# Prediction and visualisation of equipment ageing by a *Virtual Sensor*

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Several equipment of the chemical and process industry, handling or treating hazardous substances, have been commissioned many decades ago. Given the worldwide goal to reduce the consumption of fossil fuels, it is not expected to build commission new plant and, therefore, there is a grown interest in extending the use of equipment beyond their residual useful lifetime.
To manage the risk of major accidents, current legislation requires periodic controls that must be carried out to verify the health conditions (ageing) of critical equipment, that are those whose damage can cause the release of hazardous substances. To support in task, a research group of the University of Messina, in collaboration with INAIL researchers, have designed and developed a *Virtual Sensor*. It is a system, composed by hardware and software, which uses models based on extreme statistics and the Augmented Reality to assist on field inspections of critical equipment. The *Virtual Sensor* collects ageing-related information and gives back the corrosion rate, the probability of a critical pit, the corrosion evolution and the RUL; finally, it allows visualising such data through the Augmented Reality by means of maps and tables that overlays the equipment. A large diesel storage tank was used as a case study and a miniature reproduction of it in laboratory has been used to test the device.

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