

Calibration

Autumn/Winter 2011

WORLD

**Total Uncertainty
of Temperature
Calibration**

**Successfully
executing
a system
integration
project**

**Customer
Success
Stories**

Atco Power, Canada
Sellafield Ltd, UK

CEO's Letter

Two hikers on a trail came around the bend to find an enormous brown bear about 100 meters up the trail. The bear spies them and begins running toward them. One hiker drops his backpack, sits down, throws off his boots, and starts lacing up a pair of running shoes. The other hiker says: "What are you doing? You will never outrun that bear!" The first hiker replies: "I don't have to outrun the bear..."

Many of you are probably familiar with the joke above. Hopefully your company does not have the heaviest boots on if the global market gets tough. An efficient, streamlined and seamlessly integrated calibration solution may be one of the ways to make your boots lighter.

At Beamex, we are fond of words starting with the letter P. No, one of them is not the shamanic word in the Finnish language pronounced with a very strong phonetic "r" you may have heard. I mean the English words Precision, Performance and Partnership. Precision and Performance are the key target attributes of all of our products, solutions and services and also of our own way of working at Beamex.

The word Partnership is one of the themes of this Calibration World issue. The longest traditions in partnership with Beamex are in production and local sales and support – practically since the foundation of the company. Our rather new input in our partnerships is our way of working together with leading global corporations, our key customers. The Sellafeld case story in this issue is an excellent example of what the partnership is all about and how proud we are to be able to work together with top corporations in the world. The close cooperation helps us immensely to develop the most efficient solutions for all of our customers.

Beamex's tail-wind in business has continued strongly. We believe that our running shoes are quite good at the moment, but at the same time we know that there are still many things that we can and must improve. Due to low visibility of the market outlook, we also need to be agile and react quickly when needed.

Enjoy your reading and remember that we appreciate your feedback very much – not only concerning this magazine!



Raimo Ahola
CEO, Beamex Group



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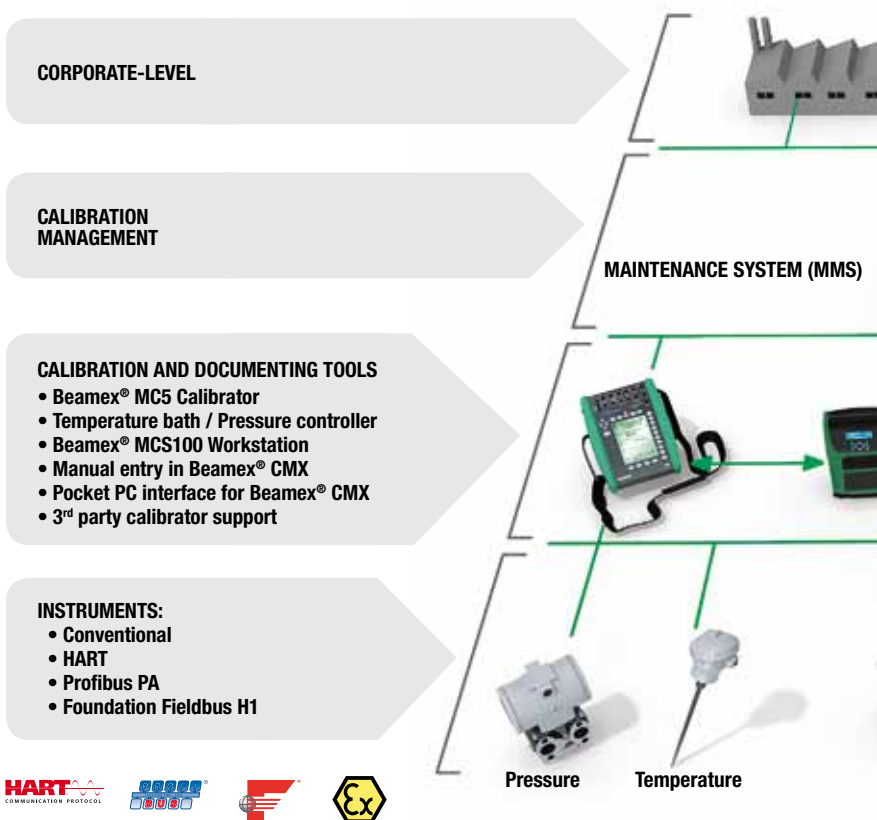
Successfully executing a system

For process manufacturers today, having a reliable, seamlessly integrated set of IT systems across the plant, or across multiple sites, is critical to business efficiency, profitability and growth. Maintaining plant assets – whether that includes production line equipment, boilers, furnaces, special purpose machines, conveyor systems or hydraulic pumps – is equally critical for these companies. Maintenance management has become an issue which deserves enterprise-wide and perhaps multi-site attention, especially if the company is part of an asset-intensive industry, where equipment and plant infrastructure is large, complex and expensive. If stoppages to production lines due to equipment breakdowns are costly, implementing the latest computerised maintenance management systems (CMMS) might save precious time and money.

In the process industries, a small, but critical part of a company's asset management strategy should be the calibration of process instrumentation. Manufacturing plants need to be sure that their instrumentation products – temperature sensors, pressure transducers, flow meters and the like – are performing and measuring to specified tolerances. If sensors drift out of their specification range, the consequences can be disastrous, perhaps resulting in costly production downtime, safety issues or batches of inferior quality goods being produced, which then have to be scrapped. For this, Beamex's calibration management software, Beamex® CMX, has proved itself time and time again across many industry sectors, including pharmaceuticals, chemicals, nuclear, metal processing, paper, oil and gas.

