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TESTINGLY

Testing, Inspection & Certification Magazine

Expertise to overcome supply chain crisis

magazine by KEMA Labs

Testingly
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> All the stakeholders, such as governments, businesses and individuals, must work together to ensure reliable access to resources and create a reliable and efficient power distribution system

Domenico Villani
CESI Group CEO

Expertise and quality to shape the future of energy

We have been living in a complex period, both geopolitically and industrially. However, the T&D industry is rapidly growing due to the increasing focus and commitment to a greener energy transition. This requires us to maintain constant focus on grid resiliency, as well as the quality and safety of each product.

The recent economic crisis, high inflation rates, and geopolitical factors have remarkably stressed the globalized value chain structure. In recent years, this has been one of the most significant competitive advantages of several industry players in terms of the efficiency of their operations. However, longer delivery times of raw materials are stretching the buffer timelines of OEM projects, potentially leading to dangerous rushes during economic recovery. Therefore, the importance of testing and maintaining the quality of electromechanical components cannot be underestimated.
We have noticed how essential components and equipment prices for electricity supply have soared, leading to a lack of certainty in the market and a pressing need for cooperation. Delays in production, difficulties in sourcing raw materials, and a slowdown in the decarbonization path have also been observed. Lack of components and supplies and maintaining component quality can be challenging. To address this problem and expand the generation fleet to serve the electrification of the world, the industry must explore viable solutions and make appropriate changes.

All stakeholders, such as governments, businesses, and individuals, must work together to ensure reliable access to resources and create a reliable and efficient power distribution system. In this threatening landscape, severe stresses could undermine conditions, and it is essential to have a robust verification and quality assurance process throughout the entire value chain. This process must include both incoming inspection of components to ensure that they meet the required specifications and ongoing testing and monitoring of components in use.

> This new issue of Testingly, the KEMA Labs Magazine, is dedicated to the supply chain challenges and how manufacturers can maintain high quality for all over their products in the testing, inspection, and certification sector

Bas Verhoeven – KEMA Labs, Executive Vice President

Another important aspect is to have a good relationship with suppliers and conduct periodic audits to ensure that they meet the required standards. This ensures that components are produced in accordance with quality requirements and that any problems are identified and addressed quickly. In general, testing and maintaining the quality of electromechanical components is essential to ensure the reliability and safety of the products in which they are used.

The new issue of Testingly, the KEMA Labs Magazine, is dedicated to the supply chain challenges and how manufacturers can maintain high quality for all their products in the testing, inspection, and certification sector. In this issue, we will analyze the current scenario and explain how and why testing is important with interviews and case studies.

Enjoy the read!

Domenico Villani – CESI Group CEO

Bas Verhoeven – Executive Vice President CESI TIC Division – KEMA Labs

Falsified Reports, KEMA Labs launches a free authenticity verification service

In the last months, the falsified reports issue registered a major increase, which created the need for a reliable solution. For this reason CESI Group, through its KEMA Labs Division, launches its free of charge report authenticity verification service for its customers.

The free service will allow customers to verify the authenticity of their reports, ensuring the validity of the data and ultimately promoting transparency and accountability within the industry. Finally, this service is meant to serve as a warning to the entire industry, which now more than ever is undergoing a moment of great transformation toward a more sustainable and responsible future horizon.

Accurate and reliable data are critical in the energy industry. For this reason, our Group offer this free service to helping its clients achieve their goals in a transparent and accountable manner.

Italian Ambassador and Arnhem Deputy Mayor hosted in KEMA Labs at Arnhem

On April, CESI Group had the pleasure of hosting at KEMA Labs in Arnhem, His Excellency Giorgio Novello, Ambassador of Italy to the Kingdom of The Netherlands and Nermina Kundic, Deputy mayor and Alderman for Economic development, Education and Youth Policy, Sustainable Mobility for the Arnhem Municipality. The two guests were received by the CESI Group CEO Domenico Villani, the CESI TIC Division Executive Vice President, Bas Verhoeven and Floris Schulze, KEMA Labs Global Director Utilities.

