



# newsletter 4

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designing smart products

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## Non-nuclear thickness measuring far more accurate



Contactless measurement systems based on the disruptive technology of millimeter waves is seen as a powerful alternative for today's nuclear and radioactive measuring equipment. No wonder the Hammer-IMS system is top of the bill.

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## MinDCet wins the X-FAB X-CITE Award



On July 26, 2016, MinDCet won the semi-annual X-Cite Award for stretching the performance envelope in X-FAB's varied semiconductor processes. MinDCet is an ISO9001 certified fabless mixed-signal IC design company, with a focus on Power Management applications. Dr. Ulrich Bretthauer, Business Line Manager Industrial & Medical at X-FAB, presented the X-Cite Award to MinDCet CEO Dr. Mike Wens. "We know MinDCet for driving our technolo-

gies to the edge, but with this proposal you aim for even more ambitious targets, beyond what we envisioned when developing our SOI technology.", stated Dr. Bretthauer.

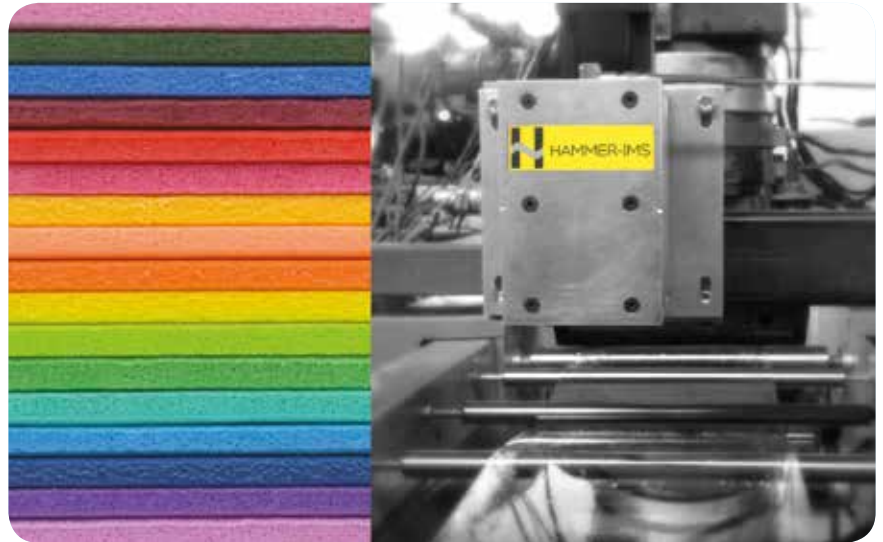


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Hammer-IMS is a high-tech company in the field of industrial sensing. It is a spin-off company of research laboratory ESAT - MICAS of KU Leuven University. The company is based in Hasselt, Belgium. Hammer-IMS supplies contactless measurement systems for measuring thickness, weight and anomalies of flat structures in production lines, based on the disruptive technology of millimeter waves. This high-frequency electromagnetic technology has been performing trial runs at international paper producers and manufacturers of plastic sheets and films, and is now further engineered to handle composites, textile coating, non-wovens, mineral wool and other materials.

**Micro level accuracy**

Millimeter wave measurements are favorable in situations where conventional technologies such as optical technologies, nuclear or radioactive radiation, ultrasound waves, inductive or capacitive measurement systems fail, are undesir-



able or provide an unreliable output. The modular and robust Hammer-IMS systems offer up to micron level accuracy on industrial in-line production machines.

The innovative millimeter wave technology is suitable for a long list of non-metallic materials across a range of industries:

paper & pulp, plastics, mineral wools, textile, composites, and glass. The Marveloc 602 family of measurement systems can optionally be combined with Hammer-IMS's CURTAIN hardware, supporting a multi-sensor solution for fast profile measurement in cross-machine direction. This multi-sensor approach is a clear differen-

# New Innovation Program on Smart Systems

We are very proud to announce a new innovation program on Smart Systems, which we recently started with the support of the European Fund for Regional Development, through the Dutch OP Zuid. What does this program mean for you?