Seamless communication

Today, most process manufacturers use some sort of computerized maintenance management system (CMMS) that sits



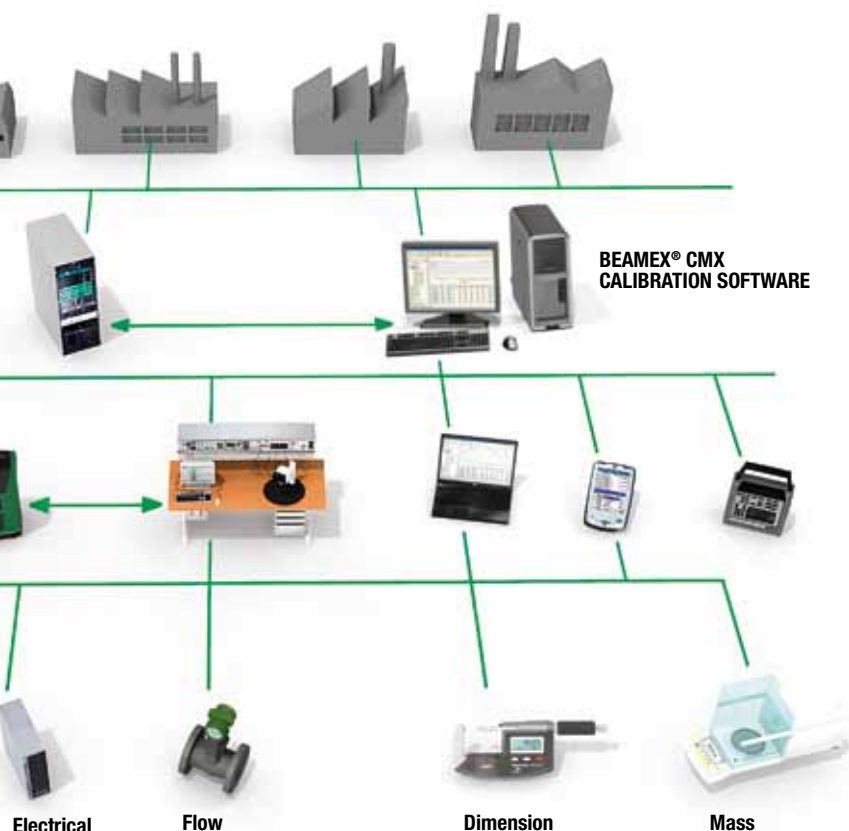
alongside their calibration management system. Beamex® CMX Professional or Beamex® CMX Enterprise software can easily be integrated to CMM systems, whether it is a Maximo, SAP or Datastream CMM system or even a company's own, in-house software for maintenance management.

Beamex® CMX helps companies document, schedule, plan, analyze and optimize their calibration work. Seamless communication between CMX and 'smart' calibrators means that companies have the ability to automate pre-defined calibration procedures. As well as retrieving and storing calibration data, CMX can also download detailed instructions for operation before and after calibrating, like procedures, reminders and

safety-related information. Seamless communication with calibrators also provides many practical benefits such as a reduction in paperwork, elimination of human error associated with manual recording, and the ability to speed up the calibration task. CMX also stores the complete calibration history of process instruments and produces fully traceable calibration records.

Integrating CMX with a CMM system means that plant hierarchy and all work orders for process instruments can be generated and maintained in the customer's CMM system. Calibration work orders can easily be transferred to CMX Calibration Software. Then, once the calibration work order has been executed, CMX sends an acknowledgement order of this work

integration project



back to the customer's CMM system. All detailed calibration results are stored and available on the CMX database.

Integration Project

A customer may have a large CMM system and a considerable amount of data keying to perform before integration is complete. A data exchange module or interface that sits between the two systems is required. The integration project involves three main parties: Beamex, the customer and the CMM system software partner.

Project organization and resourcing

In order to have a successful integration, it's important that the right people

and decision-makers are involved and participate right from the beginning of the project. It's also essential that the main roles and responsibilities of the parties are specified before the project evolves. Moreover, a project organization should be established and include members from both the supplier's and the customer's organization, as a successful project requires input from both parties. The role of each member should be defined and project managers appointed. The project manager is usually responsible for the operative management of the project. In addition, a project steering group may need to be established. The project steering group is responsible for making key decisions during the project. The role, tasks and authority

Beamex® CMX

Professional or Beamex® CMX Enterprise software can easily be integrated to CMM systems, whether it is a Maximo, SAP or Datastream CMM system or even a company's own, in-house software for maintenance management.

of the project steering group must be defined as well as the decision-making procedures.

Project phases

The integration project is divided into four main phases: 1) Scope of Work, 2) Development and Implementation, 3) Testing and finally 4) Installation, Verification and Training. The four main phases are also often divided into sub-phases. A schedule is usually defined for the completion of the entire project as well as for the completion of each project phase. Each project phase should be approved according to the acceptance procedures defined in the offer, agreement, project plan or other document annexed to the offer/agreement.

Scope of Work

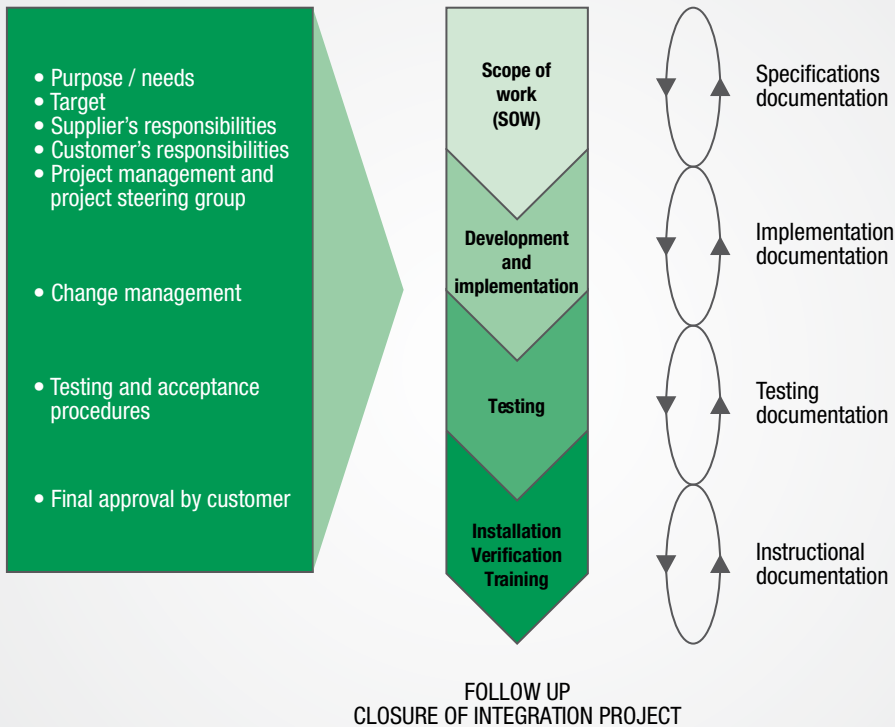
To ensure successful integration with a satisfied customer, defining the correct scope of work (SOW) is crucial. The scope of work should include a brief



