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DRILLIMO - DRILL LIFE MONITORING

Main Technological Area ⟶ Sensors

Keyword ⟶ Machining | Tooling | Drill | Drill bits | Boring | Bit wear | Sensors | RFID | Barcode

The idea of Drill Life Monitoring system (DRILLIMO) arises from the difficulties, found in the production line of manufacturing industries, in both qualitative and logistics management of the tools used in manually operated machining. As a matter of fact, there is no impartial control of the real state of wear of the tool in the process except the visual one, entrusted to the perception of the operator. Moreover, the numerousness and variety of tools used in mechanical machining do not facilitate the management, on the production line, of the replacement, re-sharpening and procurement process. The operations are therefore subject to both quality errors in the case of use of worn tools, not compliance with the safety standards required in mechanical machining and economic/management issues in case of early replacement.
The DRILLIMO is therefore designed to keep trace of tool usage in machining and inhibit its use when specific criteria are not met (e.g. if the tool has exhausted its residual life and/or if it is not the one planned to be used on the machining cycle).

TECHNICAL SPECIFICATIONS

According to what is described in the invention, a typical composition of the Drill Life Monitoring system can be as follows:

- an embedded device, Wi-Fi enabled, to be installed on the machining equipment
- a unique RFID tag on each tool for mechanical machining
- intelligent dispensers
- a centralized database in which data from embedded devices and tools is stored.

The embedded device (add-on, see Figure 1) mounted on the machining tool and easily replaceable, is equipped with:

- Wi-Fi module for connection with the infrastructure network
- IR proximity sensor
- RFID reader
- Tip revolution counter
- display
- bar code reader for machining cycles management
- pneumatic valve.

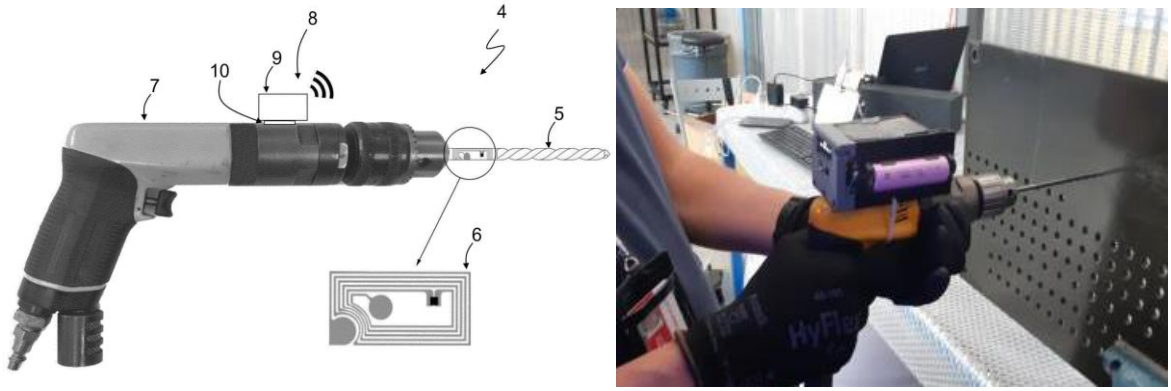

Figure 1 – Electronic monitoring device mounted on a drill

The add-on installed on the machining tool (e.g. a drill) allows the measurement of both the working time and the number of holes made and, depending on these KPIs, the wear condition of the tool can be set based upon different threshold levels.
The intelligent dispensers, connected to the centralized database, deliver to the production line and receive back the tools according to automatic and programmable storage strategies, verifying the withdrawals after reading the bar code associated with the working cycle.

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INNOVATION/ADVANTAGES

The patent represents an authentic novelty in the state of industrial art. Tool monitoring systems are usually available on the market, but these ones are applicable to automatic machining equipment (e.g. milling machines, lathes, vertical drills). The usage and wear monitoring system, on the other hand, fills an important development gap in usage and management of tools for handheld machining equipment. What is covered by the patent can be considered as a universal add-on, usable for any type of tooltip and machining tool and therefore applicable in any production line in which it is necessary to operate manually.

FIELDS OF APPLICATION

Manufacturing	Machining by using hand-held equipment provided with interchangeable tools
Bricolage/DIY	Multifunctional machining tools

PATENT INFORMATION

Priority Date – 2020/05/07
Priority Code: IT202000010255
CPC Codes – B23Q 17/0995; B23Q 11/0085; B25F 5/00

Active worldwide applications

EPO - EP3907040B1; filing date: 2021/05/07; grant date: 2022/07/27
EPO National Extensions:
Italy – France – Germany – United Kingdom – Switzerland – Nederland – Sweden – Poland - Spain

Japan - JP7620494B2; filing date: 2021/05/06; grant date: 2025/01/23
South Korea - KR102902208B1; filing date: 2021/05/07; grant date: 2025/12/18
Taiwan - TWI896660B; filing date: 2021/05/05; grant date: 2025/09/11
China - CN113627707A; filing date: 2021/05/07; grant date: [pending]
Brazil - BR102021008862A2; filing date: 2021/05/06; grant date: [pending]
Canada - CA3117623A1; filing date: 2021/05/06; grant date: [pending]

Leonardo internal code

LDO-AS016