It most importantly brings together businesses, and also research institutes, in the smart systems loop. From sensors and data acquisition to wireless connectivity and information analysis. This can take place in the embedded core of the smart system, but also in the loop closed over the internet and over the cloud. Are you active in the development of smart systems for health applications or for smart industry, then this program will support you. Especially if you are located in the southern Netherlands.

The innovation cases the program actually supports in smart health are for

example data processing for smart revalidation, a smart breathing belt, or smart environmental and safety monitoring in healthcare buildings. For the smart industry, the innovation cases include a smart tooling box for wireless sensory applications and a light-weight low cost robot platform.

For these concrete innovation cases we are looking for additional partners with complementary competencies. Do you develop revalidation instruments? Are you running revalidation services? Then you can help us setting up a demonstrator for the smart revalidation data processing. Do you provide sensor technology for low cost 3D vision? Or do you develop a short range radar sensor? Why not contribute to the robot platform. Do you plan a new application which needs a variety of sensor data? Are you also still looking for an easy-to-use solution for the wireless connectivity

and the integration of the sensors into the network? Then plug into the wireless smart tooling box.

You, yourself have an idea on developing a new smart system in smart health or smart industry? And you are you looking for partners or for a suitable funding mechanism? Our smart systems innovation program will help you.

We look forward to hearing from you!

Best regards,  
Peter Simkens  
Managing Director  
DSP Valley



tiator compared to conventional methods. The measuring technology is clean, non-nuclear and non-radioactive, and suitable for material thicknesses up to several centimeters. The Hammer-IMS systems measure both transparent and opaque materials in any color as well as rough and shiny surfaces. Moreover, millimeter waves are as affordable as conventional measuring technologies.

### Beter quality control

Engineering millimeter waves is challenging from a technical viewpoint. Designing printed circuit boards and selecting the right components for operation in the 30 – 300 Gigahertz frequency range, requires taking into account transmission line effects and related signal losses. For the development of its millimeter wave transmitters and receivers as well as other electronic circuitry, Hammer-IMS collaborates with specialised electronic suppliers.

By controlling ever higher frequencies, Hammer-IMS succeeds in measuring materials faster and more accurately on the assembly line. This is good news for manufacturers with the ambition to equip their production lines with faster and more accurately quality control. In the meantime Hammer-IMS developed a commercial portfolio of robust measuring solutions. The Hammer-IMS product offering currently contains entry level variants complemented with higher-performance measuring systems.

A number of international manufacturers – also in Flanders – have subscribed to test measurements with Hammer-IMS systems in their production lines. The company is in a favorable position because production halls are filled with nuclear measuring systems – of which governments stimulate the outfitting.

Currently Hammer-IMS is putting effort in detecting the thickness of polymer layers attached to metal substrates and special cases of multilayers. A good start is measuring the difference between 'before' and 'after' attaching a layer. This may contribute to developing technical principles for measuring coatings as well.

## TICO compression from intoPIX enables Industry's First 100m single CAT X cable solution extending UHD 4K60P 4:4:4 video with USB 2.0 and USB 3.1

**At the beginning of June, Icron Technologies Corporation, a leader in USB and video extension technology demonstrated their new "Maverick" USB and UHD video extension platform that incorporates intoPIX's visually lossless TICO video compression technology. A summary of the platform's possibilities.**

### Highly compatible USB extension over single CAT X cable

The Maverick platform features Icron's proprietary ExtremeUSB® technology to extend USB 2.0 and USB 3.1 Gen 1 in combination with TICO UHD 4Kp60 4:4:4 video over a single CAT X cable up to 100 meters, or a single LC-LC fiber cable up to 200 meters. The highly flexible OEM platform includes the ExtremeUSB suite of features such as transparent USB extension, true plug-and-play (no software drivers required) and compatibility with all major operating systems: Windows® OS X® and Linux® and supports all USB 3.1 Gen 1, 2.0 and 1.1 devices.