System integration project



INTEGRATION PROJECT PHASES



project description, services provided, main roles, partner responsibilities and the desired outcome. The scope of work is important to make sure that both the supplier and the customer have understood the project in question and they have similar expectations from it. The SOW is often developed through pre-studies and workshops.

Defining what is not included in the scope of work is just as important as defining what is included in it. This means that establishing some framework and limitations for the project are also very important, as the resourcing, scheduling and costs of the project depend greatly on the scope of work. If the scope of work is not defined carefully, questions or problems may appear later in the project, which will direct the project back to phase one where a review of the scope is necessary.

This is an urgent but time-consuming matter and can be avoided if the right people and decision-makers participate

When the integration is finished, the customer has a system that saves time, reduces costs and increases productivity by preventing unnecessary double effort and re-keying of procedures in separate systems.

in the first project phase. However, as changes to the original scope of work may be necessary and required even in projects where the SOW phase has been done carefully, it is important that the supplier and customer agree on change management procedures as early as the starting phase of the project.

Development and Implementation

When the scope of work has been defined and approved by both parties, the integration can enter the next phase, which is the actual development and implementation of the project deliverables.

Testing

Testing occurs both during the project after each partial delivery, in order to be able to continue the development work to next phase, and at the final stage



of the project. The testing, approval procedures and timelines should be defined when agreeing on the project.

Installation, Verification and Training

The final stage in the integration process is the installation and testing at the customer's facility and taking the system into production use. The project manager at the buyer's facility now plays a major role in the success of the integration process. The supplier will, if required and agreed, assist with informing, training and providing training materials.

When the integration is finished, the customer has a system that saves time, reduces costs and increases productivity by preventing unnecessary double effort

and re-keying of procedures in separate systems. When there is no need to manually re-key the data, typing errors are eliminated. A CMMS integration will enable the customer company to automate its' management with smart calibrators. This improves the quality of the entire system. The documenting calibrators that support an integration to customer CMMS are Beamex® MC4 Documenting Process Calibrator and Beamex® MC5 Multifunction Calibrator.

Integrating a CMM system with calibration management software is an important step in the right direction when it comes to EAM, Enterprise Asset Management. However, EAM is more than just maintenance management software. It's about companies taking a business-wide view of all their plant equipment and coordinating

maintenance activities and resources with other departments and sites, particularly with production teams. Savings from EAM are reasonably well-documented and come in various guises, the most common benefits being: less equipment breakdowns (leading to a reduction in overall plant downtime); a corresponding increase in asset utilization or plant uptime; better management of spare parts and equipment stocks; more efficient use of maintenance staff; and optimized scheduling of maintenance tasks and resources. But the key to success is really the quality of information you put in the software, the data has to be as close to 100% accurate as possible to get maximum benefit from the system.

Calculating Total Uncertainty of Temp

In a previous version of the Calibration World magazine there was an article on temperature and the calibration of temperature instruments. In this article we continue with temperature-related articles. We will discuss the various uncertainty components related to temperature calibration using a temperature dry-block. Also, we will discuss how to calculate the total uncertainty of a calibration performed with a dry block.

Temperature dry block

First, let's discuss what a temperature dry block is:

- consists of a heatable and/or coolable metallic block, controller, an internal control sensor and optional readout for external reference sensor. This article will focus on models that use interchangeable metallic multi-hole inserts.
- There are fast and lightweight dry blocks for industrial field use as well as models that deliver near bath-level stability in laboratory use.
- There are also some work safety issues that favor dry blocks in preference to liquid baths. For example, in temperatures above 200 °C liquids can produce undesirable fumes or there may be fire safety issues. If a drop of water gets into hot silicon oil, it could even cause a small steam explosion which may splash hot oil on the user.
- Dry blocks are almost without exception meant to be used dry. Heat transfer fluids or pastes are sometimes used around or inside the insert, but they don't necessarily improve performance. They may actually even impede the dry block's performance and damage its internal components.

EURAMET

The EURAMET guideline (EURAMET /cg-13/v.01, July 2007 [previously EA-10/13]):

- This Euramet calibration guide defines a normative way to calibrate dry blocks. As most of the manufacturers nowadays publish their product specifications including the main topics in the Euramet guide, the products are easier to compare.
- Main topics in the EURAMET guideline include:
 - Display accuracy
 - Axial uniformity
 - Radial uniformity
 - Loading
 - Stability over time
 - Hysteresis
 - Sufficient immersion (15 x diameter)
 - Stem loss for 6 mm or greater probes
 - Probe clearance
 - ($\leq 0,5$ mm at $-80 \dots 660$ °C)
 - ($\leq 1,0$ mm at $+660 \dots 1300$ °C)

Related uncertainty components

Let's have a look at the various uncertainty components that are related to temperature calibration done using a dry block. These components are relevant to all manufacturers' dry blocks. Some manufacturers specify these components and some do not.

It is possible to use a dry block with the block's internal measurement as the reference (true value), or you can also use an external reference temperature probe inserted in the block as a reference measurement.

Internal measurement as reference

First, let's discuss the uncertainty components related to the use of a dry block's internal measurement as reference.

