

# IT'S THE GEAR

WEARABLE ELECTRONIC  
SENSORS AND AI FOR SPORTS  
PERFORMANCE AND HEALTH

INSTMC END OF YEAR REVIEW

METROLOGY FOR ADVANCED  
MANUFACTURING – THE  
NETWORKING PROJECT  
ADVMANUNET

COMPETITIVE ADVANTAGE  
WITH REMOTE TELEMETRY  
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MAKING STATEMENTS OF  
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## INSTMC END OF YEAR REVIEW

Last year I wrote a short piece for this page reflecting on what a big year 2019 had been for the Institute and looking forward to our plans for 2020. This year has been another one filled with change, but obviously of very different and less positive kind. The global coronavirus pandemic has loomed large over 2020, and has had an impact on many of our Members, staff and volunteers.

In early March all head office staff were asked to work from home, as the country started to go into lockdown, and at the time (perhaps naively) there was a slight feeling of this will all be over by Christmas. However, as we head towards the end of the year, all staff continue to work from their homes, and face to face meetings and events are still not going ahead. The Institute has coped well with this new way of working, in no small part due to the upgrades to working practices and IT infrastructure that we implemented in 2019. That is not to say there have not been challenges, but we hope that bar a few hiccups at the start the majority of our members have not noticed any significant reduction in service from head office staff and still find they can get in touch when they need us.

Our Local Sections and committees have adapted incredibly well to the situation and have continued to provide excellent technical content and training to the membership in new socially distanced formats. We held our first ever virtual AGM and EGM earlier in the year, and found this format enabled more members than ever before to take part. Even as we hope things will return to some semblance of normal, we have learned how to better use technology to enable our wide



geographic spread of members to actively take part in future Institute activities.

Throughout the lockdown we have put out several calls in partnership with the Royal Academy of Engineering looking for volunteers from the industry to help support the coronavirus response, ranging from helping to building the Nightingale hospitals, through to sparing a small amount of computer processing power to help scientists researching the virus. Knowing our membership, I was not surprised to see just how many of you freely offered up your time to help in any way you could.

We do not know what 2021 will bring, but the Institute remains committed to finding new ways to support its members and adapt to the changing world.

I hope you can have a Merry Christmas, and sincerely wish you a happier 2021.

**Steff Smith**  
Chief Executive  
Institute of Measurement  
and Control

### Membership Subscription 2021

As we approach membership renewals for 2021, we would like to emphasise how much we value the loyalty and contribution from all our members and we fully appreciate that engineering, along with many other industries, has been adversely affected by the current Covid-19 pandemic. We are sympathetic to any member going through difficult personal circumstances and would like to remind you that the Institute can offer help to those that need it through a waiver or reduction of fees. If you would like to discuss any aspect of your membership renewal, please don't hesitate to get in touch as soon as possible at [admin-subs@instmc.org](mailto:admin-subs@instmc.org). We look forward to your continued membership in 2021.

# CONTENTS

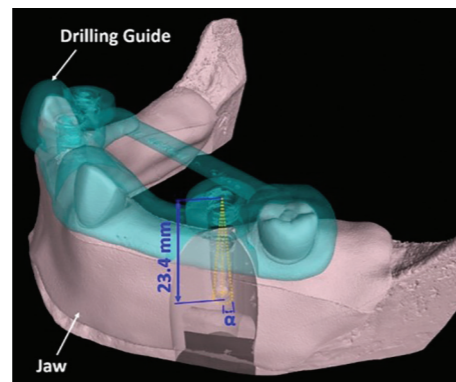
## ARTICLES

### INSTMC END OF YEAR REVIEW

3



### METROLOGY FOR ADVANCED MANUFACTURING – THE NETWORKING PROJECT ADVMANUNET



8-9

### IT'S THE GEAR

A recurring theme within engineering news media and scientific research is the development of wearable electronic sensors capable of monitoring our health and bio-performance.



6-7

### Q&A

Under the spotlight this issue is Maurice Wilkins, Executive Advisor at Yokogawa and Chair of both the Standards and Digital Transformation SIGs.

10-11



### FOCUS ON A SIG: CYBER SECURITY

Cyber Security is a vibrant, fast-growing, ever-changing, multithreaded topic for all abilities.

14



### FOCUS ON A SIG: FUNCTIONAL SAFETY

The Institute's Special Interest Group dedicated to Functional Safety (FS-SIG) continues to promote good practice in matters of functional safety and IEC 61508 and related standards.



15

### LOCAL SECTION NEWS

A round-up of the latest news and activities from our UK Local Sections.

16-17

### INSTMC 2020 AWARDS

As we approach the end of what has been a difficult year for all of us, we are delighted to announce the winners of the 2020 InstMC Awards.

20-21

### COMPETITIVE ADVANTAGE WITH REMOTE TELEMETRY UNITS

24-25

One of the issues that all industries face is inefficiency.



### CHAIN BRISTOL 2020

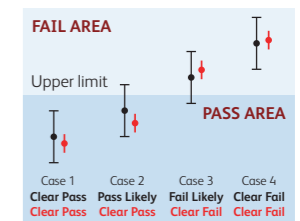
Nick Valentine reports how engineers are innovating and inspiring young people.



### MAKING STATEMENTS OF CONFORMITY USING ISO/IEC 17025:2017

26-27

Decision Rules for taking uncertainty of measurement into account when making statements of conformity continue to exercise many readers.



### COMPANION COMPANY SCHEME (CCS) SHOWCASE

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28

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# IT'S THE GEAR

## WEARABLE ELECTRONIC SENSORS AND AI FOR SPORTS PERFORMANCE AND HEALTH

BY PETER NORMAN, IENG, MINSTMC, MIET

A recurring theme within engineering news media and scientific research is the development of wearable electronic sensors capable of monitoring our health and bio-performance.

Two such areas are in electronic textiles and wrist-worn devices with smart capabilities which are also gaining artificial intelligence.

### Electronic Textiles

Electronic textiles that can be woven into garments have the potential to measure variables such as body

temperature and might also be used for energy harvesting.

At the UK's Nottingham Trent University, for example, research groups within their School of Art and Design include areas of dynamic textile functions such as the development of smart yarns produced by embedding semiconductor dice into yarns or fibres; electronically-active textiles for medical and automotive applications; and flexible fabric antennae for communication systems. In the field of sports science and medicine they are researching graduated compression garments for sports, rehabilitation, and the treatment of venous disease and lymphoedema; smart knitted structures for active moisture control; and surgical, trauma and implant training simulators and phantom modelling.

### Smart Wrist Watches, Bands and Rings:

Another wearable electronic technology is found in wrist devices like the range of smart activity tracker watches already available on the market. Fitness trackers send pulses of green light through the skin where it is partially absorbed by arteries. The amount of light reflected back through the skin is measured using a technique called photoplethysmography (PPG) and can be affected by the amount of melanin and any tattoos. The arteries expand as blood flow increases causing more green light to be absorbed rather than reflected back to the tracker which then estimates your heart rate. The shape of the pulse signal can be interpreted to identify fitness levels such as: sleep; resting heart rate; heart rate variability; maximum heart rate; respiration rate; temperature; blood oxygen level and blood pressure.

Many model variations exist and can include communication functions. The next phase of smart bands will further decompose the pulse shape to determine health risk, morbidity and mortality as pulse shape can be a function of age and fitness.

The next level of smart watch sophistication, however, is likely to be in devices that can monitor and analyse every move of the wearer. Biosensor technology, also known as 'lab on a chip', was invented in 2017 by electrical and computing department engineers at Rutgers University, New Brunswick. This miniature technology could be used in hand-held or wearable devices to monitor a person's health and exposure to dangerous bacteria, viruses and pollutants. Detection of biomarkers such as prostate specific antigen (PSA) will be useful for early diagnosis of underlying problems such as developing cancer cells within the body.

These developments are likely to become reality within this decade.

### Introduction of Artificial Intelligence

Scientists are now developing an artificial intelligence (AI) system that will enable new smart watches to realise when a routine task has been left undone and provide the wearer with a 'helpful' reminder message or signal. The intended benefits would include: health care assistance; aiding post-injury rehabilitation; promoting healthy lifestyles; and serving as memory-joggers for the elderly.

Whilst the technology can be applied beneficially to remind a worker of a forgotten task and

perhaps adherence to work safety procedures, there are more negative applications such as performance tracking of factory workers or the analysis of consumer behaviour.