### Unique Lightweight Visually Lossless compression

Additionally, Maverick includes intoPIX's award-winning TICO low latency visually lossless video compression technology and offers unparalleled performance for handling UHD 4K p60 with full 8- or 10-bit in 4:2:2 or 4:4:4 color spaces for accurate image clarity. *"The ProAV industry is certainly going to benefit from this new and highly innovative extension platform with unparalleled performance in extending both UHD video and USB over a single cable,"* said Jean-Baptiste Lorent, Product & Marketing Manager at intoPIX. *"TICO provides a truly lossless compression, with no impact on latency and this represents a real breakthrough*

*delivering cost-effective high resolution high frame rate video. We are very pleased to be a contributor to this game changing platform."*



*"This is an industry first and quite an achievement; the TICO compression engine coupled with our ExtremeUSB technology pushes the boundaries of video and peripheral extension,"* said Tom Schultz, Product Manager at Icron. *"With visually lossless 4Kp60 4:4:4 video, USB 3.1 at 5 Gbps, and Gigabit Ethernet support, our Maverick extension platform creates an entirely new performance class of USB and video extension offering OEM customers unrivalled features and flexibility to suit their own solutions for specific markets."*

### Contacts

- **Icron:** Thomas Schultz, Product Manager, thomas.schultz@icron.com. More on [icron.com](http://icron.com)
- **intoPIX:** Jean-Baptiste Lorent, Product & Marketing Manager, jb.lorent@intopix.com. More on [www.intopix.com](http://www.intopix.com).



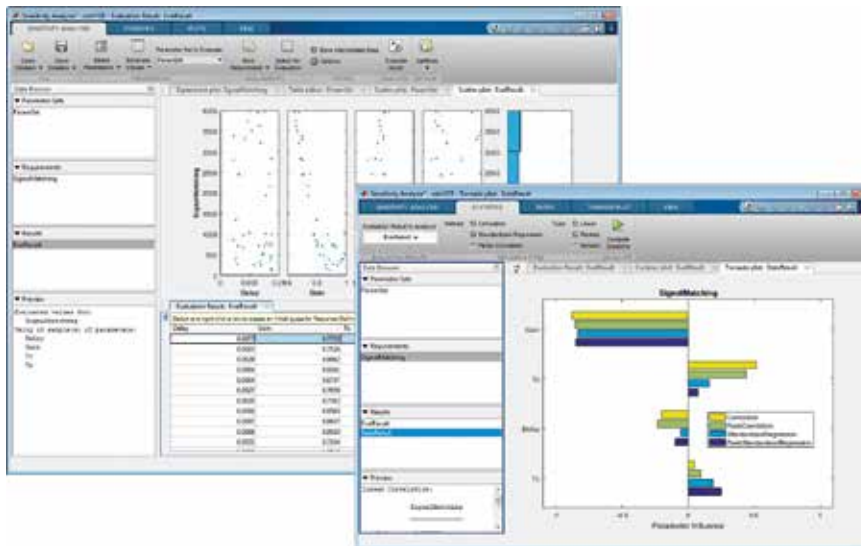
# Simulink introduces sensitivity analysis tool to support design space exploration



**Design engineers frequently need to determine how changes to the parameters in their model impact behavior. The sensitivity analysis tool helps them to measure the effect of each individual parameter.**

MathWorks, the leading developer of mathematical computing software, announced that Simulink Design Optimization now includes a new sensitivity analysis tool to support design space exploration. The tool, introduced as part of Release 2016a, allows design engineers using Simulink Design Optimization to interactively conduct design of experiments and Monte Carlo simulations of Simulink models.

The Monte Carlo simulation furnishes the decision-maker with a range of possible outcomes and the probabilities they will occur for any choice of action. Simulink is a graphical environment for simulation and Model-Based Design for multidomain dynamic and embedded systems. Engineers and scientists worldwide rely on these product families to accelerate the pace of discovery, innovation, and development in automotive, aerospace, electronics, financial services, biotech-pharmaceutical, and other industries.