The following components should be taken into account:

- Display accuracy (accuracy of the internal measurement)
 - It is important to remember that all of the thermometers based on thermal contact measure their own temperature. With dry blocks, the

internal control sensor is typically located inside the actual block, whereas the probes to be calibrated are immersed in the insert. There is always thermal resistance between the internal sensor and the probes inside the insert and other sources of uncertainty need to be considered.

- Axial uniformity
 - Axial uniformity refers to the variation in temperature along the vertical length of the insert. The Euramet calibration guide states, "dry wells should have a zone of sufficient temperature homogeneity of at least 40 mm in length" at the bottom of the insert. The purpose of this homogenous measurement zone is to cover various sensor constructions. The thermocouple typically has its "hot junction" close to the tip of the probe whereas the PRT sensing element may be 30 to 50 mm long. With this in mind, a homogenous zone of at least 60 mm is recommended.
- Radial uniformity
 - Radial uniformity refers to the variation in temperature between the holes of the insert. Related uncertainty is caused, for example, by the placement of the heaters, thermal properties of materials and alignment of the insert holes. Non-symmetrical loading or probes with significantly different thermal conductivity (for example large diameter probes) may cause additional temperature variation.
- Loading effect
 - Every probe in the insert conducts heat either from or into the insert. The more the load, the more the ambient temperature will affect the measurements. Sufficient immersion depth and dual zone control helps to reduce load-related uncertainties. The loading effect is not visible in the control sensor

Temperature Calibration with a Dry Block

indication and the controller cannot completely compensate for this shift.

- Stability over time
 - Stability describes how well the temperature remains the same during a given time.
 - The Euramet calibration guide defines stability as a temperature variation over a 30-minute period, when the system has reached equilibrium.
- Immersion
 - Sufficient immersion is important in any temperature measurement. The Euramet calibration guide states that the immersion depth should be at least 15 x the probe's outer diameter. To minimize the stem conduction error it's recommended, as a rule of thumb, to use immersion depth of 20 x the diameter, plus the length of the sensing element. As the probe constructions vary greatly (sheet material, wall thickness, lead wire thermal conductivity etc.), a test for each individual probe type to be calibrated should be made. If sufficient recommended immersion cannot be reached, then the uncertainty caused by the insufficient immersion should be estimated/evaluated.
- Hysteresis
 - Hysteresis causes the internal sensor to be dependent on its previous exposure. This means that the temperature of the dry block may be a bit different depending on the direction from which the set point is approached. The hysteresis is greatest at the mid-point and is proportional to the temperature range.

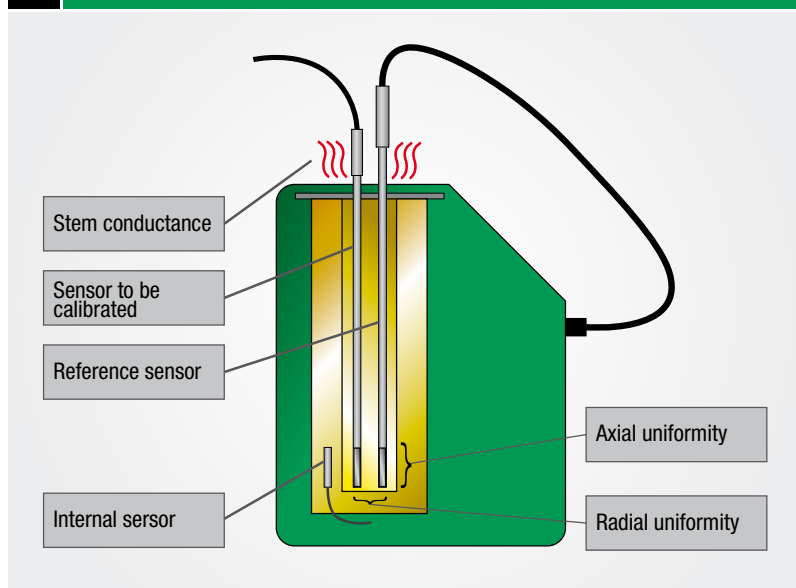
The specifications for the above uncertainty components should be



Total Uncertainty of Temperature Calibration



MAIN PARTS OF THE DRY BLOCK



in the block's specifications. If some component has not been specified, it should be estimated or evaluated.

Using an external reference sensor as reference

Unlike using the dry block's internal sensor as a reference, the external reference sensor is inside the insert together with the probes to be calibrated. Therefore, the external reference enables more accurate measurement of the temperature of the probes to be calibrated. Using an external reference sensor enables smaller total uncertainty of the system. The internal sensor has to deal with quick temperature changes, vibration and possible mechanical shocks so it has to be quite a robust mechanically. Unfortunately, mechanical robustness is usually inversely proportional to good performance: stability, hysteresis, etc.

The internal sensor is used just to adjust temperature close to the desired calibration point and keep it stable. There are many advantages to using a separate reference sensor. It helps

to minimize calibration uncertainty but also provides reliability in measurements.

In the case of using an external reference sensor, the following uncertainty components should be taken into account:

- Axial uniformity
 - Axial uniformity-related uncertainty can be minimized by aligning the centers of the sensing elements. In many cases, the user can reduce the axial uniformity well below specification. In case the probe to be calibrated is short and won't reach the measurement zone at the bottom of the insert, the reference probe can be drawn out to match the immersion. Of course, the stem conductance has to be taken into account. If the reference sensor and the sensor to be calibrated are sufficiently similar in diameter and thermal conductivity, the user may obtain good results.
- Radial uniformity
 - Radial uniformity is still present

when using an external reference probe and should be taken into account as specified.

