’t hold stocks – we produce materials to order, often on a ‘just in time’ basis”.



PULSE

Fig. 6
In this display from Acoustic Test Consultant Type 7761, two maps are simultaneously shown making it easy to compare test data. The mapped frequency range and sound power spectra are also displayed. If required, a photo of the test object can be superimposed on the contour plot that maps the level of the intensity

Blachford purchased its first PULSE data acquisition system back in 1999. In addition to the basic software PULSE FFT & CPB Analysis Type 7700, the lab also uses:

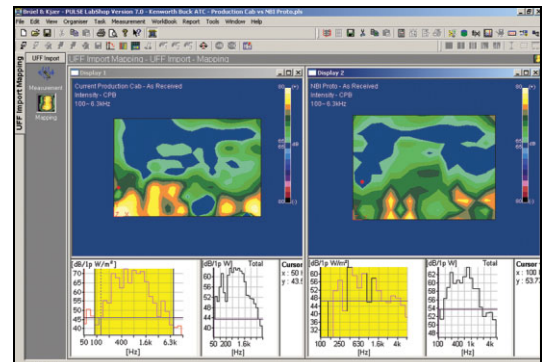
- Sound Quality Type 7698 – for use with the jury testing facility
- Time Capture Type 7705
- Acoustic Test Consultant Type 7761
- Material Testing Type 7758
- PULSE Data Manager Type 7767

Other hardware includes a Sound Intensity Probe Kit Type 3599 for the locations of noise sources, Impedance Measurement Tube Type 4206 for material testing, and a Modular Precision Sound Level Analyzer Type 2260 for general sound measurements.

A Brüel & Kjær Rotating Microphone Boom Type 3923 is used in the reverberation room to ensure correct spatial averaging of the noise level.

A diffuser with rotating vanes is used to increase the sound diffusion of the room.

The Blachford facility also has an external hard standing area with a 10m radius for sound power measurements. PULSE Value Pack for Sound Power Determination – BZ5305 is used for these tests.

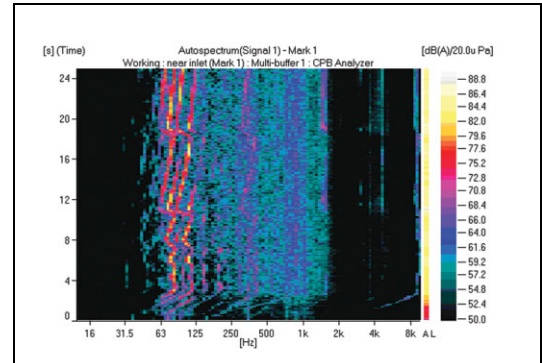


Brüel & Kjær microphones are used exclusively and are calibrated before each test using Sound Level Calibrator Type 4231.

Fig. 7
Typical PULSE display showing a 1/3-octave contour plot of frequency vs. time. This is from a test with 24 seconds of time data, from 0 to 60 mph

Benchmark testing is also carried out, especially using the material testing system, to evaluate competitor's products.

Charles continues, "Until now, we generally use steady-state conditions in the semi-anechoic room for our NVH testing, but because everything is portable and battery operated, we can also use our PULSE system on a test track, or on public roads. Being so compact and lightweight, we can also take our PULSE system to our customers for trouble shooting applications".



"There were a number of reasons for choosing PULSE. The main ones were Brüel & Kjær's reputation, and the excellent local support we have always had. We signed up for a PULSE training course, and find the system really easy to use, both for real-time data acquisition and analysis, and post-processing."

He continues, "It is easy to modify existing PULSE projects, or make new ones. We know that our test data is totally accurate and this gives us and our customers real confidence".

Data Management

Fig. 8
All NVH test processes are controlled from the control room. The large window allows the operator to visually monitor the test. A loudspeaker in the control room enables the sound from the test to be heard

Charles continues, "We have a maintenance agreement (MS1 Contract) and this means we now have PULSE Data Manager Type 7767. We need a system to archive, retrieve and compare data, so this new software and database is a special benefit".

PULSE runs under Windows® XP. Test data, including the PULSE project, is saved on the PCs hard disk and backed up on CD-ROM. Reports are created either by using the reporting facility in PULSE that exports data to Microsoft® Office programme, or by simple 'cut and paste' into Word.



Future Plans

Charles concludes by saying, "As with our customers, we regard our cooperation with Brüel & Kjær as a long-term partnership. Our plans include the purchase of an additional PULSE front-end that we can either stack with our existing systems to increase the number of channels, or use independently to give us addition testing capacity".

Key Facts

Fig. 9

Hard at work post-processing NVH test data in the control room. Headphones allow the operator to monitor time data

- H.L. Blachford Ltd. was established in Canada in 1921
- The company began to manufacture and market acoustic insulation materials in 1956
- Blachford Inc., was formed in 1995 by John Blachford in West Chicago
- Blachford's core expertise lies in the development, production and marketing of noise control, vibration damping, and floor systems materials to OEMs
- There is a special focus on noise and vibration solutions for the off-highway, heavy truck and recreational vehicle markets
- A new NVH technical and R&D centre facility totalling 6800 sq.ft (632 m²) was commissioned in September, 2003
- It can accommodate Class A trucks with a three-axle tractor (cab) unit and buses up to 40 ft long
- "Our goal is to develop new and efficient and cost-effective noise control solutions for our existing and new customers"
- "Our aim is to predict noise and vibration parameters that will result from the use of a solution, and to then verify the performance in our lab"
- Blachford purchased its first 4/1-channel PULSE data acquisition system in 1999
- "Because everything is portable and battery operated, we can also use our PULSE system on a test track, or on public roads"
- "There were a number of reasons for choosing PULSE – Brüel & Kjær's reputation, and the excellent local support we have always had"
- "We signed up for a PULSE training course, and find the system really easy to use, both for real-time data acquisition and analysis, and post-processing"
- "We know that our test data is totally accurate and this gives us and our customers real confidence"
- "As with our customers, we regard our cooperation with Brüel & Kjær as a long-term partnership"