The meeting was an opportunity to introduce the two guests to the worldwide activities of the CESI Group, with a focus on the central role of KEMA Labs Division. The future developments of testing activities were also shared, which foresee a growth towards digital. Both the Ambassador and the Deputy Mayor expressed their appreciation for the important role that KEMA Labs and CESI play in the development of the energy sector.

KEMA “Certificate of Excellence”

KEMA Labs Arnhem has successfully performed short-circuit tests for GE Renewable Energy France in one of their circuit-breakers.
This testing campaign was the closing of an era for Jean-Marc Willieme from GE as he will retire soon. Jean-Marc visited KEMA for 36 years for testing the products of GE (and former companies) and for many other testing related activities. Jean-Marc received a ‘KEMA Certificate of Excellence’ for all the years he worked together with KEMA.
We would like to express our respect for all the years and we wish Jean-Marc and his family all the best.

Earthquake in Turkey, Cesi with the people affected

The images of the earthquake and the deep sorrow for the aftermath of this catastrophic event that hit the area on the border between Turkey and Syria on the night of February 6, prompted our Group to want to support those affected by the earthquake violence.

For this reason, CESI Group decided to participate with a donation to the campaign organized by UNHCR, the United Nations Refugee Agency, a global organization dedicated to saving lives, protecting rights and building a better future for refugees, displaced communities and stateless people.

CESI Group's donation will help provide earthquake-affected people with relief and livelihood means: from stoves and food parcels to clothes and tents to house people.

THE SUPPLY CHAIN TSUNAMI

Protect the value chain

Electromechanical Equipment plays a critical role in a wide range of industrial and consumer products worldwide, including automobiles, appliances, and T&D industry.

Ensuring quality and reliability components is essential for the safety of the applications. The value chain of these components is often global in scope, as they come from suppliers all over the world. This can make it difficult to ensure their quality, as various suppliers may have different standards and practices. Moreover, as the global political climate becomes increasingly complex, the threat of geopolitical factors impacting the quality of manufacturing could become a serious concern.

In this respect, the importance of testing and maintaining the quality of electromechanical components cannot be underestimated.

The edition of July 2022 of T&D World Magazine reports that “short supply of large transformers is concerning, but it’s not the only challenge electric utilities face when it comes to supply chain.” Prices of components and equipment essential for electricity delivery have increased drastically, leading to a lack of certainty in the market and a pressing need for collaboration.

This has caused supply chain bottlenecks due to manufacturing delays, difficulty obtaining raw materials, and hindered the push to decarbonize. To effectively respond to weather-related events, mutual assistance between utilities is essential; however, the lack of components and supplies creates a challenge.

To tackle this issue and expand the generation fleet to serve the electrification of the world, the industry must explore viable solutions and make appropriate adjustments.

Various stakeholders, such as governments, corporations, and individuals, must work together to ensure dependable access to resources, and create a reliable and efficient power delivery system. In this threatening landscape, high stress could compromise the condition and it is essential to have robust testing and quality assurance process in place throughout the entire value chain. This process should include both incoming inspection of components to ensure they meet required specifications, as well as ongoing testing and monitoring of components in use. Another important aspect is to have a good relationship with suppliers, and to perform audits on a regular basis to ensure that they meet the required standards. This will ensure that the components are manufactured in a way that meets the quality requirements, and that any issues are identified and addressed quickly. Overall, testing and maintaining the quality of electromechanical components is essential to ensure the reliability and safety of the products where they are used. With the increasing threat of geopolitical factors impacting the quality of manufacturing, it is even more important to have robust testing and quality assurance processes in place throughout the entire value chain.