- Loading effect
 - Since the internal sensor cannot completely compensate the load-related temperature shift inside the insert, the external reference sensor is within the same calibration volume as the sensors to be calibrated. The loading effect is usually much less significant with an external reference sensor.
- Stability over time
 - The external reference sensor can be used to measure the actual temperature deviation inside the insert, and it may often be smaller than the specification. It also helps the user to see when the unit has truly stabilized. Dry blocks usually have a stability indicator, but depending on, for instance, the different loads, there may still be some difference between the block and the insert temperatures when the indicator shows the unit has stabilized.
- External reference sensor
 - The external reference sensor (PRT) is typically much more capable of producing accurate measurements than the internal sensor. However, using an external reference does not automatically mean better results. All of the previously mentioned uncertainty factors need to be carefully considered.
 - Uncertainty related to the reference probe components includes the probe's calibration uncertainty, drift, hysteresis, stem conduction, and the readout device's uncertainty.
 - Of course, the external reference sensor needs a unit that measures the sensor. It can be the block or an external device.



CALCULATION EXAMPLES

■ There we calculate two total uncertainty examples. One is done using the internal temperature measurement and the other with a reference probe. In both cases the MB155R is used as the dry block. The temperature in both examples is 0°C.

Due to the rectangular probability distribution of the specifications, they are divided by the square root of three to get the Standard Uncertainty. The standard uncertainties are combined as the root sum of the squares. Finally the combined uncertainty has been multiplied by two to get the expanded uncertainty.

As can be seen in the examples the total expanded uncertainty using the internal reference sensor is 135 mK (0.135 °C). When using an external reference sensor the total expanded uncertainty is 34 mK (0.034°C).

The various uncertainty components used in the examples can be found in the specifications in the product brochures.

MB155R with internal measurement @0°C

Component	Specification (°C)	Standard Uncertainty (°C)
Display Accuracy	0.10	0.058
Hysteresis	0.025	0.014
Axial Uniformity	0.02	0.012
Radial Uniformity	0.01	0.006
Stability	0.005	0.003
Loading Effect	0.05	0.029
Combined Uncertainty:		0.067
Expanded Uncertainty:		0.135

MB155R with external measurement @0°C

Component	Specification (°C)	Standard Uncertainty (°C)
Axial Uniformity	0.02	0.012
Radial Uniformity	0.01	0.006
Stability	0.005	0.003
Loading Effect	0.005	0.003
Ref sensor measurement	0.006	0.003
Combined Uncertainty:		0.014
Expanded Uncertainty:		0.028

Reference Sensor (Beamex RPRT-420)

Component	Specification (°C)	Standard Uncertainty (°C)
Short-term repeatability	0.007	0.004
Drift	0.007	0.004
Hysteresis	0.01	0.006
Calibration uncertainty	0.01	0.006
Combined Uncertainty:		0.010
Expanded Uncertainty:		0.020

MB155R and RPRT-420

Combined uncertainty:		0.017
Expanded Uncertainty:		0.034

All Specifications have a rectangular probability distribution. That is why they are divided by the square root of three to get Standard Uncertainty.

Generating efficient calibration

ATCO Power develops, manages and owns independent power generation plants. These plants are technologically advanced and environmentally progressive in nature. ATCO generates approximately 5,000 megawatts of power through 19 plants worldwide. Sixteen of these plants are operated by ATCO Power in Canada and the United Kingdom while three are located in Australia operated by ATCO Australia. Alberta-based ATCO Ltd., holds assets of approximately \$11 billion. The company has over 8,000 employees.

ATCO Power is a division of the ATCO Group of Companies. One of ATCO Power's largest plants in Alberta is the 670 MW Battle River Generating Station. This coal-fired generating station produces an electric capacity of 670 megawatts. There are three main units at the plant, named Units 3, 4 & 5. Alstom boilers and General Electric turbine-generators make up Units 3 and 4. An Alstom boiler and a Hitachi turbine-generator are contained in Unit 5. The station has been in operation since 1956. Coal-fired generating stations, like Battle River, produce the bulk of Alberta's electricity.

The Electrical & Instrumentation Department at Battle River is responsible for maintaining and calibrating all instrumentation, including transmitters, switches and thermocouples. Shane Haugen and Kurt Voss are Instrumentation Engineering Technologists at Battle River.

The Electrical & Instrumentation Department's main goal is to function as a Preventative & Predictive Maintenance

team. Shane, and Kurt perform weekly calibrations and troubleshooting as a routine part of maintaining the process system and preventing incidents. Calibration also plays a vital role during plant shutdowns and turnarounds. During a shutdown and turnaround all the plant instruments have to be calibrated for specific processes.

Important decision, simple implementation

Shane and Kurt were on the hunt for new calibration software when they found Beamex at a local ISA Tradeshow. Battle River's prior calibration software was difficult to use and did not allow the flexibility they needed for multiple users. "We were not happy with our old calibration software, it was hard to use. We needed to find something better," Kurt explains. After demoing CMX and learning about the MC5s, the

"We were very pleased with the easy and quick conversion of our existing database to CMX. The database was even simplified to meet our needs. Once we received the CMX database conversion tool, we could use it the next day."

plant purchased the CMX Professional software and several MC5 documenting calibrators.

Beamex technical support and customer service made the transition quick and simple. Shane says, "We were very pleased with the easy and quick conversion of our existing database to CMX. The database was even simplified



Shane Haugen calibrating a transmitter with MC5.

for ATCO Power, Canada

to meet our needs. Once we received the CMX database conversion tool, we could use it the next day.”

Today, ATCO Power’s Battle River plant utilizes Beamex MC5 multifunction calibrators, and CMX Professional calibration software.

Beamex user friendly products impress and save time

Shane, and Kurt perform the calibration fieldwork at Battle River. They install, calibrate, configure and troubleshoot around 600 instruments using MC5s. A schedule of work orders are given to them on a daily basis. Every day is different, so they must have reliable and accurate equipment. They trust and depend on the MC5s for all their calibration needs.

The MC5 saves time. Shane, and Kurt no longer have to walk back and forth between a computer and instruments. They are able to take a documenting MC5 to an instrument, add or edit a point, or the entire calibration procedure. Previously, there was a large amount of tubing connected to their old equipment, which made it difficult to work with. Shane specifically mentions the handy 3-way hose provided with each MC5. The MC5 documenting calibrator has automated the calibration process. “When I calibrate an RTD, I just plug in the 2–3 leads and the calibrator does the rest,” Shane says.

