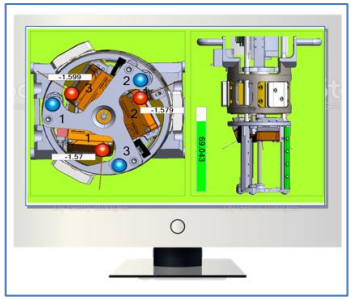
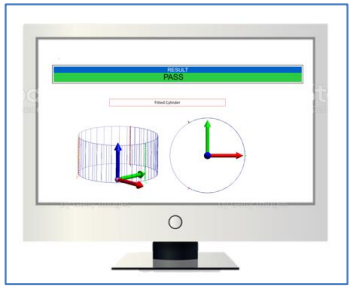
HIT-Housing Inspection Tool

- The proposed technology is based on an **integrated solution** for **inspection** and **reporting**, applicable in lots of industrial areas.
- HIT, in all its parts, hardware and software, can replace the **thread plug gauge go/no go** for the acceptance of the thread, moreover it adds lots of **information** about the threaded hole: it is possible to get diameter, axis perpendicularity, thread step, thread angle, thread length in a unique automatic report made by the software.
- HIT software can be a great solution for different inspection systems. The software architecture can be easily adapted to manage one or more **axis movement** and **laser acquisition**. Through the software it's possible to communicate with the hardware structure **remotely**, to fit the acquired data and to get the report in real time.





Technology Transfer proposal BSBF 2022

Original/Potential Field of Application

- The Housing Inspection Tool was made to perform the metrology survey of the **Flexible Support Housing holes** of the ITER **Vacuum Vessel** (threaded holes M130 and M150).
- The development of HIT has been made possible thanks to a **software** tool to enable communication in real time with the commercial **measuring software** (Spatial Analyzer) and the **Beckhoff PLC**, to gather **axis displacement** and **data acquisition** by **optical sensors** in a synchronous and deterministic way.
- HIT has been designed with a **stable structure** capable to be centered in M130 and M150 holes and be able to support the automatic movement of a set of three spot laser sensors along the axis of the hole. His absolute position along the depth of the hole is provided by a **linear encoder**.
- All the data acquired by lasers are collected in the HMI software; it fits the thread profile and send it to a measuring software (Spatial Analyzer). HMI software, thanks to a special routine, analyzes the **geometrical features** and export a **report** in a few seconds.
- The entire process, measurement and analysis, takes less than **5 minutes**.

- The function of HIT is the measuring of threaded holes with high accuracy and the reporting of the results in automatic way. By this way, the use of HIT in a non-fusion market is available in the **quality control area** for all types of production and assembly companies.
- HIT can be used for different type of holes simply by a **hardware restyling** with scales factor and a correct choice of sensors for the range of measurement.
- The instrument can also be used for the detection of **surface defects** inside holes, or more generally of hollow surfaces (cracks, machining defects, etc.).
- Axist is analyzing the possibility to use HIT in the inspection of **valves of great dimension** or **tubes with different diameter**.
- In addition, the **know-how** about **calibration of kinematic chain** acquired during the development of HIT, can be used in different projects of **multi axes machine movement**, because a custom calibration guarantees an improvement in general results.
- The development of **custom calibration algorithms** allows to increase the **intrinsic accuracy** of unconventional instruments and equipment, providing the customer with a **process improvement service**.

Proposal SWOT Analysis

Strengths

- The automatic procedure developed for HIT permits to **limit human error** and above all **human fatigue**, with increment in **accuracy**, reduction errors and effort, **save time**.
- The software is already developed; it is possible to make **customized changes** in a brief time.
- In a safety point of view, HIT has been assessed and certified by **CE Mark**.
- Besides, a part of the software developments can be easily adapted for dimensional inspection of **different shapes** respect to threaded holes.

Weaknesses

- The mechanical structure and the presence of laser spots do not adapt to **small holes**.

Opportunities

- The introduction of HIT in the quality control of different business can reduce drastically time of the measurement operations, with a resulting **economic saving**.
- HIT is oriented to **Industry 4.0**, especially for the data management: the measurements are directly compared with the nominal CAD model, then the results are shown in **real time** for the operator and **shared** with server database for easily access.

Threats

- Threats are related to the **type of laser spot** used.

IPR Status & Contact Information

- The product is the intellectual property of Axist S.r.l.

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