Another important challenge related to the supply chain in the electromechanical manufacturing industry is the lack of silicon, a key raw material used in the production of power electronics and smart meters. Silicon is a critical component in the production of semiconductors, which are used in a wide range of electronic devices, including power electronics and smart meters. The demand for silicon has increased in recent years, driven by the growth in the renewable energy sector and the increased adoption of electric vehicles. This has led to a shortage of silicon, which can cause delays and disruptions in the production of power electronics and smart meters. When silicon is not available, manufacturers may be forced to find alternative sources, which can lead to higher costs and reduced quality. This is because alternative sources may not be as reliable or consistent as the primary sources, which can lead to variations in the quality of the silicon. This can result in a reduced quality of the final products, which can impact the performance, reliability, and safety of the products.

Having a third-party partner with full accreditation of ISO/IEC 17020, 17065, and 17025 can be a critical partner for manufacturers and end users, as it can help reduce the risks associated with supplying components of reliable quality and acceptance by end users for tenders. This third-party partner can bring a wealth of experience and knowledge to the table, which can help ensure that the components meet the necessary standards and requirements, and that any issues are identified and addressed quickly. This can result in improved reliability and safety of products, as well as reduced costs and complexity in the supply chain.

Maintaining quality in the T&D Industry

Inspections on product tests and manufacturing sites

It is well understood by all end-users the importance of buying type tested products, to check in advance whether samples of the installed components are able to overcome issues which could occur in the real field during the lifetime of such equipment.

This is particularly true for the elements which are used in the electrical grid, where reliability, performances and safety must be always ensured.

Type testing at Kema Labs is for sure the most reliable guarantee, but inspections can provide something different, sometimes more, by complementing laboratories' activities.

Witnessing type or acceptance tests

Inspection is a suitable way to grant product conformity to well-defined standards or contractual prescriptions. When witnessing tests performed directly at manufacturers' premises, the inspector always verifies laboratory equipment, calibration, engineers' skills and adopted procedures.

A clear conformity statement is always written in the inspection report, that becomes easy and straightforward to read and accept.

But, what can ensure that an inspector is really able to make independent technical professional judgments and not only pure paper-works? Inspectors highly skilled in test performances and result analyses usually belong to organizations which also own laboratories, since they can leverage on getting experience from similar activities directly performed. This is of peculiar importance when dealing with long duration tests, where witnessing is not a continuous activity and each time the inspector is at manufacturers' premises, he must understand what happened in the meantime or when he is called to evaluate if the tests are at the final stages. Another fundamental role of inspections usually consists in verifying the whole set of tests on a product, which is previously tested in high-end laboratories for the most demanding performances, such as short circuit withstanding.

As a matter of fact, after short circuit, other tests are very often performed directly by the manufacturer, such as transformer routine tests or several mechanical operations of HV circuit breakers.
Inspectors can easily set-up a complete package, gathering all tests results made in different premises, identifying that the prototype is always the same used in all the various activities.
The results can be placed in a unique inspection certificate where everybody sees at a glance if the product fulfilled all the requirements.