Similar to existing activity trackers, the new smart watch will employ accelerometer sensor inputs whilst adding a vital time domain element. The main difference, however, will be that the new device will not rely upon pre-programming. The AI software will be capable of learning about new behaviour patterns and be able to identify consecutive activity episodes. An example of this is that, whereas existing activity tracker technology only sees an interrupted walk - punctuated by short stops - as a series of separate journeys, the new system will understand just a single walk being undertaken, resuming after each short rest pause.

### Application of AI for Sport

The use of AI in sports can already be seen in recruiting, training, performance analysis, maintenance of health and fitness; and, even in broadcasting and advertising. AI has a part to play in both refereeing and coaching. Athletics data is already exploding in availability.

This AI is all about neural networks and deep learning using artificial neurons. The key metrology factor, of course, is the accuracy of measurements in order to supply good, reliable data for the neural networks to perform adequate simulations.

AI sports products and projects already include:

- Running gear to measure performance include smart bra/ shirt to measure heart rate
- Bluetooth socks to measure step counting, speed, calories, altitude and distance tracking but also foot landing, cadence
- Sports shoes fitted with a sensor or Bluetooth
- Yoga gear with vibrations and alignment measuring
- Smart bands and rings to be worn

around the wrist

- Skis, golf clubs and cricket bats fitted with IoT (Internet of Things) sensors to improve sporting techniques

Experts are addressing aspects of AI to help us exercise better; make us fitter through better, smarter diets; make us faster and stronger; help us develop and improve sporting technique; combine data from different devices to nudge better performance; and help us choose the best team members particularly for the least cost at professional levels.

Algorithms for fitness now include factors such as sleep duration (Rapid Eye Movement (REM) sleep and deep sleep); heart rate variability; daily strain and recovery rate. And in the future? We will see AI increase the competitiveness in sport by a huge margin. Improved sensors and algorithms will provide better predictions and outcomes of competitions. With such scope of implementation, it is likely the entire sports industry will look to adopt AI in order to gain a competitive edge over rivals.

### Useful information links for further reading:

<https://eandt.theiet.org/content/articles/2017/09/smart-watches-equipped-with-advanced-ai-will-monitor-your-every-move/>

<https://eandt.theiet.org/content/articles/2017/06/apple-watch-and-fitbit-could-be-equipped-with-new-tiny-biosensor-that-monitors-health/>

<https://www.ntu.ac.uk/research/groups-and-centres/groups/advanced-textiles>

<https://www.rutgers.edu/news/lab-chip-could-monitor-health-germs-and-pollutants>

The Royal Society of Chemistry publishes a regular Lab on a Chip journal. <https://www.rsc.org/journals-books-databases/about-journals/lab-on-a-chip/>



# METROLOGY FOR ADVANCED MANUFACTURING – THE NETWORKING PROJECT ADVMANUNET

## Introduction and summary

Advanced Manufacturing is a branch of manufacturing that is considered to be an important driver for future economic and societal progress. The European Commission (EC) has identified Advanced Manufacturing as one of six Key Enabling Technologies (KETs) with applications across multiple industrial sectors. In particular, it can be thought of as a connecting hub for the other EC identified KETs of Micro- and Nanoelectronics, Nanotechnology, Advanced Materials, Industrial Biotechnology and Photonics, since it often acts as the enabler for these technologies. However, Advanced Manufacturing can be considered to extend beyond these identified KETs to a wider spectrum of industrial sectors.

The progress of Advanced Manufacturing, which uses emerging knowledge and innovations is strongly reliant on the development of metrology capabilities. EURAMET, the association of metrology institutes in Europe, has established metrology research programs to address the metrology needs in different thematic areas, including metrology for industry. However, in order to leverage the benefits of and increase the impact of these developments on the wider industrial landscape, a high-level coordination of the metrology community supporting the Advanced Manufacturing landscape is required. This current gap in coordination aims to be fulfilled by the establishment of European Metrology Networks (EMNs), which are intended by EURAMET to provide a sustainable structure for ongoing stakeholder interaction in different thematic

areas. The networking project JNP19Net01 AdvManuNet funded by EURAMET for four years starting in June 2020 aims to accelerate the process of establishing a European Metrology Network (EMN) to strengthen Europe's position in Advanced Manufacturing. The consortium to deliver this project comprises National Metrological Institutes (PTB, NPL, INRIM, RISE, CMI, METAS, TUBITAK, GUM), Designated Institutes (BAM), University partners (Politecnico di Torino) and the European Society for Precision Engineering and Nanotechnology (euspen) from across Europe.

The AdvManuNet project will address the need for a sustainable EMN on Advanced Manufacturing through the following specific aims;

1. To establish a single hub for regular, constructive dialogue and liaison with stakeholders across the Advanced Manufacturing landscape, as well as overlapping areas in Advanced Materials and Nanotechnology. This engagement extends to relevant societies and standardisation bodies.
2. To develop a Strategic Research Agenda (SRA) and roadmaps for Advanced Manufacturing metrology based on the stakeholder engagement activities. In particular, the SRA will identify the current gaps in metrological capabilities and consider existing networks and roadmaps.
3. To establish a knowledge-sharing program for Advanced Manufacturing stakeholders, which will promote the dissemination and exploitation of the results of the project, including those from previous EU funded research projects. This activity will build on

existing training programs and include a range of regularly hosted activities, such as exchange of researchers, industry focused events and training courses.

4. To develop a web-based platform for Advanced Manufacturing stakeholders to allow for easy access to European metrology capabilities and connections to other relevant European and international networks. In addition, a service desk will be established to support the stakeholders and the wider advanced manufacturing community with metrology-based needs. A particular requirement to support the sustainability of the network is to assure that this infrastructure and capability can be maintained by a future EMN over the long term.
5. To develop a plan for a joint and sustainable European metrology infrastructure for Advanced Manufacturing via a European Metrology Network. The plan should be completed within 12 months of the start of the project and should use coordination and smart specialisation of capabilities, align with other running initiatives and projects, promote the development of emerging member states, and consider how to extend collaboration to third countries.

In order to realise these goals, the project is subdivided into five work packages lead by four institutes. Broadly the first three work packages address the five aims of the projects, while the other two relate to dissemination of the results and management and coordination of the project. They are as follows;

- Dialogue with stakeholders
- Strategic road mapping and

- plan for EMN
- Technical infrastructure for EMN operation
- Creating impact
- Management and coordination

The success of the project will be measured by the following key deliverables over the course of the project and will be overseen by the Scientific Advisory Committee (SAC). The SAC will be comprised of established figures representing the diverse range of industries within the Advanced Manufacturing domain. The key deliverables for the AdvManuNet project are;

- a. Plan for a joint and sustainable European metrology infrastructure for Advanced Manufacturing via an EMN to be presented to the EURAMET General Assembly 2021.
  - b. Report on the knowledge sharing program for Advanced Manufacturing stakeholders. The program includes promotion of the dissemination and uptake of research results on advanced manufacturing and a range of regularly hosted activities.
  - c. Produce a final list of the metrology needs for Advanced Manufacturing, which includes input from stakeholders, relevant societies and standardisation bodies.
  - d. Report on the final testing of the functionality of the web-based platform for Advanced Manufacturing stakeholders. This platform includes access to European metrology capabilities, links to other relevant European and international networks, as well as a service desk to answer stakeholders' questions.
  - e. Develop a Strategic Research Agenda (SRA) for metrology for Advanced Manufacturing.
  - f. Provide examples of early implementation of the project deliverables by end users and examples of contributions to new or improved international standards.
- The project has started the early activities which are necessary to establish the scope of the project. In particular, Advanced Manufacturing

still does not have a universal and accepted definition, which is needed to establish the boundaries to conventional Manufacturing. The definition which will be used within the project is: Branch of manufacturing that exploits evolving or emerging knowledge, technologies, methods and capabilities to make and/or provide new or substantially enhanced goods or services, or improve production efficiency or productivity, while ensuring environmental and societal sustainability. However, to assist with the scope definition, a list of keywords and key industrial sectors is also being created.

Advanced Manufacturing represents a broad landscape of technologies and industries with both unique and overlapping metrological requirements. Understanding these requirements and identifying the capability gaps is a key early task in the establishment of the Strategic Research Agenda for Metrology for Advanced Manufacturing.

An example of the diverse requirements for metrology in Advanced Manufacturing are illustrated for the key technology of Additive Manufacturing. These requirements range from the dimensional characterisation of the feedstock powder through to the temperature measurement of the melt pool via in-situ thermography and the final part dimensional and NDT inspection, including surface roughness with re-entrant features. Figure 1 shows an application of Additive Manufacturing techniques in the area of medical implants using computed tomography as an advanced metrology method, developed within the EMPIR project MetAMMI.

