MEDICAL INSULATION MONITORING SAVES LIVES IN FINNISH OPERATING ROOMS

PPO-Elektroniikka Oy

Continuos monitoring in the OR

In Finland, insulation monitoring system monitors all electrical devices

24/7

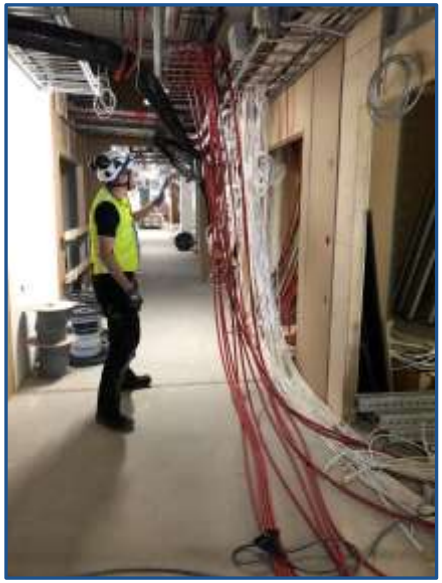
Insulation monitoring since 1981

- PPO-Elektroniikka was founded in 1981 to develop a system to improve electrical safety in operating rooms. Our first-generation insulation monitoring system MEV-2 was completed in the same year.
- Our MEV-system brought up: The electrical failures were clearly a risk to patients, staff and operating room equipment.
- At the request of hospital engineers, our first digital insulation monitoring device MEV-3 was launched in 1983.
- MEV-3 -system revealed **a big problem**; there were many more medical devices with electrical current leakages than had been expected. Hospitals had even more than 20 device alarms a day.

Mandatory in Finland since 1983

- No operation will be performed in Finnish operating rooms if insulation monitoring is not in use.

- Insulation monitoring is required in all operating rooms and other critical care areas in all countries in the European Union since 2015.



Why is insulation monitoring needed?

Prewarnings

- Extremely important **in G2 medical premises,** where the medical devices are used for cardiac-related functions. The medical device may pose an immediate danger to the patient, who is entirely dependent on equipment that ascertains vital functions.

Old and new devices

- Electrical leakage currents occur in both old and new electrical devices due to malfunction, age and poor design. Common reasons for insulation faults include bad connections, damaged cable insulants and defective components. Fast technological development and the rush to launch medical equipment create new challenges; new equipment may cause disturbances in power networks and other electrical devices.

A residual current device that switches the electricity off does not give a prewarning - not enough to guarantee safety!

MEV-system functions 24/7 in Finland

- The electric power network of the operating room is separated from electrical grid with a medical isolation transformer.
- The insulation-level monitoring system monitors all the electrical devices connected behind this transformer. Units control the insulation level of the IT system, the transformer load, and temperature as well as the continuity of protective earth **24/7**.
- The equipment indicates the faults and problems before dangerous situations arise. This gives time to replace the defective device without breaks in the operation.

Photos: MEV-system in The New Children's Hospital in Helsinki.

Safety, efficiency and cost savings

The leakage of electrical current is an invisible killer without any visible signs.

Insulation Monitoring System

- Protects the patients and personnel from electric shocks
- Prevents electrical fires and burns
- Ensures that unnecessary downtime can be avoided
- Ensures that the life of surgical equipment is extended.

Acquiring insulation monitoring system is a long-term investment; the price is low in relation to the value. It is a matter of human life that cannot be measured in money.

