

MAGICS TECHNOLOGY RAD-HARD SEMICONDUCTOR SUPPLIER

SOLUTIONS FOR NUCLEAR APPLICATION

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ABOUT MAGICS TECHNOLOGIES NV

“Go where no electronics have gone before”

Magics Technologies is based in Geel, Belgium, established in 2015 by Jens Verbeeck and Ying Cao as a spin-off from KU Leuven university and SCK-CEN. Turning > 3M euro revenues and employing 39 people.

The spark for Magics is a shared conviction that autonomous machines are the keys to unlocking secure, sustainable sources of energy and exploring other planets.

Magics continuously leveraged their rad-hard-by-design methodology and library into five ITAR-free product lines:

- Motion series: enabler for nuclear robotics and motion and instrumentation subsystems in space.
- Time series: on-board clock generation and time-of-flight sensors in space and nuclear applications.
- Power series: DCDC applications in nuclear and space.
- Vision Series: Rad-hard imaging and serialization for nuclear.
- AI series: AI accelerator ASICs and software solutions.



**TID Immunity and
SEL/SEU/SET tolerant**

Rad-hard by Design | No
shielding needed

Enable digitalization in high
radiation environments

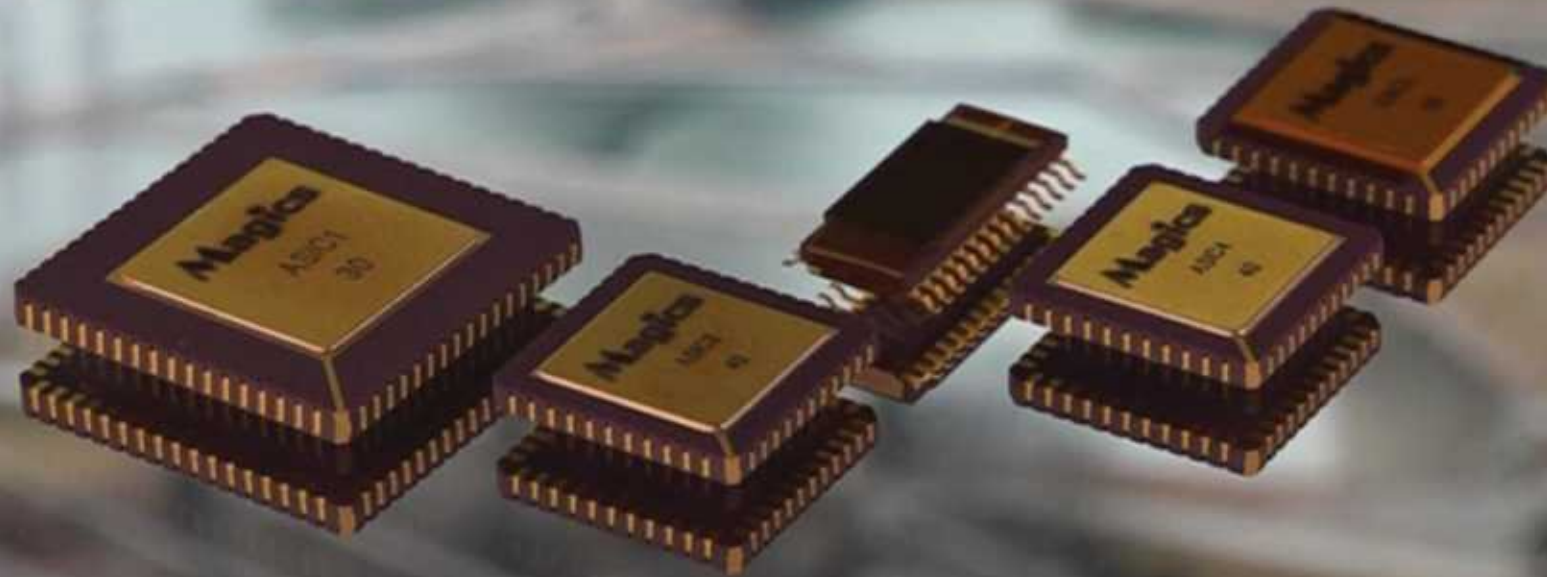
Increased lifespan of your
device

Trusted, ITAR free European
semiconductor supplier

Create lightweight and
compact end-products with
highest reliability

Reduce cabling and increase
sensory information

All digital

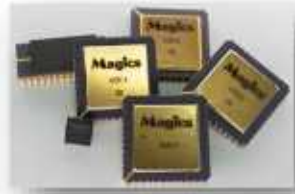


A single, strategic supply partner to secure your stock of semiconductor components |



OUR SOLUTIONS FOR NUCLEAR APPLICATIONS

OVERVIEW



- **MOTION SERIES**
 - RDC1001
 - SROIC2100
 - MSW2100
 - DRV1001
 - BUS1100
 - **POWER SERIES**
 - DC/DC Converter
 - **VISION SERIES**
 - **TIME SERIES**
 - PLL
 - TIME-TO-DIGITAL CONVERTER
 - **AI SERIES**
- MOTION CONTROL SOLUTION