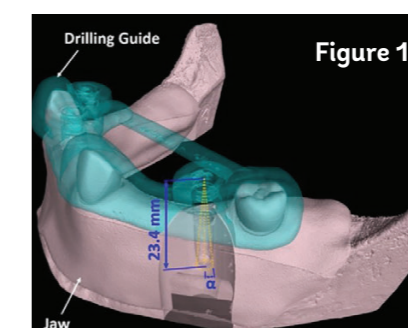


Figure 1

**Figure 1:** Trial of a dental drilling guide produced by additive manufacturing for the drilling of holes to fit dental implants into artificial jaw models with only few abutment teeth. The drilling angle  $\alpha$  and the drilling depth were measured by means of computed tomography. Source: PTB

Another example of where Advanced Manufacturing and metrology connect is shown in Figure 2 which is a thermally stable multi-feature standard for checking the performance of machine tools with integrated measuring capabilities. The standard had stringent requirements on the manufacturing specifications (form error  $\leq 1 \mu\text{m}$ , roughness  $\leq 0.2 \mu\text{m}$ ) and therefore had to be realised using advanced manufacturing techniques, such as jig grinding.

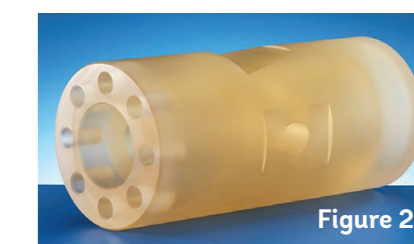


Figure 2

**Figure 2:** Multi-feature check standard, made from Zerodur using advanced manufacturing technologies. Source: PTB

<https://www.euramet.org/research-innovation/search-research-projects/details/project/support-for-a-european-metrology-network-on-advanced-manufacturing>

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# Q&A

## Maurice Wilkins

Under the spotlight this issue is **Maurice Wilkins**, Executive Advisor at Yokogawa and Chair of both the Standards and Digital Transformation SIGs.

### What was the root of your interest in Engineering?

I grew up in the Midlands and, as a boy, enjoyed visiting the Birmingham Science Museum to see all the old machines in action. I also loved working with my dad and brothers on car and motorbike engines. When

I went to school it became apparent that I had a knack for chemistry and I was also good at algebra. But the careers advisor suggested that I look at civil engineering, which confused me, as I hated applied maths. One of the senior lecturers suggested that I visited a friend of his who was a chemical engineer. I did that, and while being very impressed with his house, I also found out that chemical engineering brought chemistry and algebra together on large pieces of process equipment. So, I decided to study chemical engineering and eventually obtained a 1st class honours degree and a doctorate.

### What is your vision of Engineering in Britain for the next ten years?

After I graduated, I joined Esso Chemical Ltd at Fawley as a control systems engineer. There was only one job available and I was lucky enough to get it, although at the time I knew very little about process automation. This started a career that has run for over 40 years and counting. I was lucky enough at that time to start by working on Distributed Control Systems (DCS), the first control systems using micro-processors and with in-built intelligence. Until then all controllers were panel mounted and stand-alone. This heralded the start of a move to centralised control rooms and advanced control. All of this happened in the late 1970's.

For the next few decades we had iterations in technology but no big leaps – until now. I believe we are now at the most exciting time for engineers since that time early in my career. The advent of Digital Transformation has meant the introduction of technologies we could have only dreamt of several years ago. I would like to see British engineers at the forefront of this new technology revolution and this will require more 'blended' rather than the current 'pure' engineering disciplines. For instance, in future oil and gas operations, multi-disciplined engineers will work from central operations centres and be required to support global operations.

### What should the UK government do to address the shortage of UK engineers?

As I said, we are probably at the most exciting time to be an engineer for many years and yet engineering is still not seen as a 'go to' career. The government needs to show the value of engineering and the impact that young engineers can make, using all media outlets from TV infomercials to publications and social media. I also think apprenticeships should be re-introduced. Some of the best engineers I have known in my career had been through apprenticeships. I hear from students, when I give guest lectures at universities, that they are expected to have experience. BUT, without any kind of support programmes, how do they get it? The government should subsidise engineering apprenticeships.

### What do you do in your free time to relax?

I am lucky that I live in the Somerset countryside, so I love to go for long walks with Sara, my wife, and our two dogs, Bailey, an adorable Yorkie-Shih Tzu cross and Millie, a bonkers Cockapoo. We also like to go for runs with Millie. We really enjoy visiting some of the wonderful places near where we live and hope to be able to do that in style soon when we take possession of a mint condition 2003 Jaguar XJ8, which will become our fun car.

### Given one wish what would that be?

In the current circumstances I think I, along with everyone else, wish for a vaccine for COVID-19 and for life to begin to return to normal.

Coming back to the subject of engineering, my one true wish would be for British engineering to be back at the forefront. We still have some very good inventors but seem to have lost the capability to take the next step. As I said at the start of this interview, I grew up admiring British engineering and still love the old British cars, trains and aircraft. We need to dig deep and bring that spirit back instead of selling it to other countries.

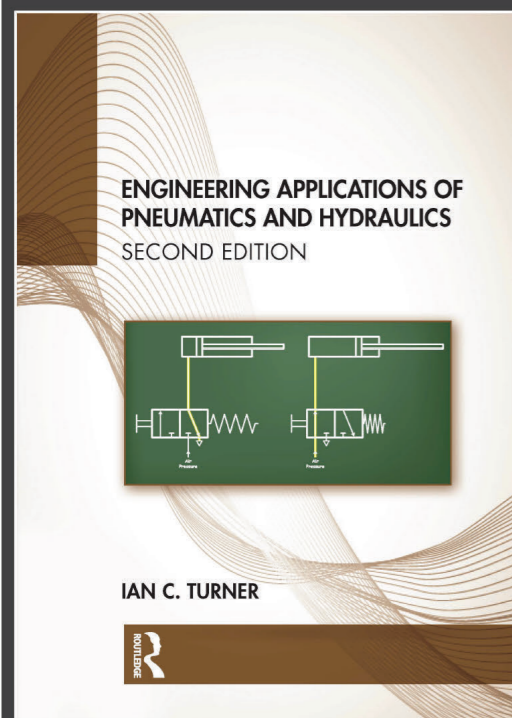


The advent of Digital Transformation has meant the introduction of technologies we could have only dreamt of several years ago.



I also think apprenticeships should be re-introduced. Some of the best engineers I have known in my career had been through apprenticeships.





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#### TABLE OF CONTENTS:

Preface; *Acknowledgements* 1 Applications of Pneumatics and Hydraulics in Industry; 2 Basic Principles of Fluid Power Systems; 3 Features and Characteristics of Pneumatic and Hydraulic Systems; 4 Component, Equipment and Plant Symbols; 5 Fluid Power Generation, Supply and Distribution; 6 Control Valves I – Types and Principles of Operation; 7 Control Valves II – Types and Principles of Operation; 8 Actuators; 9 Pneumatic and Hydraulic Circuits and Arrangement of Components; 10 Electro-Pneumatics and Electro-Hydraulics; 11 Fluid Power Measurement Systems; 12 Troubleshooting and Maintenance; 13 Basic Principles of Fluid Power Control; 14 Emergency Shutdown and Safety Systems; 15 Health and Safety at Work; *Appendix 1 Answers to revision questions; Appendix 2 City & Guilds specimen examination questions; Appendix 3 Standards and standardisation organisations; relevant fluid power; Appendix 4 Bar litres: calculations; Appendix 5 UK professional engineering bodies and organisations*

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# INTRODUCTION TO INSTMC SIGS

InstMC Special Interest Groups provide an opportunity for like-minded engineers to network, share ideas and expertise, collaborate and learn, and keep updated on industry news and developments.

Our SIGs cover technical topics within the measurement and control fields and are driven by groups of volunteers who work, or have expertise, within the topic area. SIGs promote the sharing and advancement of knowledge through a range of activities including white papers, briefing notes, conferences, seminars and exhibitions.

Members can join any SIG through the members only area of the InstMC website. If you are interested in finding out more about a particular Special Interest Group visit <https://www.instmc.org/Special-Interest-Groups> or email the following relevant contact.

**Cyber Security** Cevn Vibert  
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# FOCUS ON A SIG: CYBER SECURITY

The InstMC Cyber SIG is still embryonic. My fault, as I have been madly busy, changing jobs and honestly not getting “a round-tuit!”