The efficiency of calibration has improved. The MC5s are highly valued at Battle River, especially when it comes to turnarounds and shutdowns. Shane and Kurt, along with other technicians, must check all the instruments in a certain process during one of the events. Many times, technicians from different plants are brought in to help. “In the past, getting the individual up to speed using the equipment was painstaking,” Kurt continues, “the MC5 and software combination has alleviated it and made

“When you are called out in the middle of the night, you can quickly and easily verify if an instrument has been calibrated, its accuracy, and if it was within range.”

the process far easier.”

CMX is used as the calibration management tool to micro-manage, verify, and locate instruments in the plant for all processes at Battle River. The majority of calibration completed at Battle River is for plant and equipment reliability. Documentation and records must be kept for reporting purposes. This data is required to include ranges and accuracy. CMX allows Battle River to store all of this information

for their 600 plus instruments in an easy to navigate, structured database. History trend analysis, verification and location pinpointing through CMX has saved the company time, money and improved efficiency. Shane adds “When you are called out in the middle of the night, you can quickly and easily verify if an instrument has been calibrated, its accuracy, and if it was within range.”

The user friendly interface and windows based software make it easy. Even if a technician is not computer savvy or familiar with the software, they are able to catch on quick. “Creating a database that multiple people can easily use has been one of the biggest benefits,” Shane says.

“Technicians from other plants within ATCO have come to our plant to help with shutdowns. They were really impressed with ease of use and plan to buy MC5 calibrators to increase their plant performance,” Shane notes.



CALIBRATION IN POWER AND ENERGY

■ ATCO Power is a division of the ATCO Group of Companies. One of ATCO Power’s largest plants in Alberta is the 670 MW Battle River Generating Station. This coal-fired generating station produces an electric capacity of 670 megawatts.

Since 1956, the Battle River Generating Station has operated to improve reliability, sustain efficiency and keep its operations compatible with increasingly strict environmental standards. Calibration of process instruments is considered an essential function at Battle River. Proper calibration ensures the best possible plant performance, increases efficiency, and reduces risk of problems.

Beamex Product Solution

- MC5 multifunction, documenting calibrators
- CMX Professional Software

Significant Benefits

- Simple integration aiding quick startup
- Easy to use and reliable
- Speedy calibration through combination of calibrators and software
- Increased efficiency saves time and reduces problems
- User friendly calibrators and software allow new or temporary technicians to use the products with ease
- Error-free process
- Easy access digital certificates and records

Sellafield Ltd, United Kingdom

Sellafield Ltd benefits from lower cost of ownership, lower risk of contamination

Sellafield Ltd is responsible for safely delivering decommissioning, reprocessing, nuclear waste management and fuel manufacturing activities across sites at Sellafield in Cumbria and Capenhurst in Cheshire.

The company has sites at Sellafield in Cumbria and Capenhurst in Cheshire as well as an extensive engineering design capability based at Risley in Warrington. Now under the ownership of Nuclear Management Partners, Sellafield Ltd has the largest concentration of nuclear expertise in Europe, with over 50 years of experience.

The Sellafield site in Cumbria employs 12,500 people. The site itself is divided into 10 different divisions. Alistair Norwood is the Technical Engineering Support at the engineering department of one of the site's divisions. He gives advice regarding calibrations for the entire site and controls the site's calibration database. Alistair's division has its own calibration facility, which employs five calibration technicians. The division has 60 calibration technicians in total.

The situation

The main calibration needs at the site are related to pressure, temperature and flow measurements. The site itself has approximately 80,000 plant instruments that must be calibrated regularly. Alistair's division as such has between 20,000 and 30,000 calibration work orders on a yearly basis. Because of this, the Sellafield site has demanding calibration requirements

and calibration plays a crucial role in the site maintenance.

"It's all about ensuring safety and taking care of the community", Alistair explains the philosophy of calibration. Calibrations are performed at the Sellafield site according to an annual maintenance plan. All calibration results are documented on calibration certificates, which are accessible for audits. The site also utilizes a maintenance management system, which keeps records of what has been calibrated, when and by whom. The actual detailed calibration certificate is stored in paper format. There are also a total of 20 people in Alistair's division whose main task is to prepare maintenance and calibration instructions and procedures.

Calibrations are performed at the Sellafield site to meet various objectives. First of all, regulatory requirements and standards demand periodic calibrations; as we all know, the industry is heavily regulated. In addition, the sites' calibration and maintenance procedures are audited on a regular basis. Secondly, and perhaps more importantly, calibration is a matter of safety. In a nuclear plant like

"To me, the biggest selling point and benefit of a Beamex® calibrator is that it can be easily moved from one area to another, without the risk of contamination. This brings us major cost-savings. The recalibration of Beamex® equipment can be done efficiently."

Sellafield, the accuracy and reliability of measurements are essential.

There are a few challenges that complicate performing calibrations at the Sellafield site. "One of the most costly and challenging issues in all our maintenance and calibration procedures relates to cleaning the equipment and making sure that it is not contaminated when being moved from one location to another. This is a challenge we always face when the equipment is needed in another section of the site or when the equipment must be recalibrated or otherwise serviced", Alistair explains.

"For instance, if the device is designed in a way that it tends to collect (contaminated) liquid in various parts of the device, we must fully disassemble and clean the device", Alistair continues.

The solution and main benefits

The calibration technicians at the Sellafield site utilize the Beamex® MC series of calibrators for performing calibrations, particularly the Beamex® MC5, MC4 and MC2 Calibrators.

"The ideal calibrator from our perspective is robust and easy to use, but still it should have a lot of functionality integrated into one piece of equipment", Alistair describes the criteria for selecting calibration equipment. "If the equipment has a complicated design, it can easily collect liquid or other substances", he adds.

"If we have to use several different devices instead of one all-in-one device, the recalibration and maintenance costs are much higher", he continues. In addition, if multiple devices are required to perform calibrations, it means that the technicians must be trained for all those various devices.

