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Tools for operating a safe remote maintenance

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Man-machine interface: Dangers and consequent risks

Today's topics



What are the dangers and risks for workers with the introduction of enabling technologies 4.0?

- *Production*
- *Maintenance*

New Remote Maintenance Products Designed by Lab IV and already applied

- **Sisom** *Intelligent System for the Safety of Machine Operator*
- **Artemis** *Wearable Augmented Reality for Employee safety in Manufacturing sYStems*
- **Senergy** *Smart de-energization of machinery assemblies with wearable RFID devices*

What does the new machinery regulation say about remote control ?

- EHS (Essential health and safety requirements) 1.1.9 - *Protection against corruption*

How does the worker's function evolve and what other risks does he have to deal with?

- *Training (Human Factor)*
- *Others risks*

Man-machine interface: Dangers and consequent risks

Today's topics

Production

What are the dangers and risks for workers with the introduction of enabling technologies 4.0?

- *Production*



With the advent of the fourth industrial revolution, the approach of the man-machine interface **has changed even more significantly**. Many machines have remote control for production management and access is limited to the production parts of the machine or assemblies of machinery.

Man-machine interface: Dangers and consequent risks

Today's topics

Production



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What are the dangers and risks for workers with the introduction of enabling technologies 4.0?

- *Production*

an immediate association of ideas that:

Fewer operators = Fewer Injuries



STILL TOO MANY INJURIES



WHY?

Man-machine interface: Dangers and consequent risks

Today's topics

Maintenance



What are the dangers and risks for workers with the introduction of enabling technologies 4.0?

- *Maintenance*

Now, as much as the machine may be "autonomous" for example, "self-diagnosis of faults" – *but Maintenance activities*, are and will always be necessary:

- Extraordinary and ordinary maintenance,
- Adjustment,
- registration,
- cleaning,
- tool change.



In these cases the workers are in contact with parts of the machine and therefore there are possible risks of injury for the workers

Prevention Through Innovation

New Remote Maintenance Products Designed by Lab IV and already applied

Today's topics

P. H. Innovation

- **Sisom** *Intelligent System for the Safety of Machine Operator*

SISOM can be used to support the safety (also for training) in Industrial Plants

SISOM proposes a solution

SISOM leverages the mobile technologies combined with

Additional SISOM applications concern the maintenance, monitoring levels of productivity and the organization of production

based on the joint use of Augmented Reality and Personal Assistant SOPHOS-MS (*understand and respond to oral questions posed by the user*)

interactive 3D virtual environments, information and multimedia content available in Augmented Reality



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Prevention Through Innovation

New Remote Maintenance Products Designed by Lab IV and already applied

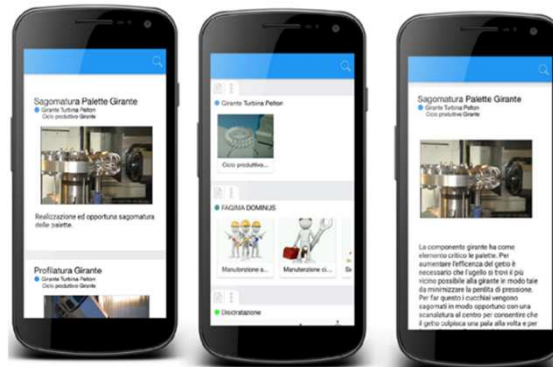
Today's topics

- **Artemys** Wearable Augmented Reality for Employee safety in Manufacturing sYStems

It is a smart system based on the joint use of:

Industrial Internet of Things, IIoT, and tecnologie wearable and Interactive & Intelligent Mixed Reality

Target:



the increase in the safety of the operators in contact with assemblies of machinery, favoring the interaction between the operators themselves and the machinery of a production system.



Prevention Through Innovation

Today's topics

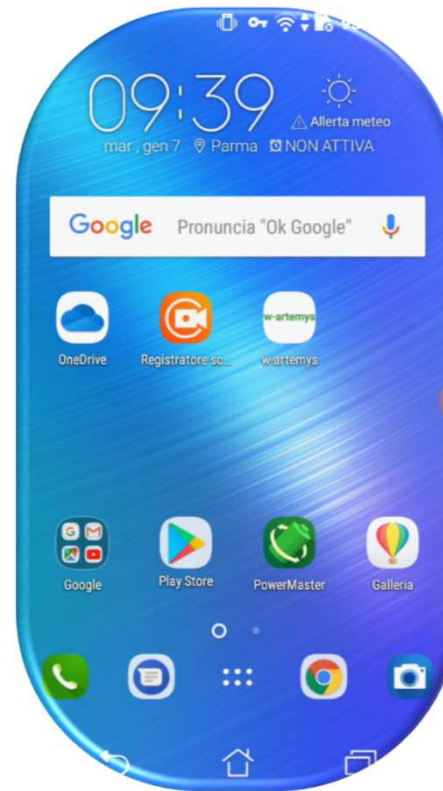
P. H. Innovation



New Remote Maintenance Products Designed by Lab IV and already applied

- **Artemys** Wearable Augmented Reality for Employee safety in Manufacturing sYStems

