friends organize locally. Thus, we hope to get in touch with a range of interesting new people from differing disciplines, professions, age and gender, and especially from Asian, Latin American and African cultures.

In short, my motivation is to bring people and continents closer together and to build bridges, by challenging and changing traditional viewpoints from a global perspective. I also see this job as a moral duty. My participation in the TICCIH World Congresses, every three years since 2006, each time meant a big push for my motivation and a lot of inspiration, which kept me happy and running over the next few years thinking about new research topics, becoming familiar with unknown perspectives, getting in touch with more and other people, setting up new projects and networks... Now, I feel it's time to put something back to our global community: invest my time so that others can benefit from similar experiences, especially younger people who think globally and act correspondingly at their local scale, shaping our way into a global society, maybe also more just and more peaceful. Let's hope that all this works out well – and that we still have some time left at the end of each day to talk nonsense and take a deep look at the wide-open sea.

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REPORT

RUNNING HISTORICAL ENGINES SAFELY

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Conservators have to manage specific challenges when dealing with industrial and technical heritage. The challenge we decided to focus on is related to the functionality of historical vehicles.

The aim of the research project, entitled Acoustic Emission Monitoring of Historical Vehicles (ACUME_HV), is to develop a diagnostic tool to help people in charge of historical vehicles (conservators, technicians, mechanics…) during the condition report and the maintenance of the engines. Ancient vehicles can be conserved statically or working. In this second option, historical vehicles can be started or used more or less frequently, depending on the purpose of the museum or the private collection. However, heritage institutions have always the responsibility to maintain the vehicle in a safe condition, for the artefact itself as well as for the driver, passengers and for the public.

In order to fulfill these sometimes conflicting requirements, traditionally the restorer dismantles completely the engine or proceeds with some preliminary tests to evaluate its condition and state. Starting an engine after a long period of not running without any diagnostic is not recommended, due to the risk of breakdowns. Depending on the use of the vehicle, if it has not been started for a long time, it is possible to encounter several problems. Just to cite three examples, these might be the presence of corrosion products, bad sealing of valves or gaps between contact pairs of components. The maintenance is mainly dependent on the competence and the feelings of the persons in charge. Moreover, it can be a time-consuming process and lead to more problems if not detected on time.

Acoustic emission test performed on a Renault AG1 ©HE-Arc CR 2019

To get a more precise way to assess the state of an engine, and one not wholly human-dependent, we wanted to explore the advantage of acoustic emission (AE) methods. The principle of this technique is to register acoustic waves generated by the rapid release of localized stress energy inside the material, e.g. impact or by crack formation. AE allows the detection, localization and characterization of any damage. It is generated mostly by material failure, friction, cavitation and collisions. In engines, AE signals come from the contact pairs, i.e. gears, camshaft, crankshaft, valves, connecting rod and piston, and also from the combustion process. The AE sensors placed in contact with an engine measure the transmission of the impacts

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inside the materials in the form of waves. The sensors are relayed by their preamplifiers to a computer that allows it to register and post-process the acquired data.

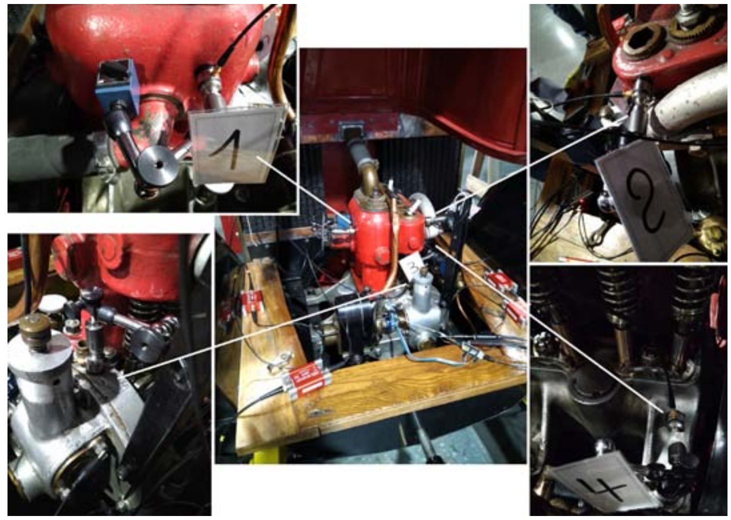
The technique comes from the industrial fields, for instance for controlling pieces of metal in rocket engines. It is already used in some fields of cultural heritage, such as for monitoring cracks in buildings or infestation within wooden musical instruments. In this project, we developed a protocol to adapt the AE technique to monitoring historical engines.

The research turned around three main parts. First, we needed to find a proper way to fix the sensor on the engine and to determine the best locations to register the AE signals. The second part consisted in cold tests, aiming at registering the acoustic signature of the engine when moved by hand. Thirdly, we tested the engine in running condition, with also the combustion process. The first two parts will be briefly described in the next paragraphs.

We choose to work on Renault AG1 vehicles, known as the Taxi de la Marne from the First World War. The engine, with its two cylinders, is a basic one to start the AE study. The Musée National de l'Automobile de Mulhouse (MNAM) has three engines of this type, so we thereby had the possibility to test several in different states of conservation.

The first step of the project was to establish a protocol for the measurements. The sensors need to be in contact with the surface to monitor, in this case the external part of the engine, in order to record any changes occurring inside the materials. As the surface of an engine is not perfectly smooth we applied couplant, a kind of gelthat facilitates the transmission of ultrasonic energy into the test specimen, to obtain a good signal. The couplant allows the signal to pass from the surface to the AE sensor. It needs to resist both cold and heat, to stay on the surface horizontally and vertically, and to be completely safe for the surface of the engine, which could be partially covered with oil-based paint. This means the couplant should not generate corrosion on the bare-metal parts nor modify the surfaces' aspect and paint. We tested several solutions, from industrial AE couplant, gels and grease to obtain the expected result. Finally, we decided to use a common grease from the brand Miocar®. It leaves no stains on the painted surfaces and has good viscosity for our purpose. Moreover, it is a common product available in many workshops with no risk to pollute the surface with alien components.