The Beamex® MC5 Multifunction Calibrator serves Sellafield's purposes well. The main benefits are robustness, integrated functionality as well as the movability of the equipment. "To

ation and increased levels of safety with Beamex calibrators



The Sellafield site in Cumbria

me, the biggest selling point and benefit of Beamex® calibrators is that they can be easily moved from one area to another, without the risk of contamination. This brings us major cost-savings. The recalibration of Beamex® equipment can be done efficiently", Alistair explains.

"Secondly, the Beamex® multifunction calibrator integrates several devices into one, which means that we need to learn to use only one device and we must only recalibrate one device instead of several", he adds.

"The all-in-one capabilities of the Beamex® calibrator means also that our technicians don't have to run back

and forth to the calibration facility in order to change equipment, as they can perform most of the calibrations with one device", Alistair summarizes.

Today, Sellafield owns more than 70 Beamex® MCs and a large number of EXT modules. According to Alistair the amount of calibrators will probably exceed 100 by the end of 2012.

Case Story in Brief

Customer profile

Sellafield Ltd (Sellafield site)
United Kingdom

The situation

Sellafield Ltd is responsible for safely delivering decommissioning, reprocessing, nuclear waste management and fuel manufacturing activities across sites at Sellafield in Cumbria and Capenhurst in Cheshire. The main calibration needs at the site are related to pressure, temperature and flow measurements. The site itself has approximately 6,000 instruments that must be calibrated annually. There are a few challenges that complicate performing calibrations at Sellafield site. Many of the challenges relate to moving equipment from one location to another and making sure that the equipment is clean and that it is not contaminated when being moved from one area to another. The Beamex® MC5 Multifunction Calibrator serves Sellafield's purposes well. The main benefits are robustness, integrated functionality as well as the movability of the equipment.

Beamex Product Solution

- Beamex® MC5 Multifunction Calibrator
- EXT modules
- Beamex® MC2 Calibrator

Main Benefits

- Robustness
- All-in-one device with integrated functionality
- Equipment can be move from one area to another without the risk of contamination
- Low cost of ownership

Roth + CO. AG aiming at being number one in Switzerland

■ Roth + CO. AG in Oberuzwil, Switzerland was established in 1951. "We started as an agent for thermostats made in the USA and since 1971 we have been a manufacturer of temperature sensors. From 1975, we have also offered temperature controllers, temperature converters, indicators, power controllers and recorders in our product range. In the 1990, we established the Swiss Calibration SCS laboratory for temperature", Mario Baumann, CEO at Roth Co Ag, says.

Since June 2011, Roth Co Ag is not only the first private primary laboratory for temperature in the world, but also Beamex's new distributor in Switzerland. The calibration market in Switzerland ties in very well with Beamex's concept of calibrators and calibration software, because we offer the possibility to unite



Mario Baumann, CEO, Alain Kulczyki and Michael Spiak from Roth Co Ag.

our calibration management system with our customers' own maintenance

management systems. With 60 years of experience in temperature, Roth knows most of the companies that need calibration products on the Swiss market: process manufacturing, power and energy, food and beverage, pharmaceutical companies, packaging, printing and agriculture, oil and gas companies.

Co-operation with Roth will give Beamex access to important competitive advantages on the Swiss market: highly experienced personnel, top after-sales service, a laboratory for temperature calibrations and experience with ATEX products. Possessing core competence in temperature and utilizing Beamex's products and services, Roth aims at being number one on the Swiss market.

Novartis eCalibration Competence Center visits Beamex

■ Novartis just recently finished the implementation of Beamex® Integrated Calibration Solution and the system is now up and running. It is integrated in the process of continuously improving the documentation and procedure of Novartis' maintenance. Novartis has named this calibration solution *eCalibration*. *eCalibration* is the integration of Comos (Computer Aided Engineering, CAE), SAP-PM (Computerized Maintenance Management System, CMMS) and Beamex® CMX Calibration Software. The new system has standardized test equipment, within a single calibration management system, automated data recording and error calculation. It describes the location, integration and



Kevin Hammond, Arnaud Pfefferkorn, Ognjen Smiljanić and Daniel Grola from the Novartis eCalibration Competence Center. Pekka Videnoja, Anders Nyman, Sami Koskinen and Heikki Laurila from Beamex Oy Ab.

communication between master data such as: engineering data, calibration

data and scheduling of work orders within Novartis.

In November 2011, Kevin Hammond, Arnaud Pfefferkorn, Ognjen Smiljanić and Daniel Grola from the Novartis eCalibration Competence Center visited Beamex to discuss further cooperation.

The integration between Comos, SAP-PM and CMX guarantees global process harmonization and consistency of all quality-related calibration data as well as automation of critical maintenance activities. "Beamex and Novartis will continue to develop the partnership when supporting Novartis Competence Center in the global roll out process," Beamex Global Account Manager Sami Koskinen describes.

Establishing a deeper partnership with Sellafield



Representatives from Sellafield and Beamex gathered for a group picture after the workshop.

■ Sellafield Ltd is the company responsible for safely delivering decommissioning, reprocessing, nuclear waste management and fuel manufacturing activities on behalf of the Nuclear Decommissioning Authority. Sellafield Ltd has the largest concentration of nuclear expertise in Europe, with over 50 years of experience. The Sellafield site in Cumbria (UK) employs 12,500 people. In October 2011 representatives from Beamex Oy Ab (Finland) and Beamex Ltd (UK) visited the Sellafield Ltd site at Cumbria. Beamex's Calibrator Product Manager spent two days at Sellafield. The visit was arranged to get feedback from the instrument technicians at Sellafield. They have been using Beamex calibrators for a couple of years and their opinions and usage experience are valuable in

product development. Beamex received important feedback on the Sellafield technicians' own needs as well. Finally, the visit included a workshop with a larger group of people involved in the Sellafield calibration process.