MOTION CONTROL SOLUTION

Plug and play modular system for nuclear robotics for inspection, - maintenance or -decommissioning



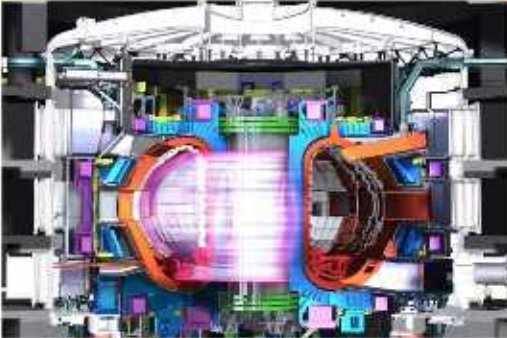
- Integrate our modular system easily into your current system
- Protect and upgrade your robotic system with Magics subsystems up to +1MGy TID immunity.
- Compose easily in 3-Steps:
 - Explore all rad-hard ASICs
 - Compose your modules
 - Integrate into your system



FROM NEW ENERGY APPLICATIONS TO BROADER MARKETS

DISCOVER HOW WE SUPPORT DIFFERENT INDUSTRIES WITH OUR MICROCHIPS AND INTELLIGENT SENSING SOLUTIONS VIA OUR PROVEN TRACK RECORD.

NUCLEAR ENERGY



- **CASE 1:** MAGICS motion series for F4E' ITER maintenance
- **CASE 2:** Inetec' remote handling robotics with Magics rad-hard solution,

NUCLEAR DECOMMISSIONING AND RAD-WASTE MANAGEMENT



- **CASE 3:** Waste detection
- **CASE 4:** Rad-waste packaging

SPACE



- CASE 5: Object detection, navigation and precision also for the nuclear industry

MANUFACTURING



- CASE 6: Supply chain optimization



WHAT HAS **MAGICS** DONE SO FAR?

RAD-HARD MICROCHIPS

| THE FOUNDATION FOR FOLLOWING APPLICATIONS:

Nuclear robotics
for maintenance



Nuclear robotics
for nuclear waste sorting
ML



Nuclear infrastructure
sensing
(e.g. nuclear containers)





WHAT HAS **MAGICS** DONE SO FAR?

NUCLEAR ROBOTICS FOR MAINTENANCE

Nuclear robotics
for maintenance



Nuclear robotics
for nuclear waste sorting

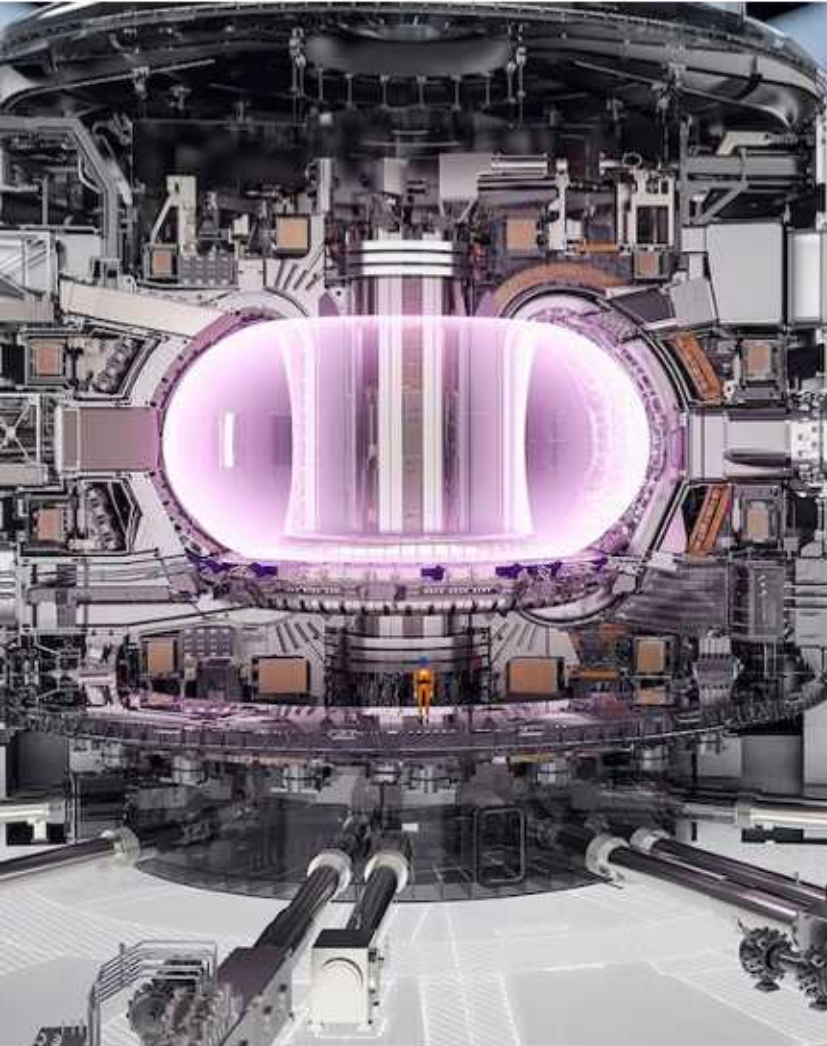


Nuclear infrastructure
sensing
(e.g. nuclear containers)