*Simulink Design Optimization helps perform sensitivity analysis to see how the cost function varies with model parameters (top). Compute statistics and create tornado plots (bottom) to determine which parameter has the greatest influence on a cost function.*

## Large design space

Design engineers frequently need to determine how changes to the parameters in their model impact behavior. By identifying which parameters have the greatest influence on design characteristics such as fuel efficiency, engineers can gain confidence that their design meets the specified requirements. The sensitivity analysis tool helps perform analysis through Monte Carlo simulations, which enable the exploration of a large design space. The analysis tool helps to interactively specify multi-

# Flanders Make develops model-based force measurements

**It's difficult or even impossible to measure dynamic data such as force, torque or strain. Therefore Flanders Make decided to start a project to make these data measurable.**

## Focus on four subdomains

Estimate physical quantities (e.g. forces) that are in practice difficult/expensive to measure are their main challenge. Therefore the strategic research center will focus on the integration of four subdomains:

1. Generating a model that is accurate and easy to evaluate;

2. Selecting an adequate instrumentation plan;
3. Correlation of model and measurements through Kalman filtering;
4. Deployment on an embedded system.

## Ready for the industry

The overall goal is to further develop this enabling technology of virtual (force) sensing and bring it to a level of maturity that is ready for industrial applications. This general objective is divided into three pillars:

1. Development of fast estimation solutions in service to real time applications;

2. Development of high-end estimation solutions in service to condition monitoring and system analysis;
3. Demonstration of the above mentioned techniques on use cases of industrial complexity.

## Economic Value

During the prototype development phase of machinery and vehicles, virtual sensing approaches allow the manufacturer to decrease the discrepancy between the virtual design and the actual design. This will speed up the virtual prototyping process and generate a more reliable/performant design

ple parameter variations, incorporate a number of standard and custom design requirements, and analyze the results of these simulations graphically and quantitatively.

### Direct influence

The results of sensitivity analysis can be used to directly influence the design, as well as improve the performance of numerical optimization tasks such as fitting models to test data and tuning models to meet design requirements. Simulink Fast Restart and Parallel Computing Toolbox can help speed up the sensitivity analysis tool's performance.

*"Growing design complexity is creating increasingly large models. To maintain model accuracy, engineers are challenged with identifying which model parameters impact behavior the most,"* said Paul Barnard, design automation director, MathWorks. *"Now, engineers can use Simulink Design Optimization to determine model sensitivity, fit the model to test data, and tune it to meet requirements."*

To learn more about Simulink Design Optimization, please visit [mathworks.com/products/sl-design-optimization](http://mathworks.com/products/sl-design-optimization).

with smaller safety margins leading to a considerable cost reduction in labor effort and product resources. During the life-time of the machinery, the health of the machine can be monitored towards predictive maintenance thus decreasing down time and unnecessary scheduled replacements. The control of the machine can be improved by exploited the new available sensor information and creating a more performant design and a competitive advantage.

### Contact

You want some additional information on this project? Or you have a specific question? Contact project leader Jan Croes

## MathWorks extends Simscape for modeling and simulating fluid systems

**This summer, MathWorks, also released Simscape Fluids. This extension to Simscape provides component libraries for modeling and simulating thermal liquid systems.**

The new libraries and examples include heat exchangers, pipes, valves, and other components; this enables engineers to develop fluid power, heating and cooling, and fluid transportation systems for applications such as backhoe actuators, engine cooling systems, and water supply networks.

### Early detection

Simscape Fluids enables engineers to build a causal model of fluid systems that integrate directly with block diagrams in Simulink, state machines in Stateflow, and MATLAB functions. Simulating the entire system within a single environment streamlines tasks such as designing control systems and optimizing system-level performance. This also makes it possible to detect integration issues earlier in the development process, when they are less expensive and time-consuming to address.