There are now currently **218** members of the “embryonic” Cyber SIG. I believe that is 218 volunteers all very ready to make the Cyber SIG an incredible success. Do you have some occasional round-tuits you can lend me and the SIG?

We do need to launch the SIG so I propose an initial online Teams meeting (due to Covid-19, geography, cost and ease) for anyone who wishes to join on Thursday 21st January at 5pm. Future post-covid meetings should be tea/cake/pizza/beers whatever suits the SIG. It will be good to meet you all. Many buddies have joined and I would like to meet many more.

Topics for the launch event are many and varied but we need **YOU** to help.

Cyber Security is a vibrant, fast growing, ever changing, multithreaded topic for **all** abilities.

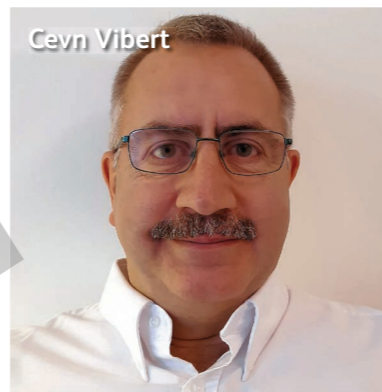
All 218 of us are learning, every day.

You can help this SIG by asking yourself these questions about the new SIG and help to find answers.

- How will the SIG formation evolve?
- What are our key drivers?
- What involvement can you provide?
- What support is needed from others?
- How will we define and build innovation in the SIG?
- What meetings and events shall we create?
- Shall we form conferences, blogs and more networking forums?
- What training, qualifications, certifications are available?
- What standards are available and still needed?
- Do you know of the CyBOK and how does this fit with our work?
- Can we provide unbiased, unaffiliated reviews of products and services?
- What links can we build and publish of our links to Government bodies?
- Are blogs, articles, papers and streams possible to build?
- Are you a Teams Admin/expert/dabbler?
- What help can YOU offer the SIG?

My intention for the InstMC Cyber SIG is for it to provide fun enjoyable educational value to all.

Many of you have asked me about the work of the InstMC as part of the UK Cyber Security Alliance which has draft aims to form the UK Cyber Security Institute to provide Chartered Cyber Professionals in some form. InstMC are onboard



waving the Industrial/ICS/IACS/OT Cyber Security flag!

A reminder of who makes up the UK Cyber Security Alliance:

The International Information System Security Certification Consortium (ISC)<sup>2</sup>, BCS (The Chartered Institute for IT), Chartered Institute of Information Security (CIISEC), CIPD, CompTIA, Council of Professors and Heads of Computing (CPHC), CREST, Chartered Society of Forensic Sciences (CSFS), Engineering Council, Information Assurance Advisory Council (IAAC), The Institution of Analysts and Programmers (IAP), The Institution of Engineering and Technology (IET), Institute of Measurement and Control (InstMC), ISACA, Security Institute, techUK, The Worshipful Company of Information Technologists (WCIT).

Cyber Alliance Project Workstream examples include: Management, Consortium Formation, Council Formation and Operations, Communications, Developing the Profession, Qualifications, Code of Ethics, Thought Leadership, Royal Charter, Transition to Council.

More news will be forthcoming from Government, DCMS and NCSC and the InstMC will circulate all news as it emerges.

**Cevn Vibert, Chair**  
Email: [cevn@vibertsolutions.com](mailto:cevn@vibertsolutions.com)  
LinkedIn: [vibertprofile](#)  
Twitter: [@cevnv](#)

# FOCUS ON A SIG: FUNCTIONAL SAFETY

The Institute’s Special Interest Group dedicated to Functional Safety (FS-SIG) continues to promote good practice in matters of functional safety and IEC 61508 and related standards.

Although the standard is now over 20 years old, functional safety is still a new discipline in many regards. Awareness of the standards remains patchy although generally high in the major hazard industries. Awareness is one thing however, understanding is quite another. One area in which the SIG can contribute is in nailing the myths that appear to proliferate. For example, there is a notion that equipment used to build a SIL rated safety Instrumented Function (SIF) must be certified. In fact, the standard does not stipulate certification for anything; not equipment, not people, not processes. The requirement is to establish an appropriate degree of confidence that these things are fit-for-purpose. There are a variety of means of doing this. Certification may well be helpful in this regard but is not the only way and not necessarily to be preferred – all sorts of games are played! The SIG



produces occasional Briefing Notes to explain key issues and these are first distributed to the SIG membership before they are offered for wider publication.

The standards are so very broad in their scope that they can be difficult to navigate in any given context. The safety lifecycle promoted by the standards is a model that cannot be simply mapped on a 1-to-1 basis with real project activity that includes parallel paths and iterative loops. Absolutely rigorous compliance is a fantasy that we approach asymptotically (only reached after expending infinite resource!) There are many occasions when it is appropriate to exercise professional engineering judgement about the appropriate means of fulfilling objectives. The implication of the professional engineering qualifier is that the judgement should be suitably informed and exercised by a competent engineer. The FS-SIG aims to support members in their navigation of these turbulent waters.

The SIG also administers the Registered Functional Safety Engineer (RFSE) qualification on behalf of the Institute. If you are actively engaged in functional safety at a professional level, this qualification may be of interest. The qualification is based on a peer review of the candidate’s wider professional engagement with the functional safety discipline and considers experience, qualifications and continuing professional development (CPD) activity. The assessment process is modelled on that for registration with the Engineering Council UK as IEng/CEng. Such registration is a prerequisite and provides demonstration of general professional competence, underpinning knowledge and understanding (UK&U) and a commitment to CPD. These we consider essential to the development and maintenance of professional competence in functional safety. We are often asked about how this qualification stands in relation to others in the field. A key point is that it requires a demonstration of competence and commitment at the professional level over an extended period – short course attendance will not satisfy the requirements. The qualification is intended to help practitioners substantiate claims of competency.

**Harvey Dearden, Chair**

FS SIG LinkedIn: <https://www.linkedin.com/groups/8917923/>



# LOCAL SECTION NEWS

## CENTRAL NORTH WEST

### Webinar: “Benefits of Professional Registration”

On 24th September Central North West hosted an online technical talk designed to support members on understanding the benefits of professional registration within the InstMC. The section opens its online sessions to non-members so this was also an opportunity to encourage new members too.

Dr Beverley Stanford, InstMC Professional Registration Committee Chair, kindly agreed to present to us via Microsoft Teams. The session was enlightening and provided information on professional registration for all grades (EngTech, IEng and CEng) alongside the additional qualification of RFSE and REXE. The material included all requirements for professional registration including the education requirements and different routes

to membership such as the Career Based Learning route as well as the ‘normal’ route with accredited educational qualifications (Masters degree) and responsibilities in the workplace.

The session was attended by 16 members. The locations of the members extended beyond the boundaries of Central North West with attendees from the Republic of Ireland, Nigeria and Malaysia. The session provided some very good interaction between the attendees with many questions for Beverley on general queries and those specific to individuals circumstances which I think attendees found very useful, with comments like ‘superb session’ and ‘thoroughly worthwhile evening’.

We recorded the session and this is now available to view on the

InstMC YouTube channel – <https://youtube.com/channel/UCM-SCCcAMxM7LfMzVgGCq0A>

I have personally been contacted by two members for copies of the video to share with their colleagues who are also interested in professional registration. Fingers crossed that the session has enabled some people to move forward with their applications.

Central North West will continue their technical talks online into 2021 whilst restrictions remain in place due to the current pandemic. They are open to anyone and details are being updated regularly on the InstMC website as talks are confirmed. We hope to return to face to face sessions too when it is possible.

**Dave Green**  
Chair, Central North West Section

## WEST OF SCOTLAND

During September 2020, the West of Scotland Section has held two online seminars via Microsoft Teams, in order to benefit from the expertise within their network. These presentations were hosted by Bradley Chapman, Dwyer Instruments Inc.

### Understanding ATEX – 14th September

Considering that instrumentation and control devices are commonly used in hazardous area applications, this presentation explained the basics of ATEX for both Intrinsically Safe and Explosion Proof installations. This online seminar covered ATEX background and global accreditation, followed by other bodies that offer hazardous area certification. By the

end of the lecture, the audience could identify ATEX markings for gas and dust hazards; equipment category, group classification and protection identification.

### Understanding Sensor Accuracy – 21st of September

Accuracy has a large effect on the cost, quality or efficiency of a sensor and the process it is measuring. It is important to understand what factors determine accuracy and what questions to ask when selecting a sensor. This lecture focused on explaining the differences of approaching accuracy according to different manufacturers and how to differentiate parameters such as Hysteresis, Non-Repeatability and

Non-Linearity. By understanding how manufacturers calculate accuracy, the audience will now be able to make a more informed decision when evaluating sensors.

