essebi
monitoraggio e diagnostica strutturale

DOES IT REALLY MAKE SENSE AI WHEN WE'RE LACKING OF COMMON SENSE?

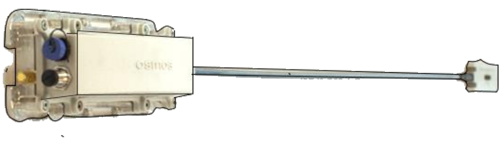
The day before yesterday ESSEBI presented two articles at EVACES, an important international conference held at the Milan Polytechnic on experimental vibrational analysis. One of the two dealt with Artificial Intelligence applied to forecast models of damage to bridges and viaducts in relation to passing traffic. Artificial Intelligence is a great thing, but first we need to apply intelligence, or common sense, to the usual installations.

The times are not yet ripe and it takes a lot of effort. Actually, at the moment, in the specific field of road infrastructure control, rather than artificial intelligence, it would be more appropriate to speak of artificial stupidity. Often it seems that we act deliberately to adopt solutions that collide with common sense. The main aspects that stand out are:

- The most established dynamic weighing systems are those substantially aimed at verifying the passage of vehicles with non-permitted loads with the often primary aim of raising fines. They have the transducers incorporated in the road surface and do not allow to provide effective knowledge on the structural conditions of the road work. Even if they could be considered less precise in the effective calculation of the overload, the systems which envisage the use of strain gauges on the intrados have a more significant structural value.
- Excessive concentration on transducers which, although important, can be based on milder and less restrictive specifications (Temperature transducers).
- Exaggerated use of transducers whose measured quantities have insignificant variations for the interpretation of the phenomena to be investigated (inclinometers).
- Often, although the variations they have to measure are slight, low-level transducers are used (for example MEMS or electrolytic inclinometers, instead of the more performing ones of the servo-accelerometric type).
- And as for compensation, they are erroneously and unnecessarily combined with high-performance data acquisition systems, which are underused, even castrated.

Little space, compared to what it deserves, is given to the measurement of deformations. And very often vibrating wire transducers are used or in any case reference is made to others of a conformation such as to introduce high transportation momentum which can induce errors of the same order of magnitude as the measurement to be made.

Vibrating wire transducers still find great application as a geotechnical heritage even if they have great limitations in their dynamic operativity. Few years ago there was great interest in fiber-optic Bragg grating transducers, but they have marked time due to the high cost of optic interrogators and above all due to their poor integration with copper-wired systems.



The most reliable solutions at the moment are those based on flat extensometers with strain gauge bridges and on optical strands capable of transmitting a current signal, but they are rarely used at the moment.

The dynamics continues to be associated only with frequency control, even though we know that even significant structural modifications, which do not directly impact on an evident variation of the stiffness, are hardly appreciated if we refer exclusively to this parameter. Often the manager entrusts the design of monitoring systems to third parties by imposing the type of instrumentation that must be used and above all the basic architecture of the system to be implemented. This has repercussions on poor decision-making ability and above all on a complicated definition of roles aimed at identifying the actual responsibilities in case of events in which control of the artifact is lost and degenerative facts could occur up to collapse conditions. On the other hand, many infrastructure managers often refer to improvised, poorly skilled, non-qualified work suppliers, who come from the most disparate fields without any experience in measurements.