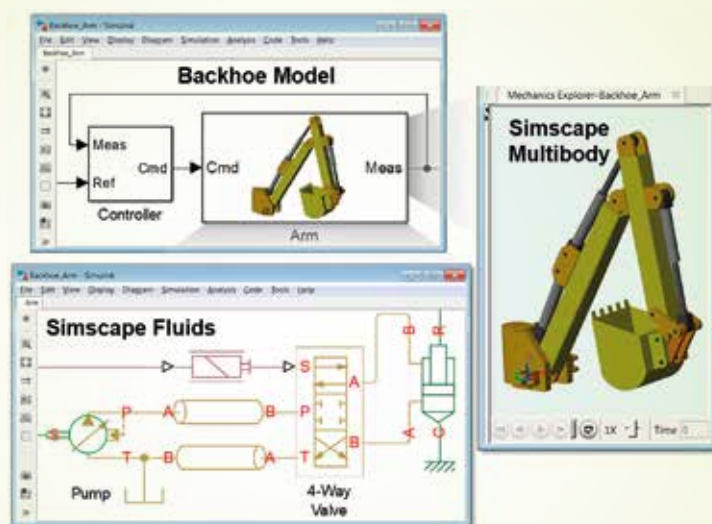
Simscape Fluids models can also be converted to C code to support testing of embedded software in configurations such as processor-in-the-loop and hardware-in-the-loop testing, which is much safer and more efficient than testing on hardware prototypes.

### Part of united environment

*"Simscape Fluids is a valuable addition to Simscape that allows us to use simulation to solve problems in complex fluid systems such as liquid cooling*

*systems in engines and water heating systems in buildings,"* said Jean Brunet, deputy CEO at Sherpa Engineering. *"An added advantage is that by working with Simulink, Simscape Fluids is part of a united environment for developing control algorithms and physical systems. This increases the value of Model-Based Design by enabling a more useful and elaborate executable specification."*

*"Simscape Fluids is another step in our continued investment in the Simscape platform and libraries for modeling physical systems,"* said Paul Barnard,



*Backhoe with hydraulic actuation model (bottom) in Simscape Fluids.*

marketing director, MathWorks. *"Simscape Fluids is an important component in our solutions for engineers who tune closed-loop actuation systems and evaluate system-level performance of heating and cooling systems. Now, engineers working with automotive, aerospace, and industrial machinery can easily use simulation to verify system behavior without relying on hardware prototypes."*

To learn more about Simscape Fluids please visit [mathworks.com/products/simhydraulics](http://mathworks.com/products/simhydraulics).

## Averna launches first all-in-one infotainment RF Signal Source



**Looking for a software-defined instrument that validates automotive infotainment systems? Today and tomorrow? Averna, a leading global Test & Quality Solutions provider, has the answer.**

At the beginning of August, Averna launched the first all-in-one infotainment RF signal source based on the NI Vector Signal Transceiver. NI, or National Instruments is a global leader in test, measurement and control solutions. Featuring Averna's leading RF and test expertise, the software-defined AST-1000 generates all common infotainment RF signals, including AM/FM, DAB, GPS, HD Radio, and Sirius/XM. Therefore this all-in-one solution is ideal for validating automotive infotainment systems.

### Key Features and Benefits

Due to the AST-1000's software-defined architecture, the instrument will soon accommodate new signals, including connectivity protocols like Bluetooth and WiFi, and non-RF signals like CAN for bus monitoring.

Its key features and benefits are easy to perceive. The tool supports all common broadcast radio and navigation protocols, the FPGA framework easily accommodates new signals, saving on instrument costs. There is a seamless integra-

tion with Averna URT Instruments to protect your investment. It also has an easy-to-use interface for quick signal generation and easy test setups. The flexible PXIe architecture allows integration of other applications/cards and the instrument is rackmountable, it handles lab validation as well as functional and EOL testing. And finally, the AST-1000 has a standardized platform, is easy to calibrate, simple to maintain and receives global support.

### Ideal for testing

"We've been working closely with the team at NI to develop an RF signal source based on the NI Vector Signal Transceiver, so it's fitting to launch our AST-1000 during NIWeek 2016," said Alex Pelland, Product Marketing Manager at Averna. "The AST-1000 is an innovative software-defined instrument, ideally suited for infotainment testing applications. It currently supports all common broadcast radio and will soon be able to accommodate new signals, such as navigation (GNSS), audio/video, and connectivity."