We are continuing technical lectures for the rest of the year in topics related to instrumentation that might be of interest. Thanks to all those who have attended so far. Please, check the Events page on the InstMC website <https://www.instm.org/Events> as well as InstMC social media channels, for details of the online seminars scheduled in upcoming months.

**Carolina De la Cruz**  
Events Co-ordinator, West of Scotland Section

## LONDON

### Webinar: ‘Improved Efficiency of the Digitalisation Journey in Oil and Gas’

This Sensia webinar presentation on 8th September was very well received and attended by the London Section membership and guests.

Sensia (a JV between Rockwell Automation and Schlumberger) condensed their presentation to demonstrate how an Open Digital Platform can facilitate the implementation of a digitalisation programme in an operational environment and assist oil and gas operations, by implementing environment information with an open architecture with the option to allow influence from the latest technologies from automation and IIOT (Industrial Internet Of Things), allowing the additional benefit of

developing analytics, applications and business process workflows.

Sensia advised that the benefits of digital oilfield projects which have been implemented around the world with end users, have actioned the reduction in operational costs by up to 30% and certainly reduced safety risks. The design of a digitalisation suite allows easy integration of instrumentation, automation and digitalisation solutions. With tools from production optimisation to reduce the complexity and efforts to integrate operational technologies with analytic tools and the added benefits for object modeling and dataflow management. The subscription management services with messaging queue

telemetry transport protocol enables communication with Schlumberger Avocet software Platform Production Data Management System (PDMS), which enables a robust architecture to connect, store, manage, validate and report. This allows end users to see a comprehensive picture of all assets for the complete well, equipment and event life cycle. The systems architecture allows connection to other data stores, removing the need for data duplicating.

**Barry O’Regan**  
Hon Secretary, London Section

## NORTH OF SCOTLAND:

### InstMC 2020 Student Awards

In November, five students from Aberdeen universities were announced as winners by the North of Scotland Local Section’s 2020 Institute of Measurement and Control Student Awards.

The awards, now in their second year and sponsored by InstMC Companion Company Scheme member, Dräger, aim to identify and encourage engineering talent in the North of Scotland.

Megan Hine, Account Manager at Dräger and Programme Manager for InstMC North of Scotland said: “Knowledge and expertise of measurement and control topics is a key skill for many careers in engineering, especially here in Aberdeen, home of the North Sea Oil and Gas industry. For example,

it is critical in the spheres of gas detection and monitoring and consequently key to the safety of operations offshore. These awards seek to highlight and support the next generation of engineering talent in the North of Scotland, talent which will be crucial in driving forward the future economy of the area, particularly as the focus increasingly shifts towards renewable energy.”

The student winners are as follows:

- Callum Knight – Outstanding Student MEng, University of Aberdeen
- Benjamin Rees – Outstanding Student BEng, University of Aberdeen
- John Williamson – Overall Best

Student BEng Stage 1, Robert Gordon University

- Peter Scott – Overall Best Student BEng Stage 2, Robert Gordon University
- Allister Morgan – Best Student Introduction to Industrial Control, Robert Gordon University





# Professional Registration with the InstMC

## HOW ?

To obtain professional registration individuals must be a member of a recognised Professional Engineering Institute such as the Institute of Measurement and Control.



InstMC is licensed to award:

- Chartered Engineer (CEng)
- Incorporated Engineer (IEng)
- Engineering Technician (EngTech)

## WHEN ?

**Now!** Whether you are looking to achieve the next level in your professional registration journey or are just starting out, the process is easy to complete online.

To find out more and start your application today, visit: <https://www.instmc.org/Membership-Registration/Professional-Registration>.

## WHY ?

Being professionally registered demonstrates to employers that you are committed to maintaining and enhancing the knowledge, skills and competence required to meet the engineering and technological needs and standards of today. Your title will improve your CV and may lead to wider employment options, career progression and promotion.

## APPLY ONLINE

As an InstMC member apply through 'Engineering Council Registration' in the member's portal of the Institute's website. Complete the relevant form and supply the necessary supporting documentation. The membership team will assess your application then ask you to attend a professional review interview with our qualified assessors. If successful they will recommend to the InstMC Professional Registration Committee that you be added to the professional register.

### Supporting Documents:

- A current CV
- An Organogram of your company
- Attested copies of your Degree/Diploma Certificates
- Attested copies of Academic Transcripts



# Awards 2020



## Congratulations to our Award Winners

Thomson Gold Medal  
Hartley Medal  
Callendar Medal  
Oxburgh Medal

Lambert Award  
Lambert Award  
Tallantire Award  
Hon FInstMC

Dr. James Olthoff  
Prof. Sheila Rowan  
Prof. Andy Augousti  
Prof. Lisa Hall

Gary Tse  
Harvey Dearden  
Dr. Beverley Stanford  
Prof. Jan Maciejowski

Institute of Measurement and Control



# INSTMC 2020 AWARDS

As we approach the end of what has been a difficult year for all of us, we are delighted to announce the winners of the 2020 InstMC Awards. Normally we would honour all recipients at an Awards Night ceremony held in October, but due to ongoing COVID-19 restrictions, the event was sadly cancelled this year. InstMC President, Martin Belshaw, and Prizes & Awards Committee Chair, Professor Ken Grattan, kindly recorded video messages as part of a virtual ceremony featured in the November issue of The InstMC Wire newsletter. The messages can be viewed at 'InstMC Virtual Awards 2020' on the InstMC YouTube Channel <https://www.youtube.com/channel/UCM-SCcAMxM7LfmzVgGCqQA>

Huge congratulations to our winners and we would like to take the opportunity to present them to you here.

## Sir George Thomson Gold Medal

**Winner: Dr. James Olthoff**

Acknowledges contributions to measurement science resulting in fundamental improvements in the understanding of the nature of the physical world.



This is the highest award of the Institute and given only once every five years. Dr Jim Olthoff has made an outstanding, sustained contribution to measurement science in his role as the Associate

Director for Laboratory Programs at the National Institute of Standards and Technology (NIST) in the USA. This has resulted in fundamental improvements in the understanding of the physical world through providing direction and operational guidance for NIST's scientific and technical laboratory programmes and he serves as principal deputy to the Under Secretary of Commerce for Standards and Technology and NIST Director. Dr. Olthoff has filled high-profile positions representing NIST and the United States within the international metrology community and currently serves as the President of the Board of the NCSL International, the U.S. representative to IMEKO, and the SIM Technical Committee Chair.

## Sir Harold Hartley Medal

**Winner: Professor Sheila Rowan**

For outstanding contribution to the technology of measurement and control.



The Sir Harold Hartley Medal is awarded to Professor Sheila Rowan MBE FRS FRSE FInstP, who is Professor of Physics and Astronomy at the University of Glasgow in Scotland, and director of its Institute for Gravitational Research since 2009. She is highly distinguished in her field and awarded the medal for her work in advancing the detection of gravitation waves. In 2016, she was appointed part-time Chief Scientific Advisor to the Scottish Government.

## Callendar Medal

**Winner: Professor Andy Augousti**

For outstanding contribution to the art of instruments or measurement.

The Callendar Medal recognizes the sustained contribution of Professor Andy Augousti, Professor of Applied Physics and Instrumentation, and founding Director of the Doctoral School of the Faculty of Science, Engineering and Computing at Kingston University. He has published nearly 150 refereed journal and conference publications, 3 patents, 5 volumes of edited conference proceedings, and a laboratory manual for physics students with international colleagues. He has been a Series Editor for a book series on Sensors and Instrumentation published by Kluwer Academic Publishers and has, in his career, organised over 50 conferences and meetings, chaired 4 national conferences, and organised and delivered over 50 short courses in the UK, France and China.



## Oxburgh Medal

**Winner: Professor Lisa Hall**

Awarded to any person whose contribution to measurement, instrumentation and control in the field of environmental science and



engineering is of outstanding merit.

The Oxburgh Medal, in recognition of the contribution to the Institute of Lord Oxburgh, is awarded to Professor Lisa Hall for her research focused on understanding how biology can be interfaced with electronic, mechanical and optical systems and new ways to answer fundamental and applied questions concerning new measurement regimes. This links transduction technologies (electrochemistry, optics, ultrasound) with synthetic biology and nanomaterials to achieve sensors & diagnostic systems. The research bridges theoretical methods and modelling with lab-based experimental science. She is Head of the Department of Chemical Engineering and Biotechnology at the University of Cambridge and Head of Cambridge Analytical Biotechnology, a research group directed towards environmental, medical and industrial application, pro-active in responding to and advising industry of existing capability and future direction.