CASE 1 AUTOMATION: MAGICS AS SUPPLIER FOR F4E

| Remote handling – components – manufacturing – spin-offs



- Operating in the core of ITER requires many challenges and reliable solutions. Many components available on the market are too bulky for ITER.
- The levels of precision required to monitor what is happening in keeps experts very busy. Magics' solution can offer an answer to the need from F4E (Fusion for Energy).
- Engineers from Magics are testing if the electronics can operate in the ITER Torus core during its maintenance.
- Due to the levels of radiation, engineers will not be able to access the ITER Torus to fix or replace components. Similarly, not all material qualifies to operate in Torus. Exactly for this reason, experts from the fields of remote handling, robotics, diagnostics, electronics, need to collaborate to produce the equipment that will help us maintain the fusion device from a distance.
- Magics provides F4E with rad-hard ICs to realize remote handling processes for ITER' maintenance.



Experts from MAGICS testing the electronics that are used in the core of the ITER machine. The realization has been funded by F4E and result from the collaboration between Veolia Nuclear Solutions, MAGICS and ©F4E

CASE 2 AUTOMATION: MAGIC_LANCER II

| Innovative robotic system for non-destructive examination of reactor pressure vessel



INETEC and MAGICS have teamed up to create a more robust and resilient set of electronics for the LANCER II manipulator that can withstand higher levels of radiation while retaining all peak performance.

- Reducing O&M costs and exposure of operators.
- Development reduces cable mass and apply additional digitalization.
- Increased overall lifespan with reliable data.



WHAT HAS **MAGICS** DONE SO FAR?

NUCLEAR ROBOTICS FOR NUCLEAR WASTE SORTING

Nuclear robotics
for maintenance



Nuclear robotics
for nuclear waste sorting



Nuclear infrastructure
sensing
(e.g. nuclear containers)



AUTOMATION: AUTOMATED GRASPING IN WASTE STREAMS

| Object detection, navigation and autonomous handling for the nuclear industry



- This set of images demonstrates a set-up for automated grasping for a waste stream application.
- Collaboration between a robot arm and a worker
- The robot will be trained to detect a specific waste stream and remove it.



WHAT HAS **MAGICS** DONE SO FAR?

NUCLEAR INFRASTRUCTURE SENSING

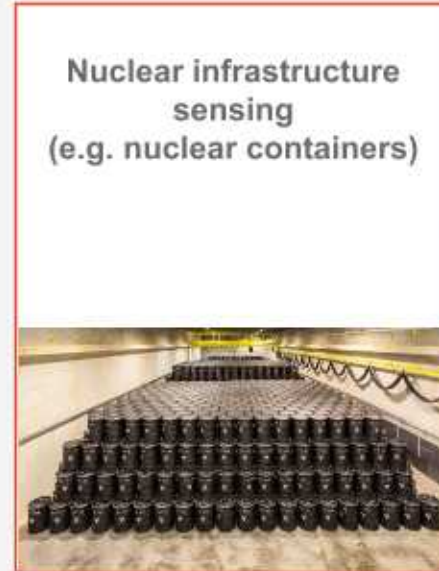
Nuclear robotics
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RELIABILITY: SMART SENSOR NETWORK FOR RADIOACTIVE WASTE

| End-user challenge

- Conditioned radioactive waste was supposed to remain stable, but it is not.
- Current monitoring techniques use pressure gauges that are visually inspected. Change are only detected after a long period of time and when damage is already done.
- Allows to safely intervene when pressure starts building up, but it will not provide data on the processes of gas production.
- Swelling, corrosion, ASR gel: what's next?



CASE 5 RELIABILITY: SMART SENSOR NETWORK FOR RADIOACTIVE WASTE

| Sensor interfaces, temperature, pressure and low voltage sensors



- Demonstration of high reliable IoT solutions in Nuclear waste management facilities with easy integration on existing fittings of traditional manometers.
- Reliable data transmission: 99,99%.
- Size: 114x54x59 mm with pressure sensor.
- Designed to monitor nuclear waste for 20 years.
- The module can be used as a hub for other sensors (i.e., strain gauges, silicon-based radiation sensors).

A SELECTION OF OUR WORLD-RENOWNED CUSTOMERS | ARE YOU NEXT?



LET'S HAVE A TALK!

Peter Berben
Business Advisor

Teo de Lellis
Sales Manager

Luisa Leroy
Business Developer

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