Reducing risks on series production

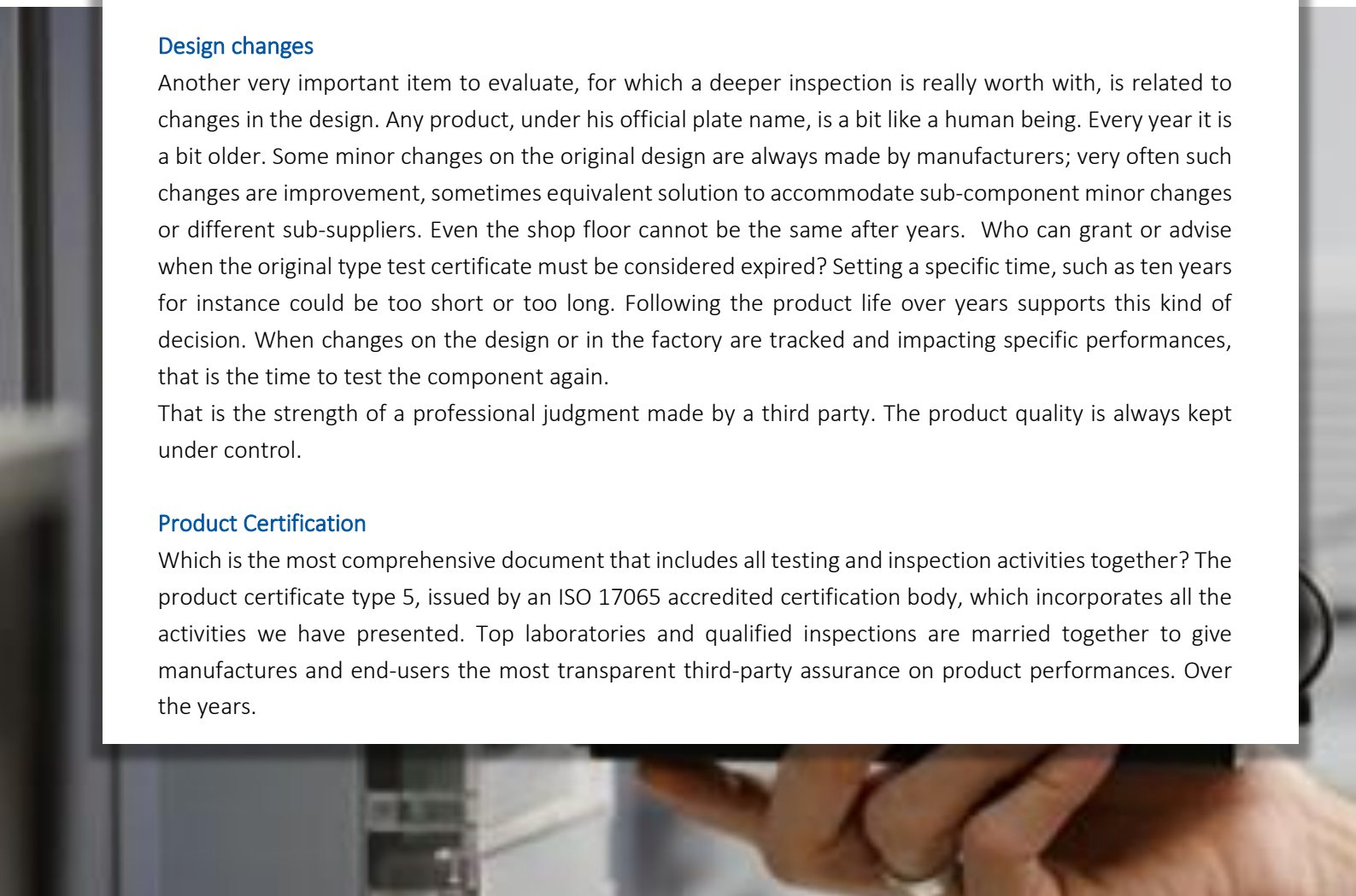
Type testing acquires even more importance when the supply is a batch one or a series production. Type test reports are based on a clear assumption: a specimen identical to that to be supplied has been previously tested to proof its capabilities and performances.
In which way is it possible to verify that what is bought is exactly a copy of what has been tested? Here inspections help a lot since products can be inspected during their own manufacturing phases. Is the sealing of a switchboard the same used to provide IP code? Is the welding of the metal clad made of the same quality of the prototype that passed the internal arc? Is the insulation material of the same supplier and quality? The type tested components is very often the golden sample; a deep inspection to the factory's activities helps to ensure a better alignment between the current supply and the tested sample, evaluating the risk of any deviation.
But again, who has the skills to provide such evaluation and inspections? The essence of the requested knowledge is the component behavior, which comes from the inspector experience on how the product has been designed, build, operated and especially how it fails. Having experience in direct testing in internal laboratories is an irreplaceable source of information when witnessing.

Design changes

Another very important item to evaluate, for which a deeper inspection is really worth with, is related to changes in the design. Any product, under his official plate name, is a bit like a human being. Every year it is a bit older. Some minor changes on the original design are always made by manufacturers; very often such changes are improvement, sometimes equivalent solution to accommodate sub-component minor changes or different sub-suppliers. Even the shop floor cannot be the same after years. Who can grant or advise when the original type test certificate must be considered expired? Setting a specific time, such as ten years for instance could be too short or too long. Following the product life over years supports this kind of decision. When changes on the design or in the factory are tracked and impacting specific performances, that is the time to test the component again.
That is the strength of a professional judgment made by a third party. The product quality is always kept under control.