With the exception of the regular sales visits made by Beamex Ltd, people from Beamex Oy Ab headquarters visited Sellafield earlier this year. Dr. Raimo Ahola, the CEO of Beamex Group, met with Mr Alistair Norwood, Technical Engineering Support at the Sellafield site, to deepen the partnership and discuss common product development issues. "The visit and workshop turned out to be mutually beneficial and we are looking forward to making it a regular event", say Mr. Norwood from Sellafield and Mr. Heikki Laurila from Beamex Oy Ab.

"It was very interesting to see the unique Sellafield site. Sellafield

utilizes Beamex process calibrators as standard procedure and indeed has a large number of Beamex calibrators. Sellafield has quickly become one of Beamex's largest calibrator clients. We highly appreciate the warm and open partnership with Sellafield", Mr Laurila comments.

Today, Sellafield owns more than 70 Beamex® MCs and a large number of EXT modules. Next year the amount will most likely exceed 100. Sellafield engineers are also currently evaluating Beamex® CMX Calibration Software to integrate it with their own computerized maintenance management system (CMMS).

Beamex grows rapidly in China

■ Establishing its own sales office on the Chinese market turned out to be the right strategic decision made by Beamex's board of directors in 2009. Located in Shanghai's Zhangjiang Hi-Tech Park, the Beamex Representative Office in China has been operational since March 2010 and sales are growing rapidly.

"With Beamex's main customer groups on the Chinese market in mind, Shanghai was the perfect location. There are the areas of east and south China, both of which have vast development industries, for example chemical and petrochemical plants, power plants as well as assembly and manufacturing plants. North China is also an extremely important market area, thanks to its heavy industry of iron, steel, mining, manufacturing and power plants. Last, but not least, the west of China is a rapidly developing region with oil and gas, mining and power plants", Sales Director Henrik Nystrand, describes.

Rapid growth

The successful recruitment of competent personnel was crucial to the rapid growth. Mr. Hao Yan, general manager at Beamex in China, assisted by Mr. ZhiCheng Wang, is managing and executing the Beamex sales and marketing strategy with excellent results. Knowing that he is an experienced sales executive with thorough knowledge of calibration, Mr. Yan's appointment as general manager played an important role in the Beamex growth strategy. Mr. Wang, on the other hand, possesses much experience in the sales of calibration equipment and distributor support. Thanks to this fabulous experience in calibration and instrumentation, the Beamex office with its distributors are able to provide excellent customer service.



Mr. ZhiCheng Wang, Sales Manager and Mr. Hao Yan, General Manager at Beamex in China.

The Beamex distributor network is constantly expanding. The distributors have local technical knowledge and can therefore provide customers with beneficial cost-saving calibration solutions according to their specific requirements. Beamex products have rapidly accomplished a good reputation in China, thanks to the high quality and functionality of not only its individual products but of Beamex® Integrated Calibration Solutions for industry-specific solutions. The distributor network also offers Beamex customers essential sales support.

China: a competitive market

China's industrial growth has resulted in increased demand for calibration solutions. The competition is tough; all of the major international suppliers of calibration equipment are there, as well as tens of local manufacturers. Industrial plants in China want to get the best out of their calibration equipment and calibration processes. The competition forces them to run manufacturing

processes as close to the optimum as possible to produce products of even quality.

In spite of hard competition, Beamex is expanding rapidly in China, thanks to our beneficial and unique calibration solutions combined with competent personnel and distributors. Beamex's own presence will further increase the confidence among valuable customers. Beamex recently expanded its product range with temperature dry blocks which means that nowadays even temperature is a part of Beamex® Integrated Calibration Solutions. This has given Beamex additional competitive advantages in the competition of complete calibration solutions.

"The future is very exciting with all of the challenges and opportunities in China, but thanks to the successful expansion in China, we are convinced that customers will discover and experience the benefits of using Beamex calibration solutions", Mr. Nystrand adds.

Beamex in brief

Beamex is a leading worldwide provider of calibration solutions that meet even the most demanding requirements of process instrumentation. Beamex offers a comprehensive range of products and services — from portable calibrators to workstations, calibration accessories, calibration software, industry-specific solutions and professional services. Through Beamex's partner network, their products and services are available in more than 60 countries.

Learn more about Beamex products and services:

www.beamex.com

Brochures, product demonstrations and quotations

info@beamex.com

www.beamex.com/request (online request form)

Software support

support@beamex.com

Re-calibration and service

service@beamex.com

Find your local Beamex sales office at:

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Contact: pamela.skytte@beamex.com

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please visit www.beamex.com or send an e-mail to info@beamex.com

Beamex products and services

Portable calibrators

Beamex's range of portable MC calibrators for field calibration is known for their accuracy, versatility and also for meeting both high and uncompromised quality standards.

- MC5 Multifunction Calibrator
- MC5-IS Intrinsically Safe Multifunction Calibrator
- MC2 Series
- MC4 Documenting Process Calibrator
- MC2-IS Intrinsically Safe Multifunction Calibrator

Workstations

A workstation can be considered ideal when most of the maintenance and calibration tasks are performed in the workshop.

- MCS100 Workstation
- MC5P Calibration Host Module

Accessories

Beamex's calibration accessories complete your investment into calibration equipment.

- External pressure modules
- Calibration hand-pumps
- Spare parts

Calibration software

Plan, manage and document all your calibrations efficiently and safely using Beamex's calibration software.

- CMX Light
- CMX Professional
- CMX Enterprise

Professional services

An essential part of a total calibration solution is Professional Services — service and re-calibration, installation and training, software support, validation services and integration services.

- Re-calibration and service
- Installation and training
- Software Service Agreement (SSA)
- Validation services (pharmaceutical industry)
- Integration services



Integrate Beamex® CMX with your maintenance management system

Beamex® CMX Professional or Beamex® CMX Enterprise software can be easily integrated into computerized maintenance management systems, whether it is Maximo, SAP or Datastream or your company's own, in-house software for maintenance management. Beamex offers professional service in the execution of system integration projects.



Read more at
www.beamex.com

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