To obtain useful signals, we tested several positions for the four sensors to get the best signal from different AE sources inside the engine. The sensors need to be close to the contact pairs and location of the possible breakdowns. Even if the dimensions of the sensors are pretty small (less than 2 cm in diameter) we encountered also some spatial constraints due to the shape of the engine and the car structure. The best positions for the sensors on this kind of engine are one on the cylinder block close to the first cylinder, one close to the cylinder's valves, another one on the crankcase on the cover of the gears of the cam system and the last one on the crankcase leg.



Location of the sensors on the engine ©HE-Arc CR 2019

Renault AG1 on the circuit of the MNAM ©MNAM 2014

Another important point is to use a position sensor, mounted on the magneto drive shaft, to register the speed and the position of the internal pieces. These data are useful to correlate the position of the moving parts and the origins of the AE signals as well as to measure the speed for each position of the engine. The speed needs to be constant in order to compare the results of the different tests.

During the cold test phase, we registered the acoustic signature of an engine, bought by the MNAM for spare parts, mounted on a test bench. We know the state of this engine thanks to a complete condition report carried out prior to the first measurements, so it acted as a control. We turned the engine by hand, with a handle fixed on the crankshaft. We made several sets of tests in order to compare the results, for instance with and without sparkplugs, or by introducing controlled default such as a play between connecting rod and crankshaft. During this phase, we tested also a 1909 Renault AG1 (Inv. 2209) from the collection and the Renault AG1 (Inv.7003) used for the live exhibition of vehicles within the museum.

During these tests, we highlighted a problem concerning the signal that we identified as the compression of the second cylinder. The discovery of this anomaly was done by comparing the two signals with sparkplugs of the bench test engine and the Renault AG1 Inv. 2209. After a sealing test performed on the second cylinder, we detected a leak in the intake valve causing a loss in compression. This problem was not detected during the regular maintenance of the vehicle. Now the museum is aware about the presence of this malfunction and it has adapted consequentially the next maintenance program of this car.

In conclusion, at the end of the project, we obtained interesting results, compiled in a previous article (see below). We could acquire repeatable measurements and even detect a problem at an early stage on one of the vehicles tested. We have developed a non-intrusive protocol to perform the measurements of acoustic emissions on a 2-cylinder engine. Currently, we plan to test other types of engines in order to create a database useful for conservation-restoration professionals.

This technique could become a useful tool to decide on the reactivation of an engine. In a collection, the recording of AE signals could become part of the maintenance protocol of the vehicles. Last but not least, a comparison of this database between two maintenances could be used to detect malfunctions at an early stage due to the frequency detection range of the method, more efficiency than human ear.

For more on the research see Roda-Buch A., Cornet E., Rapp G., Chalançon B., Mischler S., Brambilla L., "Diagnostic of Historical Vehicle's Engines by Acoustic Emission Techniques," *Proceedings of the 2019 IMEKO TC-4 International Conference on Metrology for Archaeology and Cultural Heritage*, Florence, Italy, December 4-6, 2019

WORLDWIDE

UNITED STATES

GREEN GENTRIFICATION, HISTORIC PRESERVATION, AND NEW YORK'S HIGH LINE

Dr. Brian Rosa, Universitat Pompeu Fabra, Barcelona

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An innovative public promenade created on top of a disused elevated railway in Manhattan, the High Line is recognized worldwide as among the most iconic urban landmarks and public spaces of the 21st Century. It has stimulated public interest in landscape design while simultaneously reintegrating an industrial ruin—destined for demolition—into the everyday life of New York City. As many critics and journalists have noted, through its elevation from the street below the High Line provides a unique experience of being at once in, and separate from, the city. Its architectural and horticultural design, vibrant public art, and cultural programming offer unique, immersive experiences while encouraging an appreciation of the historic urban landscape in a zone restricted exclusively to pedestrians. The park dramatizes the creative appropriation of abandoned infrastructure, and revives the nostalgic pastime of the urban promenade.

However, since its opening in 2009, with additional segments completed in 2012 and 2014, it has gradually been perceived by New Yorkers as less of a success and more of a 'tourist-clogged catwalk' and a 'trojan horse for redevelopment.' Even Robert Hammond, co-founder of Friends of the High Line, which instigated the project, acknowledged in 2017 that the 'High Line has failed' because the project was too focused on design and execution, failing to adequately consider issues of social equity and inclusion in the zones through which it passes. Between the mid-2000s and today, largely stimulated by the presence of the High Line and the boom in luxury high-rises along its path, the West Chelsea neighborhood of Manhattan has arguably become the most socially unequal neighborhood in the entire United States, with the only remaining affordable housing being in two large public housing complexes (themselves under threat by redevelopment). Meanwhile, as other cities throughout the world see the success of the High Line as a conversion of an urban viaduct into a linear public space—with success being predominantly depicted in terms of stimulating real estate development and boosting tax revenues—dozens of similar projects have been proposed. As I have argued, 'high line' is no longer simply a proper noun; it has become a generic term for a typology of new urban space. In London alone, at least three have been proposed.

At the point in which I and Christoph Lindner conceived the edited volume *Deconstructing the High Line: Postindustrial Urbanism and the Rise of the Elevated Park* (Rutgers UP, 2017), there were few critical voices investigating the impacts that the High Line was having on

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