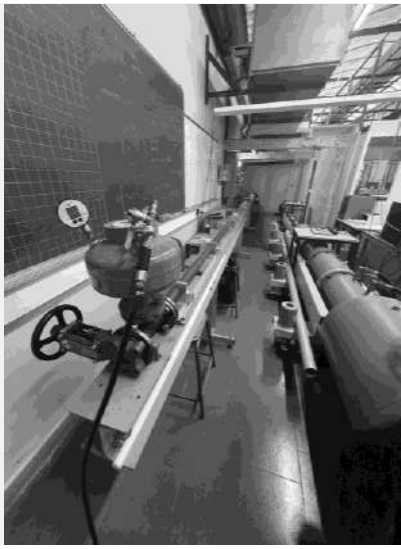
Redefining Split Hopkinson pressure bar testing with Dragonfly®

The Challenge

The **Split-Hopkinson Pressure Bar (SHPB) test** is a widely recognized method for analyzing material behavior under high strain rates. The test involves generating an impact in an input bar, which transmits compression waves through the sample under investigation. The strain response, typically measured using strain gauges, can be as low as **0.5 µm/m**, approaching the detection limit of conventional foil gauges.

Even with an optimally configured test bench, **any misalignment** in the bonding of measurement and compensation gauges can significantly degrade signal quality. Additionally, before each experiment, **temperature-induced bridge drift** must be carefully compensated.
To capture these signals, which are **sampled at 5 MHz**, the setup requires **high-frequency, costly signal conditioners** and exceptionally high strain sensitivity.



1 **Precise instrumentation setup**
The proper full bridge gauge alignment can dramatically **influence the results.**

2 **Measurement noise**
Highly sensitive sensors **are required** to accurately capture the transmitted signal responses at high frequencies.

3 **Conditionner costs**
High frequency Wheatstone bridge conditioners are needed when data is **acquired in MHz Bandwidth**.

Breaking Point

Measuring extremely small strain levels in **Split-Hopkinson Pressure Bar (SHPB) tests** is a major challenge. Standard strain gauges operate at the edge of their accuracy limits, requiring costly **high-frequency conditioning equipment** to maintain acceptable noise levels.
Wormsensing's ultra-sensitive, passive sensor provides a breakthrough alternative—**simplifying system integration, reducing complexity, and enhancing overall usability**, while delivering unmatched precision in high-strain rate experiments.

LBMC | worms

We asked
Gustave EIFFEL University

What is the **key benefit** of using Dragonfly® ?

"Dragonfly® signal response validated the bench quality and **highlighted a problem** in our classic strain gauge bridge instrumentation"

Denis Brizard
In charge of the Scientific Test Bench

20 min

Installation time of Dragonfly® during an experiment at Gustave Eiffel LBMC, (Laboratoire de Biomécanique et Mécanique des Chocs)

↓ See how **Dragonfly®** transforms the Hopkinson bars instrumentation

worms

The Solution

Dragonfly® is a revolutionary strain sensor delivering **1000x more resolution than a traditional strain gauge**, enabling high accuracy, passive, conditioner free, strain measurement on split Hopkinson pressure bars.

KEY FEATURES

SENSITIVITY
1000X — MORE SENSITIVE THAN TRADITIONAL SENSORS

SIGNAL TO NOISE RATIO
>120dB — EXTREMELY LOW NOISE LEVEL

MEASUREMENT RANGE
±3000µm/m — ABOVE STEEL PLASTICITY

INTEGRATION
PLUG & PLAY — VOLTAGE, CHARGE, IEPE STANDARD

1 Range Precision

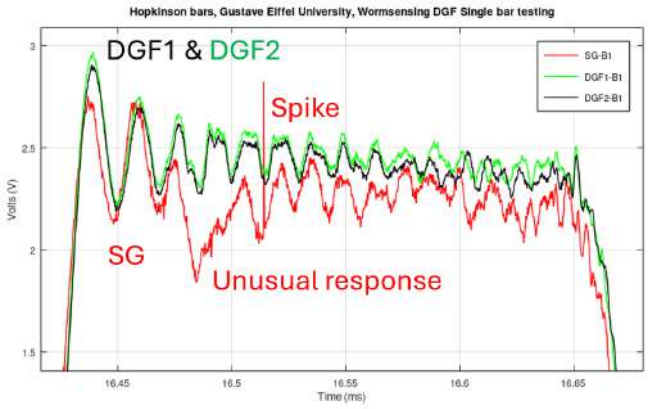
Dragonfly® can capture high range & tiny deformation caused by **the compressive pulses**.

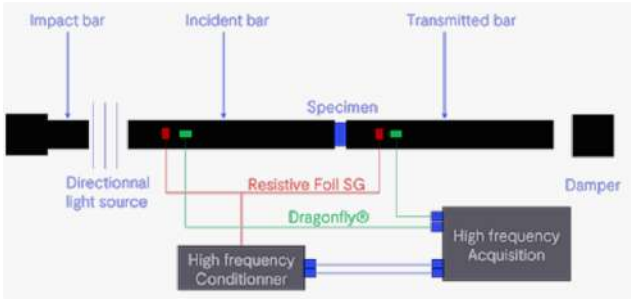
2 Passive

Instrumented and recorded **directly without costly conditionners**.

3 Zero Drift

Can be **bonded on curved surface** and doesn't need compensation for **temperature drifts.**





Two **Dragonfly** sensors, installed on the **upper and lower sides** of the incident bar (**green** and **black** curves), exhibit an almost perfectly overlaid response, confirming both the compressive nature of the wave and the high geometric accuracy of the test bench.
In comparison, the classic strain gauge bridge response (**red** curve) appears noisier, highlighting an instrumentation issue within the setup.

Tests conducted with a **foam sample** demonstrated **equal or superior** performance compared to a **high-frequency full bridge system** (DEWETRON 30-8 HSI-STG, 2MHz). The direct Dragonfly output (without conditioning) further validates the potential for cost reduction by a factor of 5 to 10 while maintaining high measurement fidelity.

Dragonfly®'s versatility extends to numerous other fields.

Wind Turbines · Automotive · Infrastructures/Bridges · Transportation

and many more applications...

About us

Wormsensing is at the forefront of **advanced sensing technology**, providing high-precision solutions for aerospace, defense, and high-performance industries. With a commitment to cutting-edge precision and sustainability

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