*"The Averna AST-1000 is a great example of bringing innovative test solutions to market through our Alliance Partner*



*Network by combining Averna's extensive industry knowledge with NI's flexible PXI-based platform." said Michael Schneider, Principal Product Manager at National Instruments "The AST-1000 is sure to appeal to automotive infotainment developers who want a software-defined instrument that will continue to evolve to cover their ongoing test requirements."*

### You want to learn more?

Visit [www.averna.com/AST-1000](http://www.averna.com/AST-1000) or contact **Alex Pelland**, Product Marketing Manager for the AST-1000 (alex.pelland@averna.com, t +1 514-842-7577 extension 689).

Contact for Europe

**Koen Schoofs**, Accountmanager (koen.schoofs@averna.com, t +32 (0)11352548)

### Pricing and Availability

The Averna AST-1000 is available to customers worldwide. Detailed pricing and product information is available on request. Please contact us at [sales@averna.com](mailto:sales@averna.com) or visit the AST-1000 product page.



### Averna Wins Outstanding Technical Resources Award at NIWeek 2016

On August 1, during NIWeek, the annual global conference on graphical system design, Averna was awarded Outstanding Technical Resources – Platinum Level by National Instruments. The award is given to the NI Alliance Partner with the most certified architects and developers who support NI customers in their integration and consulting projects. Averna was honored with this award because of its high number of certified LabVIEW and TestStand architects and developers.

*Kurt Hensen, Vice President Corporate & Business Development Europe and François Rainville, Vice-President Sales & Marketing receive the Technical Resources Award.*



## You saw the eye-catching MinDCet demonstrations?

Last May, MinDCet, expert in the design of Power Management applications, showed its new intelligent solutions at the PCIM-show in Nürnberg.

The latest ASIC-solutions demonstrated were:

- A fully-integrated 700V to 5V linear regulator with which you can handle 700V on-chip
- An automotive 40V/0.6A brushless-DC motor driver chip (power management for automotive)

- A D-BUCK digital DCDC converter (a unique, very efficient and robust MinDCet-system to digitally regulate a DCDC-converter)
- Wireless power and data transfer

MinDCet excels in Power Management technologies where intelligence, speed, efficiency and power on-chip are combined. In doing so MinDCet offers its solutions to automotive, industrial, space & aerospace, biomedical and high-reliability markets.

If you are interested in these demonstrations or more, you have another opportunity to see them, since MinDCet will also be present at the Electronica 2016 Exhibition 8-11 November in München.

For more on high-voltage on-chip, the MinDCet-paper on a "Fully-integrated 650V, 3A BLDC DRIVER" might be something you want to read. The paper was presented mid-September at the ESSCIRC 2016 Conference in Lausanne. For a copy of the paper, you can mail to [info@mindcet.com](mailto:info@mindcet.com). ■

## Flanders Make aims for robust and optimal control of systems

**Are your control engineers struggling with the robust control of mechatronic systems, components of production machines and vehicle systems? With the ROCSIS-project Flanders Make aims to develop a control design software that copes with the behaviour of systems of interacting systems. The software also needs to optimize the control configuration.**

### Demand for control

The ROCSIS project is set up to address the strong demand from the Flemish industry for control design software that can adequately cope with the complex behaviour of systems of interacting subsystems.

Discussions with several companies furthermore exposed a pressing need for software to optimize the control configuration: the combination of sensors, actuators and control architecture. Since more complicated controllers and additional sensors and actuators do not necessarily lead to an economic profit, the balance between the enhanced performance and robustness and the elevated costs also has to be right.