## L B Lambert Award

**Winner: Gary Tse**

For meritorious service to the Institute particularly, but not exclusively, through involvement with Local Sections.



The L B Lambert Award, awarded to Gary Tse, recognizes his meritorious service to the Institute, particularly his involvement with the Local Section in Hong Kong. During his Chairmanship, there has been a substantial increase in membership from both the academic and industrial communities, serving better the Local Section as helpers and observers. Further, Local Section Offices at the Hong Kong College of Technology and Liaison Offices in Macau, Shenzhen, Ningbo, Guangzhou etc. have been established – all designed to promote new membership. Gary has personally maintained links with the InstMC by travelling from Hong Kong on a

regular basis and has supported local high quality learned society activities such as symposia and seminars and conducted counterparts in the Hong Kong Institution of Engineers and Shenzhen Automation Association.

## Tallantire Award

**Winner: Dr. Beverley Stanford**

Awarded for exceptional commitment and service to the Institute and to achieving its aims and objectives.



The Tallantire Award has been presented to Dr Beverley Stanford, recognizing her sustained and exceptional commitment and service to the Institute and to achieving its aims and objectives. Her nomination notes that Dr Stanford has had a distinguished career in measurement and control, is a former President of the Institute of Measurement & Control, as well as current Chair of the Professional Registration Committee and has been influential in promoting the work of the Institute across the country.

## Honorary Fellowship – Hon FInstMC

**Winner: Professor Jan Maciejowski**

Recognising distinguished, and normally long, service to the Institute and or measurement and control.



Professor Jan Maciejowski studied at the University of Sussex and the University of Cambridge and became Professor of Control Engineering and a Fellow of Pembroke College. From 2009 to 2014, he was head of the Information Engineering Division within the University of Cambridge's Department of Engineering and from 2008 to 2018, he was President of Pembroke College. His research

has dealt with various aspects of control engineering, notably fault-tolerant control, autonomous systems, model predictive control and system identification. When awarding him a Fellowship, the IEEE cited his "contributions to system identification and control." He has played an active role in the activities of several learned societies.

He was President of the Institute of Measurement & Control in 2002 and was also President of the European Control Association from 2003 to 2005.

## L B Lambert Award

**Winner: Harvey Dearden**

For meritorious service to the Institute particularly, but not exclusively, through involvement with Local Sections.



The L B Lambert Award has been awarded to Harvey Dearden, Engineering Director of HTS Engineering Group, in light of his meritorious service to the Institute over many years, in particular through his activity and involvement with Local Sections. Harvey had been responsible for the leadership of the Central North West section (Mersey and Chester previously) for 10 years from 2008, until standing down in 2018. These responsibilities were in addition to the numerous roles undertaken on behalf of the InstMC HQ (Trustee, Safety Panel member, Professional Registration Assessor, RFSE / REXE development). He has ensured that the Institute and the technical talks have been available for local engineers, over more than 15 years. The transition to the new Chairmanship was made all the easier due to Harvey's leadership and the team built around him. This has allowed the section to be forward thinking, rather than simply trying to resolve historic issues.

# COMPETITIVE ADVANTAGE WITH REMOTE TELEMETRY UNITS

BY MATTHEW HAWKRIDGE,  
CHIEF TECHNOLOGY  
OFFICER, OVARRO

One of the issues that all industries face is inefficiency.

It occurs for a variety of reasons; production waste, defective or damaged product, leakage, machines running out of tolerance and waiting/handover times amongst others. Accurately measuring these inefficiencies is essential to addressing them and improving business performance. Within the industrial process it is the RTU that is best at supporting this, forming an integral part of a SCADA system.

RTU's gather accurate data and then send/receive and execute the commands issued from the control centre. It is the gathering of this precision data that enables

management teams to quantify inefficiencies. Once they are identified, it is then a much easier process to put corrective measures in place. The adage If you can't measure it, you can't improve it stands as true today as it always has.

### Measure it to improve it

A remote telemetry unit is a powerful microprocessor with standalone capability that connects the physical and digital worlds. They are capable of accurate data acquisition and transmission from distributed monitoring points in most industrial environments, and are also used in utilities, transport, telecommunications and oil and gas.

Modern RTU solutions incorporate advanced features, such as distributed architecture, distributed database and multiple I/O. They

provide operators with a wealth of useful software features such as emergency shutdown, batch tracking, leak detection, dynamic modelling and optimal despatch, which are capable of improving business efficiency. Ultimately that results in improved profitability as well as better safety and environmental performance. Emerging technologies such as cloud, block chain and digital twin, which all rely on effective RTU solutions further enhance the ability to precisely measure and improve industrial processes.

Owners and plant designers are always looking for better ways of improving output, maximising process efficiency and reducing system downtime. The best route to achieve this is by working with an RTU partner that has a track record in the industrial sector. With

the right approach, RTU's create a platform for delivering continuous improvements.

RTUs, the field part of a SCADA system, translate the physical world into digital and then send this data for storing, trending, analysis and action. Sensors are simpler devices, which means they are not designed to interpret protocol communication on their own like RTUs. That's why RTU's play a crucial role in digitising the inputs from sensors into protocol format and transmitting them to SCADA. The SCADA then issues control commands back to the RTU which in turn transmits electrical signals to control relays. Engineers at the SCADA interface can also 'supervise' the operations by setting new KPIs (Set Points) or updating instructions (open/close this, start/stop that, for example) for RTUs to then act upon and manage locally.

RTU's can be used in locations with extreme climatic temperatures and/or remote locations that are off the power grid. For instance, Kingfisher RTU's have been selected as high availability process controllers with extensive communications capabilities for sites with temperatures ranging from -40C to +85C. Their resilient and secure nature, combined with independent communications links, redundant power supplies and redundant process controllers make them an extremely robust solution in these applications.

There has been a significant improvement in RTU processing power and memory recently, which is helping facilitate the Industrial Internet of Things (IIoT). The ability of IIoT to create smart assets is an area of opportunity, even those that are part way through their lifecycle. For example, deploying RTU's with latest processing power on an old asset can turn it into 'smart' asset. This helps engineers to make the most of their ageing equipment and reduce lifecycle costs.

### Case file

With the risk to people and environmental consequences, along with loss of shareholder value, the oil and gas industry is like no other. For more than 75 years, Distrigas of Belgium has supplied natural gas to industries, resellers, and electricity producers. With its export base in Belgium, the company occupies a strategic position at the hub of Europe's gas networks. As the leading gas provider in Belgium, it supplies natural gas to public and major industrial consumers and plays an active role in international gas transit.

The company was looking for an RTU solution that registered and controlled its meters automatically and transmitted precise data to a central computer system. After a thorough investigation of available solutions, Distrigas chose the TBox telemetry system. The RTU system

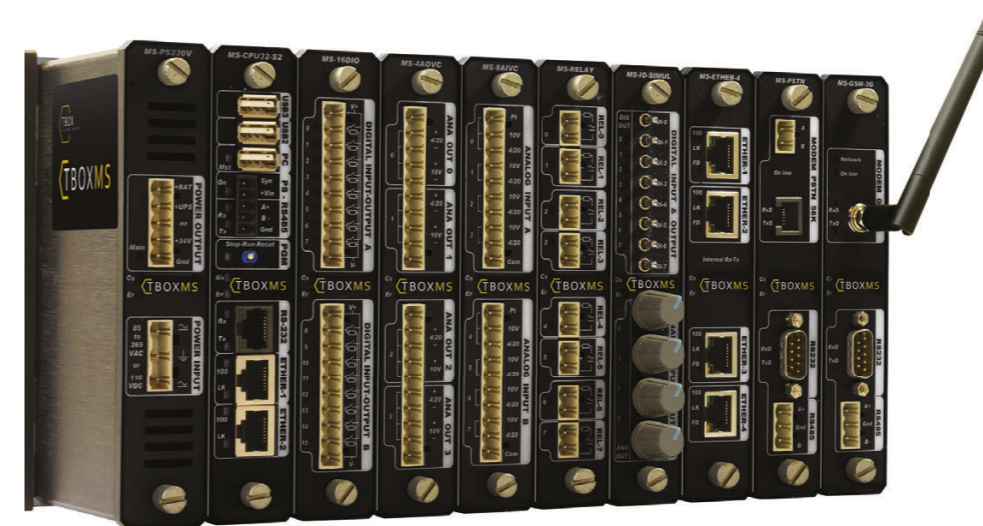
now provides it with accurate, real-time information on consumption and distribution, along with automatic alarming on pressure drops, remote control of the gas meter, as well as automatic invoicing of consumption. Since deploying the RTU system, interventions have reduced to a minimum.