Product Certification

Which is the most comprehensive document that includes all testing and inspection activities together? The product certificate type 5, issued by an ISO 17065 accredited certification body, which incorporates all the activities we have presented. Top laboratories and qualified inspections are married together to give manufactures and end-users the most transparent third-party assurance on product performances. Over the years.



How to ensure reliability of transformers in the power networks?

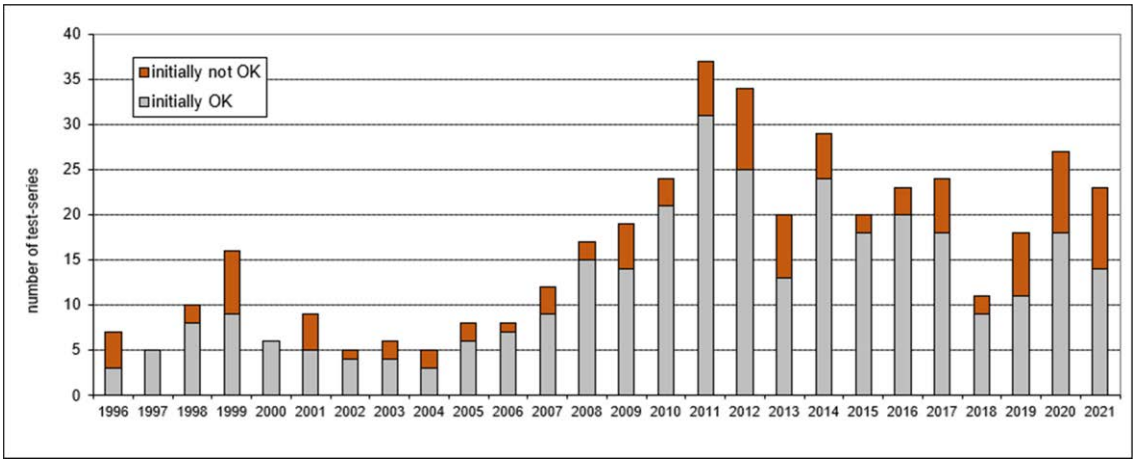
Transformers are key equipment in electrical transmission and distribution networks which help to transform the voltages suitable for transmission, distribution and also help in power regulation in an efficient and reliable manner. Though the electrical function seems to simple i.e. step up or step down voltages they are really complex machines which have to be designed, manufactured and tested carefully to ensure their reliability in service which on average is more than 25 years. Many of the large power transformers are in service for more than 40 years. There are few products in the fast-developing technological world which are manufactured with an aim to last that long. Being the core of the power transmission and distribution networks their reliability under normal and abnormal service conditions are critical to ensure the reliability of power supply which is essential to the functioning of society in large.

These transformers can be found everywhere – in substations, power generating stations, industrial, commercial & residential sites, ships, trains, solar & wind parks etc; The sizing and type of transformers also vary depending on the application- dry type, liquid filled, indoor, outdoor etc;

Apart from the thermal stresses arising from transmission of the rated power, the transformers are subjected to abnormal stresses such as dielectric stress arising from lightning and switching phenomena to which the network is subjected and electrodynamic stress due to short-circuits which occur in the networks due to natural causes and failure of other equipment in the networks. These abnormal stresses cannot be absolutely avoided, and the transformers must be designed and built to withstand these stresses without being damaged/impaired.

The capability of a transformer design to withstand dielectric stresses is always tested by the manufacturer in their own or other laboratories by a set of tests as given in the Standards before being accepted by the end-user. However, the capability of a transformer design to withstand short-circuit is often not verified for reasons such as lack of time and cumbersome logistics involved in transporting the equipment to the test labs. Instead, calculations are provided as evidence of withstand capability against electrodynamic stresses. These are mostly based on the theoretical stresses applied on ideal material and in static condition unlike the electrodynamic stresses applied on the complete transformer during actual testing.