**Valuable and reliable software**  
Development of reliable and efficient

software is the first goal. This means:

- design of robust and optimal controllers
- adequate for systems of interacting subsystems
- with a user-friendly design interface that automates the design and supports use by non-experts
- that supports the selection of the optimal control configuration, yielding the best performance and robustness for a given implementation cost

Demonstrating the potential and value of this software to find economic solutions to control complex industrial systems is the second goal. That will be realized through:

- validations performed on experimental development cases and models of industrial cases
- feasibility studies to explore usage of the developed software in company applications

### User-friendly

The ROCSIS user-friendly control design interface and software will enable Product Manufacturers, CAE Developers and Engineering Service Providers:

- to design simple controllers compatible with industrial control hardware (low computational and implementation cost) for systems of interacting

subsystems

- to optimise the number and type of sensors and actuators and the complexity of the control architecture in order to manage the costs and pay-back time of a more complex control configuration, and find a good trade-off between costs and benefits (improved performance and robustness)
- to maintain or improve performance and robustness while improving upon other criteria, e.g. energy efficiency, without a significant increase of the implementation cost
- to systematically analyse the influence of communication delays, amount of data communicated, sampling rate ... on performance and robustness, and hence realise the most economical solution for the given system, system uncertainty and specifications
- to reduce the commissioning cost related to on-site (re)tuning of controllers.

### Contact

You want some additional information on this project? Or do you have a specific question? Contact project leader Wilm Decré. ■



# The Industrial Internet of Things will be smart



**Today the Industrial Internet of Things is almost reality, but soon industrial equipment will also need to perform more than just a mechanical function. It must become smart.**

The Industrial Internet of Things (IIoT) has grown beyond information technology concerns (gathering data, data processing and security, etc.) and now includes predictive maintenance of assets to reduce cost and nonproductive time, and eliminate breakdown and failure.



Robotic systems can be modeled using ANSYS electronic, rigid dynamics, and mechanical systems.

One of the first steps in realizing the benefits of the IIoT for industrial equipment is to create intelligent machines/digital products. As evident from consumer products like smartwatches, soon industrial equipment will also need to perform more than just a mechanical function, and must become smart or intelligent.

## New value creation

For industrial equipment, the idea is not to just add sensors everywhere. The strategy is to collect information that drives business objectives, resolves a technical or operational bottleneck, and meets industry standards and regulations. The major goals include optimization, reliability and new value creation (reducing downtime, extending asset life, reducing failure). This can be achieved through a combination of field data (sensors, operators) with non-field data (historical, simulated, physics-based analysis).



Many industrial companies are gearing up to benefit from the IIoT: industrial automation equipment providers, networking component providers, and original equipment manufacturers, along with operating companies across various industries such as metals and mining, agriculture, manufacturing, energy and power, oil and gas, materials and chemicals, and water and wastewater. The IIoT covers a broad ecosystem; both software and hardware solutions, and their applications, vary with each industry vertical.

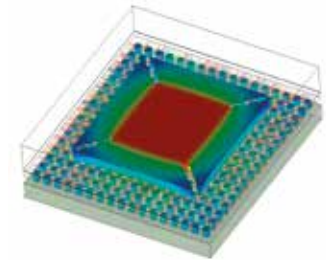
## 5 common challenges

The work of ANSYS, a simulation engineering company, focused on electronics, systems and embedded software has highlighted five common engineering challenges and associated critical success factors:

- **Size, Weight, Power and Cooling**  
The addition of IIoT technologies, such as pervasive connectivity and sensing, brings higher density of electronic components, leading to additional size, weight, power, and thermal challenges.

- **Sensing and Connectivity**

Smart connected products are 'smart' because they can sense their environment, communicate with other electronics, and enable decisions and outcomes. Combining equipment design, sensor placement and connectivity



reliability can create costly physical prototyping. An automated design loop enables engineers to investigate and optimize their designs through hundreds of design permutation analyses without manual intervention.

- **Reliability and Safety**

The expanding adoption of autonomous operating systems and intelligent machines is helping to increase safety, but this must be done by developing equipment.

- **Integration**

Model-Based Software Engineering, 3-D Physical Simulation, and Multiphysics and System Simulation are helping organizations shrink their product development time.

- **Durability**

One of the attractions of IIoT is that trillions of sensors and communication systems will be deployed to collect and share useful information 24 hours a day, seven days a week. These systems will be expected to perform reliably not just in their intended operating environment, but must also be able to withstand the rigors of usage in what are often extremely harsh environments whose exact conditions are difficult to define in advance. An integrated approach can lead to more reliable products. ■

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