### Conclusion

Historically, data from machines was measured manually – a time consuming process that was prone to human error – or simply not done at all. That meant management teams had little visibility of how the process was performing or how to make improvements. However, thanks to advances in RTU technology these processes can now be automated, so that at-a-glance data provides valuable insights into improving efficiency. At the same time, the right technology partner will help you choose the right RTU solution and expand the skillset for your employees, helping them understand and interpret data, which can deliver significant benefits to business performance in itself.

These specialist technology partners with access to the appropriate RTU platforms can provide 'live' insights into the health of assets, regardless of location. Once in place, the RTU monitors day-to-day critical asset information as well as the external environment, so operators have a 'live' view of the asset along with a historical log for trending and analysis.

All businesses operate at a fast pace in a quickly changing environment, and it is those that are most reactive to change that increase their market share. Accurate information about all aspects of the business is critical for this and developments in RTUs, internet, laptops and smart devices have facilitated radical improvements in communication. With expert guidance from an RTU specialist, businesses can turn this data into a competitive advantage.



# CHAIN BRISTOL 2020

Nick Valentine reports how engineers are innovating and inspiring young people.

On 22nd October CHAIN hosted its first virtual event, hosted by the Institution of Mechanical Engineers on their webinar platform, with CHAIN recreating its atmosphere of collaboration between the engineering institutions online. With presentations ranging from air breathing rockets to disaster relief in Mozambique, we heard how engineers in every discipline are innovating and inspiring people to make the world a better place. We were particularly honoured to have the President of the InstMC, Martin Belshaw, introduce the evening. But what is CHAIN I hear you ask?

Well, CHAIN is a series of events that brings together organisations, predominantly the Professional Engineering Institutions, for young engineers and aims to present a cross-section of the engineering world to let young people know about the different disciplines available.

It informs them about current and future issues that may affect them as engineers and about the different institutions that are available, who they are, and who they cater for and specifically what they do in their local area. CHAIN encourages young engineers to network and get involved with their local engineering community and most importantly, to inspire and create opportunities for all those that attend the event.

By working together as institutions, we know that we can meet these aims and build communities of multi-disciplined young engineers who are empowered to make a difference. Following our first event in Manchester in 2016 we have since run events in Bristol, London, Dubai, and now cyberspace.

This latest event was organised by young member panels in the South West of England and, as well as the InstMC, included contributions from the Institution of Mechanical Engineers (IMechE), Institution of Civil Engineers (ICE), and Royal Aeronautical Society (RAeS). Given the lack of geographical restrictions we were able to reach out and contact engineers from all over the UK.

Martin gave an introduction to the InstMC and explained how instrumentation and control is pervading every facet of our lives. Whilst the concept of automation

“Birds can fly and can balance, and I’m pretty sure I’m smarter than a bird, so surely I can fly?”

within manufacturing is now something that we are all used to, he revealed to us the ‘Internet of Cows’, showing how the agricultural sector is also looking to embrace these technologies in order to feed an ever growing and demanding population.

John Williams, previously of Reaction Engines, spoke for the IMechE and gave a particularly comprehensive overview of air breathing rockets, speaking on their history (including other nation’s attempts) as well as their inner workings. It was fascinating to see the different cycles that occur within the current engine, and the different challenges faced by that company in their work towards making single stage to orbit spaceflight a reality. He also spoke of the different challenges to innovation he has seen during his varied and fascinating career, lessons which I plan to incorporate into my own work.

Speaking on behalf of the Institution of Civil Engineers, Adam Gait gave us an insight into Atkins work on identifying the energy mix that will help us to achieve net carbon zero. It was reassuring to hear that this was understood to be achievable in the UK, and that the nation had made significant strides towards achieving that goal.

Holli Kimble spoke to us about her work with RE:ACT, a charity predominantly made up of veterans who mobilise to aid those in need. RE:ACT have deployed all over the world, with Holli mobilising to support the charity’s work after a hurricane in Mozambique. Hearing how she used her engineering competencies and technical mindset to aid people following a catastrophic event was utterly awe inspiring, and showed how the skills we all possess as engineers can be used with rudimentary resources in even the most austere environments to make a real difference to people. Holli is continuing to inspire people through her Churchill Fellowship, highlighting the stories of engineers in Africa. Follow her story at: [wanderingengineer.co.uk](http://wanderingengineer.co.uk)

Positively soaring into our final speaker slot and flying the colours for the Royal Aeronautical Society was Alex Wilson of Gravity Industries. For those of you that haven’t seen their significant presence in the media,

Gravity Industries have designed and built their own series of jet suits. Alex told the story of these feats of wearable technology, starting with the founder, Richard Browning’s, inspiration for the project: “Birds can fly and can balance, and I’m pretty sure I’m smarter than a bird, so surely I can fly?”. From this questionable but relatively logical argument, through a farmyard and the inevitable blooper reel, Alex took us through their initial prototypes to their adventures displaying their unique partnership of jet and human around the world. With World Records under their belts, I am sure there are still great things to come from the company.

In true CHAIN form we heard from a huge variety of speakers, the main theme connecting them all being the strong and compelling story told by each speaker, and we’re certain that each attendee was able to take some unique and valuable lessons away. Our next event is going to be telling the stories of those who have used their technical abilities to lend their

support in combating the COVID-19 pandemic, taking place on 24th November.

To hear the incredible stories and find details of the next event, head to [www.ChainEvents.org.uk](http://www.ChainEvents.org.uk), where we will soon be uploading the videos from the event.

We hope that this has given you a taste of our work in bringing our institutions together. We’re hoping to continue our work with the InstMC, so if you have any ideas on how we might better achieve this, please do get in touch!

**Nick Valentine,**  
CHAIN Bristol



# MAKING STATEMENTS OF CONFORMITY USING ISO/IEC 17025:2017

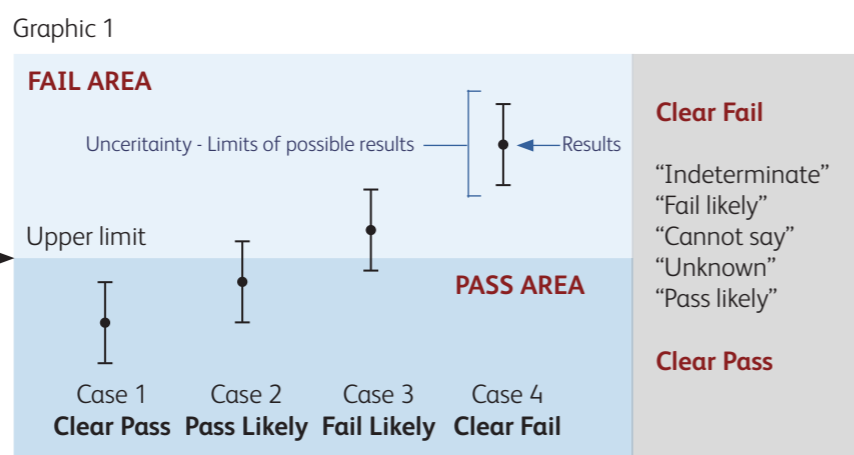
BY TREVOR THOMPSON, BESTMEASUREMENT.COM

*Decision Rules for taking uncertainty of measurement into account when making statements of conformity continue to exercise many readers.*

This article aims to make the requirements clear and to assure labs and their customers that this is not a new requirement, but a clarified and improved one in the world's most implemented and respected measurement laboratory competence standard ISO/IEC 17025:2017.

A Decision Rule is defined in the latest version of ISO/IEC 17025:2017 as "a rule that describes how measurement uncertainty is accounted for when stating conformity with a specified requirement. This appeared in the earlier versions stating that when statements of compliance are made, the uncertainty of measurement shall be taken into account."