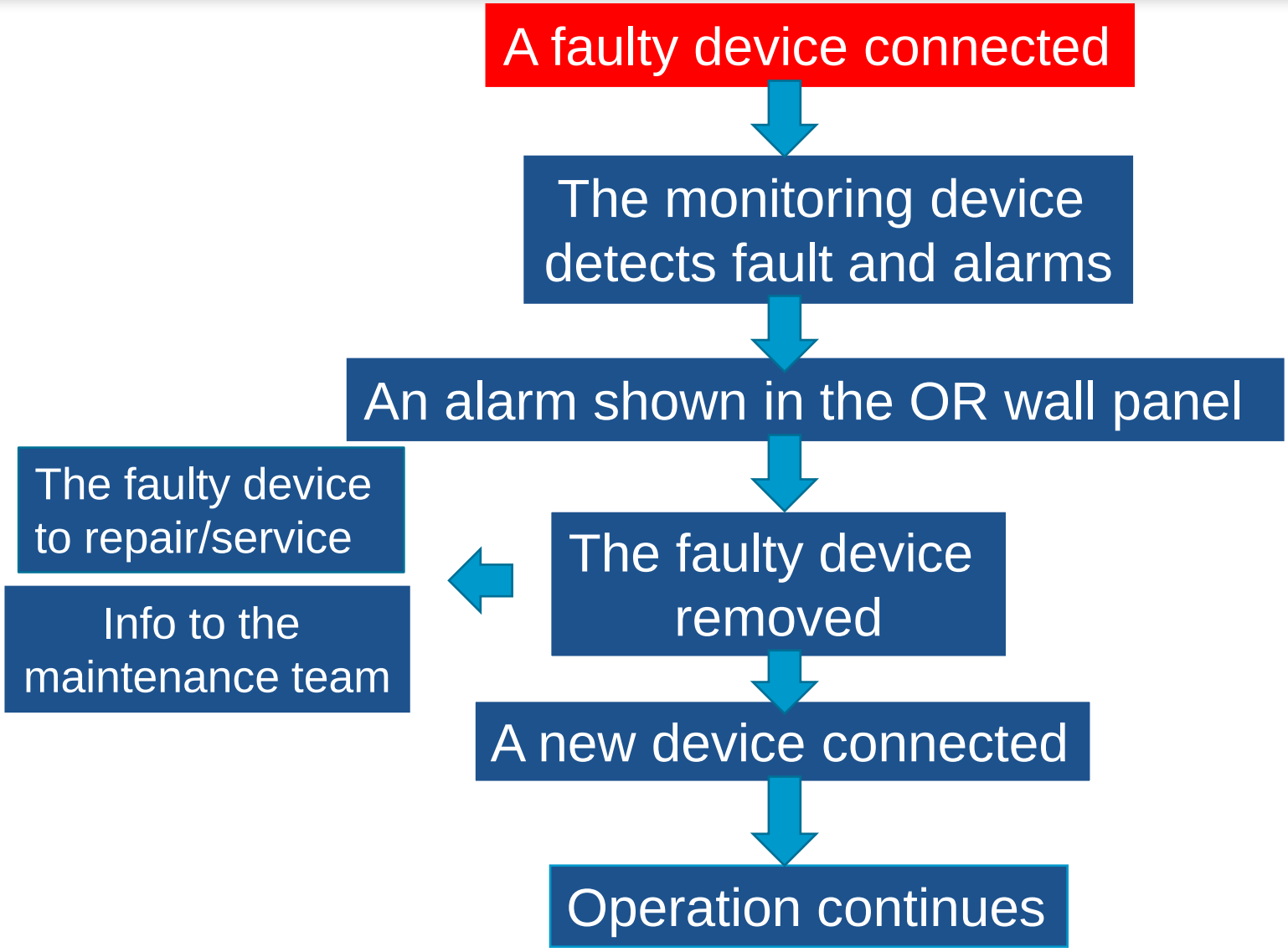
Operating room is full of electrical devices

Serious hazards have to be prevented and minimized in every possible way. The obligation is both legal and moral.

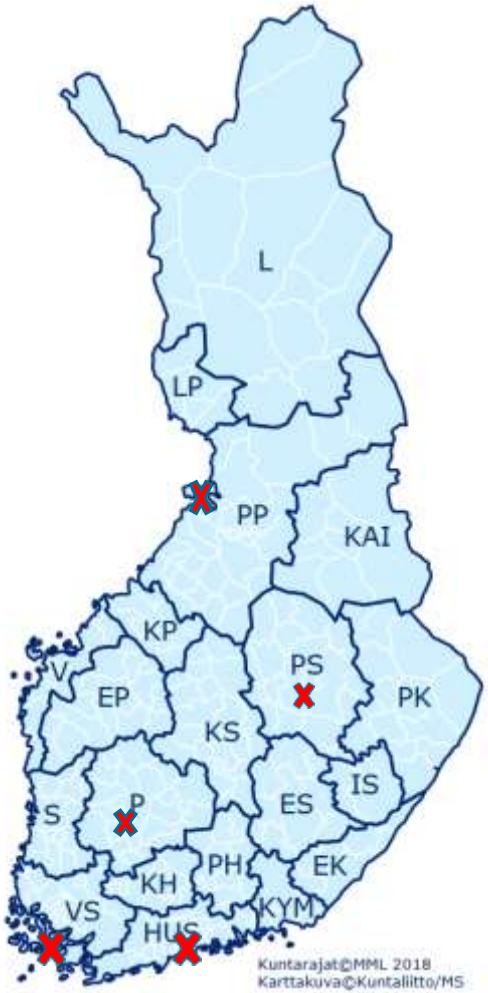
International Consortium of Investigative Journalists in 2019:
“Manufacturers, doctors, and others potentially linked more than 1.7 million injuries and nearly 83,000 deaths to medical devices in reports to U.S. regulators over the last decade.”