In particular, the system is characterized by:



IIoT architecture in order to interact with the machine or with assemblies of machinery regardless of the position of the operator;

direct connection with corporate information systems and real-time collection of data relevant to safety from machinery;

actions by the operator using mobile devices (e.g. tablets, smartphones) and experimentation using mixed reality (MR) systems, such as hololens.

Prevention Through Innovation

New Remote Maintenance Products Designed by Lab IV and already applied

Today's topics

P. H. Innovation



- **Senergy** *Smart de-energization of machinery assemblies with wearable RFID devices*

Motivations

in the workplaces a very frequent hazardous situation for the operators concerns the execution of manual maintenance activities on machineries assemblies, integrated manufacturing system and large production plants, where some energy sources **and stored energies can be present**

every energy supply or stored energy must not induce the **un-expected start-up of the machinery** and not produce hazardous situations for the operators (electrocution, un-expected movement, ...) - clause 1.6.3. Isolation of energy sources of Annex I of the Machinery Directives 2006/42/EC

Prevention Through Innovation

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Today's topics

P. H. Innovation



- **Senergy** *Smart de-energization of machinery assemblies with wearable RFID devices*

The de-energization of the machine is a fundamental preliminary activity designed by the Manufacturer and managed by the Employer through the **Lock Out Tag Out (LOTO) procedure**;

Motivations

the **LOTO standard is currently one of the most violated procedure** with very severe and dramatic effects on Employees and it is essential to control the human error during this kind of operations

In this context the current digitalisation of the machineries carried out under the Industry 4.0 paradigm can play an important role for the safe management of the de-energization/re-energization

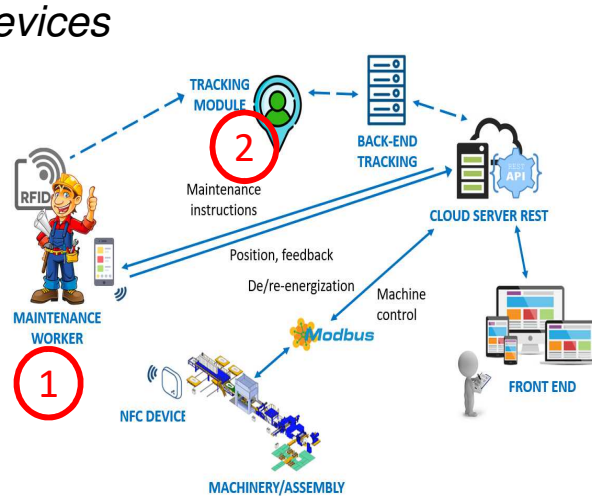
Prevention Through Innovation

New Remote Maintenance Products Designed by Lab IV and already applied Patent has been applied for

Today's topics

P. H. Innovation

- **Senergy** Smart de-energization of machinery assemblies with wearable RFID devices



The maintenance operators must wear their working coverall and PPEs with several ultrahigh frequency-radio frequency identification (UHF-RFID) passive tags



A localization system based on the UHF-RFID technology detects the real-time position of the operators wearing the UHF-RFID tags. Through to a moving reader antenna, the operator positions are determined with a localization error of few decimetres.

Regulation Of The European Parliament And Of The Council on machinery

Today's topics

EHRS 1.1.9.



What does the new machinery regulation say about remote control ?

- **EHRS** (*Essential Health and Safety Requirements*) 1.1.9. *Protection against corruption*

The machinery or related product shall be designed and constructed so that the connection to it of another device, via any feature of the connected device itself or via any **remote device that communicates with the machinery or related product does not lead to a hazardous situation.**

.... Omississ....

The machinery or related product shall collect evidence of a legitimate or illegitimate intervention in the software or a modification of the software installed on the machinery or related product or its configuration.



Human factor: Change management

Today's topics

Human factor

How does the worker's function evolve and what other risks does he have to deal with?

Training (Human Factor)



An innovative approach of training focused on

Learning education

knowledge exchange

Change management

In terms of skills



- ✓ resilience
- ✓ adaptability
- ✓ flexibility
- ✓
- ✓

Workers will have to be increasingly able to assess and self-manage their need for professional updating



Other dangers and consequent risks

Today's topics

Other risks



SAFETY



Other Risks

Tecno Stress



Privacy



Cyber





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