The change in wording was quite deliberate. Previously the requirement may have been met, but how was often unstated and shrouded in mystery. Attempts to standardise the approach were made in guidance documents, notably ILAC G8 with its four-case model:



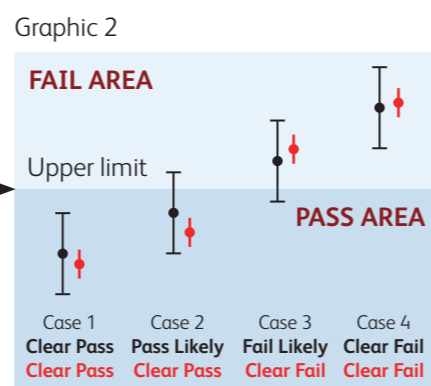
It was agreed during the writing of the latest version of the Standard that no single solution to this problem could be found. Different industry areas had very different ideas. It was clear however that whatever rule was used the risk of false accept or reject shall be known and agreed. This resulted in the present requirement that the decision rule (describing how uncertainty is accounted for) is agreed as part of the contract review and is stated with the results. Uncertainty of measurement can be accounted for in a variety of ways and these vary greatly. The rule may arise from:

- The ILAC model (perhaps the default)
- Simple Pass/Fail (provided risk is known and agreed)
- In a product/test specification
- In legislation
- Industry Expectation
- Client Requirement
- Other agreed, PFA/PFR, TUR, and more

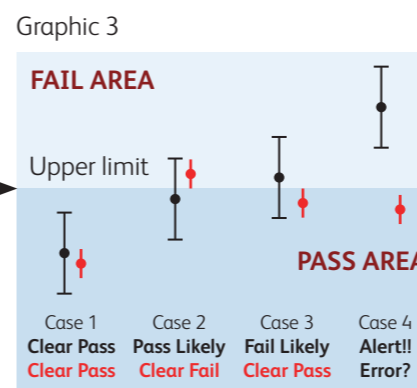
But bearing in mind that a decision rule is defined as a statement that describes how Measurement Uncertainty is taken into account. If measurement uncertainty is not involved in the rule then it is not a

decision rule as defined for ISO/IEC 17025:2017. However, if measurement uncertainty informs the discussion and the risk is known and agreed then maybe measurement uncertainty is not actually used in the calculation.

If we use a variant of the ILAC model to illustrate the difference between results from labs with higher or lower uncertainty, the issue becomes very clear. A client may choose the lab according to their risk profile. Here a customer may have to choose a more expensive test, or take a greater risk if they want to safely make the product near to the limit. In cases 1 and 4 the lower uncertainty test is probably not necessary.



In more extreme cases as shown in Graphic 3, one lab may show a pass but another a fail although both are producing valid results in cases 1 to 3. In case 4 there is an apparent error, one lab is wrong as the results are not shown to come from the same potential population, i.e.  $E_n > 1$ .



We can see here that both labs are correct (in that their results could both potentially come from the same valid population,  $E_n < 1$ , when looking at the combined uncertainties) but one could produce a fail statement and one a pass for the same product or measuring instrument. They have very different degrees of confidence in their result. This can be variously expressed. I prefer Percentage False Accept or Reject (PFA/PFR). This gives a clear impression to the user about the risk involved in his case. Knowledge of the measurement uncertainty is needed for this and can be applied as guard-banding. Often in engineering, a test uncertainty ratio of 4 to 1 results in around 2.5% percentage false accept or reject when operating at 95% confidence. This is single-sided constrained simple acceptance and is relatively easily understood and may be applicable in general non-critical engineering.

Some laboratories say that their customers are uninterested in measurement uncertainty and it is certainly true that many customers do not understand it. However, the risk of obtaining an invalid result shall be known and agreed, according to ISO/IEC 17025:2017. Several requirements cover the total situation, including that when

a statement of conformity to a specification or standard is provided, the laboratory shall document the decision rule employed, taking into account the level of risk associated with the decision rule employed and apply the decision rule.

The Standard also says that when the customer requests a statement of conformity to a specification or standard for the test or calibration (e.g. pass/fail, in-tolerance/out-of-tolerance), the specification or standard and the decision rule shall be clearly defined. Unless inherent in the requested specification or standard, the decision rule selected shall be communicated to, and agreed with, the customer. Furthermore, it requires that the laboratory shall report on the statement of conformity, such that the statement clearly identifies the decision rule applied (unless it is inherent in the requested specification or standard).

Our intention was to encourage decision rules that are suitable for the wide range of industries and disciplines that use 17025 and are as diverse as microbiology and digital forensics, as well as the classical mechanical and electrical measurement work.

There are also several overarching related requirements affecting this situation, that again are not new and should leave the reader very clear that a knowledge of the measurement uncertainty (MU) is necessary when making conformity statements like "The Certificate/Report shall declare MU where MU affects conformity to a specification" or "The Certificate/Report shall contain all information necessary for interpretation of the results".

As we reach the end of the transition period for the 2017 version several problematic situations are being observed.

Firstly, it must be understood that a decision rule that ignores measurement uncertainty would be non-compliant. That is not to say that it must necessarily be

used in the decision calculation. "Simple Acceptance" (not using the measurement uncertainty in the pass/fail calculation) can be deployed, according to the new ILAC guidance G8:July 2020, if the risk of false accept or reject has been explained, understood and agreed. To do this, a laboratory will certainly need to discuss the measurement uncertainty with their client so that in comparison with pass/fail limits, the risk can be determined.

Secondly, the issue cannot be sidestepped by stating on reports or certificates that no decision is being made whilst providing marks against results indicating comparison with pass/fail limits. The standard does not require particular words to be used and marks indicated against limits do constitute a pass/fail statement in my view!

An easy way to appreciate the decision rule situation is to consider three phases or sub divisions of it.

1. The Decision Rule. This must take uncertainty into account. That rule describes what the lab does for that client, standard or type of client. This includes the conversation to be had, the explanations to be made and the agreement about the reporting.
2. The Decision Process. This is what is undertaken in the lab. It may be a documented procedure or process that covers the contract review, the agreement and the reporting.
3. The Decision Calculation. An algorithm providing the pass/fail statement. It is a calculation that would normally include allowance for measurement uncertainty, but exceptionally might not, provided the risk is otherwise determined, declared and agreed.

The issue of how best to handle statements of conformity is so very important as it enables a customer to distinguish between high and low measurement uncertainty labs, often with different prices and service levels.

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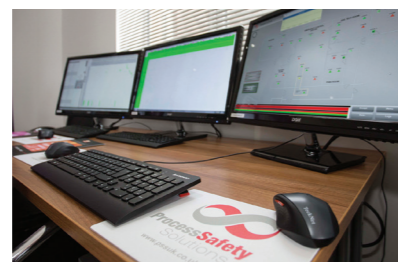
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# SPOTLIGHT ON STAFF:

## Q&A with InstMC Staff Member Sydney Reed, Business Executive

### How long have you been with InstMC?

Just over 3 years now.

### What is your background?

When I first started, I did a digital marketing course for a year and a half. After that the Institute asked if I wanted to do another course so I decided to do Business Administration. Before that I was a qualified hairdresser for 3 years. I wanted to change because I didn't think it really suited me. I had some insecurities about my dyslexia and thought I couldn't do an office job but decided I shouldn't let it hold me back and stop me doing what I really wanted to do.

### What is your role at InstMC?

A little bit of everything really. I book meetings, sort the post, co-ordinate events, answer the phone to all our lovely members, taking payments and answering any questions. I am also now helping out with accounts. It's good to see how the business side of the company runs.

### Can you describe a typical day in the office?

Prepare for the phones to start ringing when I arrive! If there is a meeting happening at the office, I make sure everything is ready for that. That the room is ready, catering organised and letting visitors know where to go when they arrive.

### What do you bring to the team?

Being young! Only joking. Hopefully a younger person's view. In an office with mixed ages we all think

differently and have different interests but all really get on.

I am happy to help anyone that needs it and like to throw myself into any task. There's always lots to learn.

### What do you like best about working for the InstMC?

I like the small team. We're all quite close and it's easy to find out what's going on in every section of the company. Now we are all working at home with lockdown we don't speak as often but we're all available on the phone. It's easier to offer help when people need it too.

### What do you do to unwind, once your working day is over?

I like going out with friends for drinks and a meal. I used to go to the gym regularly but over lockdown I bought some gym equipment and now exercise at home. I used to do horse riding when I was younger. I also like to watch a good movie with a cup of tea – generally just relax.

### Can you tell us a fun fact about yourself?

I once got very lost in Amsterdam. For about 4 hours! I went on holiday with some friends. They wanted to go somewhere while I wanted to go to a shop. I told them I knew where to go and would meet them later, but actually didn't know the way. My phone died so I couldn't get up a map and everyone I asked in the street didn't understand me. I wandered round the whole of Amsterdam before I finally found my hotel by accident. Went to my room to charge my phone and had about 20 missed calls. At least I got to see all the sites though.



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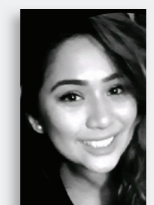
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