Insulation monitoring is one of the most efficient measures to prevent dangerous situations.

Case example: Faulty equipment in the OR



References



Our MEV-insulation monitoring system is in use in all hospital districts in Finland.

Our solutions are delivered to hospitals either directly or through hospital builders or central manufacturers.

In Finland, we also install and perform commissioning inspections.

20 hospital districts

- Five University Central Hospitals
- 16 central hospitals
- 52 regional hospitals

Sources: Local Finland, Valvira

Examples of our clients in Finland

ABB	AMPLIT	ARE	ARO SYSTEMS	Automaatio Center
Assemblin	Caverion	CONSTI	e avenue	ELPRO
esp ESP TEKNIIKKA OY	Granlund	GISTELE	intertrafo	KEMPELEEN KOJEISTOTUOTE OY
KONECRANES	kontram	M-Light	NORELCO	QUATTRO mikenti group
KOJEISTO OY	SLO	SÄHKÖJEESI	SÄHKÖPOINT OY	VoltmenOy

Few of the latest hospital references in Finland

Company name	Project name	Location	Date	Devices
Oulu University Hospital (OYS)	OYS TULSA 2030	Oulu	2021-2022	MEV-8 151pcs SP-8 160pcs FI-8 285pcs LC-8 285pcs
HUS University Hospital	Park Hospital	Helsinki	5.8.2020	MEV-7 40pcs LC-7 91pcs EV-7 40pcs M-7 40pcs
Central Finland Health Care District	Hospital Nova of Central Finland (KSSHP)	Jyväskylä	13.3.2020	MEV-7 130pcs LC-7 170pcs EV-7 130pcs M-7 130pcs
Kymenlaakso Central Hospital	Carea G-building	Kotka	17.2.2020	MEV-8 53 kpl SP-8 53 kpl LC-8 127 kpl FI-8 127 kpl
Central Ostrobothnia Hospital District	K-PKS Kokkola, Operating rooms	Kokkola	27.1.2020	MEV-7 10pcs LC-7 16pcs EV-7 10pcs M-7 10pcs
Lohja Hospital	Emergency changes in Lohja hospital	Lohja	9.1.2020	MEV-8 4pcs SP-8 4pcs LC-8 16pcs
Kainuu Central Hospital	Kainuu New Hospital	Kajaani	14.10.2019	MEV-7 67pcs LC-7 81pcs EV-7 67pcs M-7 67pcs
HUS University Hospital	New children's hospital	Helsinki	20.1.2018	MEV-7 220pcs LC-7 295pcs EV-7 220pcs M-7 220pcs

Case example: Oulu University Hospital (OYS 2030)

MEV-8 –insulation monitoring system installation

- MEV-8 Insulation level monitoring device 151 pcs
- LC-8 Line monitoring device 285 pcs
- FI-8 Fault locator unit 285 pcs
- SP-8 System monitoring panel 160 pcs

Our articles in international publications

IFHE Digest -publication offers views from hospital and healthcare sector written by engineers, architects and facility managers. IFHE Digest is published every year by The International Federation of Hospital Engineering.

- IFHE Digest 2022 (pages 68-70)
  Training operating rooms staff in electrical safety

- IFHE Digest 2019 (pages 19-22)
  Operating rooms and their electrical safety

- IFHE Digest 2017 (pages 51-53):
  Insulation monitoring in operating rooms

HEJ Healthcare Estate Journal 9/2020 : Insulation monitoring brings safety and cost-savings
(Pages 69-72) Authors Mr Timo Ohtonen and Mr Petri Pelkonen

PPO-Team at your service

- Over 30,000 MEV-Insulation Monitoring Systems since 1981.
- All operating rooms in Finland use MEV-8 or its earlier generations.
- We have started our fifth-generation MEV-8 export in 2019. In 2021, we have 17 distributors globally.

CEO Timo Ohtonen Technical Manager Kimmo Konttinen Production Manager Petri Pelkonen

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