Experience gained at KEMA Labs over the last two decades show that 25-30% of the transformers tested for short-circuit fail during these tests. The failures most often occur in a mode unforeseen in the 'successful' calculation models. Often the failures caused suddenly or progressively by the electrodynamic forces are misinterpreted as failures caused by dielectric stresses. This is because the failure due short-circuit stresses often manifest as failure of the insulating materials.



Testing is an important part of the design process because it helps to verify that the product meets the specifications and requirements. This includes ensuring that the final product is functional, reliable, and safe to use. By reduction of the testing requirements, there is a higher risk of design flaws or defects slipping through, leading to built-in risks for the transformers in the power networks to fail at an inopportune moment.

The continuous developments in the design of transformers due to the evolving requirements such as less weight, less oil, compact designs for wind turbine applications, constantly varying and unbalanced loading for solar applications, environment friendliness, reduced risk for fire by using natural esters, non-toxic dry insulation for indoor applications have introduced multitude of changes in the design of the windings, insulating liquids, insulation material as well as the production processes. These in-turn necessitate thorough testing of the transformers for operation under normal conditions as well as for the stresses produced under abnormal conditions. Experience gained worldwide shows that full-scale testing is the most comprehensive method to ensure that the design of a transformer comply with the requirements of the Standard.

CASE HISTORY

Ensuring Safety and Reliability: Internal Arcing Testing on Low Voltage Switchgear

Testing the safety and reliability of components before they are put into service is critical to ensure the safe and efficient operation of critical assets. Internal arcing faults, for example, can cause severe damage to equipment and pose a safety risk to personnel.
By conducting tests such as Internal Arcing Tests on Low Voltage Switchgear, potential faults and risks can be identified and mitigated before equipment is put into service. Therefore, KEMA Labs Chalfont in the US conducted a successful testing campaign for the Nuclear Regulatory Commission (NRC).
August 15th to September 7th, KEMA Labs in Chalfont, PA, hosted the Nuclear Regulatory Commission (NRC) to perform High Energy Arcing Fault (HEAF) tests. These were conducted as part of the Nuclear Energy Agency (NEA) Organization for Economic Cooperation and Development (OECD) HEAF II research program.

The first week of the test program was mainly spent in the Customer Assembly Bay (CAB). This allowed the NRC to work with the National Institute of Standards and Technology (NIST), and Sandia Laboratories to prepare and organize their instruments, high-speed cameras, and thermal imaging cameras. The picture to the right shows only a couple out of the hundreds of calorimeters and stands that were used to measure the energy given off by the high-power arc fault tests. Along with the calorimeters and data captured by NRC, KEMA Labs also supplied and recorded data using additional calorimeters and pressure transducers.

During the two weeks of testing, KEMA Labs performed 10 arc tests for a duration of 2 or 4 seconds. These unique tests were conducted to help get a better understanding of high energy arcing faults, and to verify models on the amount of energy and damage that can occur when the conductive material and surrounding support structures are made of different materials. The pictures below show the before and after from a 4 second, 30kA arc test on aluminum bus and aluminum enclosure bus duct.

KEMA Labs and NRC were proud to host 19 members of the NEA/OECD HEAF and Fire Incident Records Exchange (FIRE) programs from Belgium, Canada, Czech Republic, France, Germany, Korea, Japan, the Netherlands and Spain for the last week of testing. During the last week of testing, senior leadership from NIST, RES and NRR DRA division management and Region 1 staff were present to witness tests.

In conclusion, ensuring the safety and reliability of electromechanical equipment is crucial for any end user of critical assets. Internal arcing faults, among other potential risks, can cause severe damage to equipment and pose a safety risk to personnel.

The entire team involved in the testing in front of KEMA Labs Chalfont (Pennsylvania, USA) Test Cell 9

MUAMMER LEVENT CELIKEL

KEMA LABS

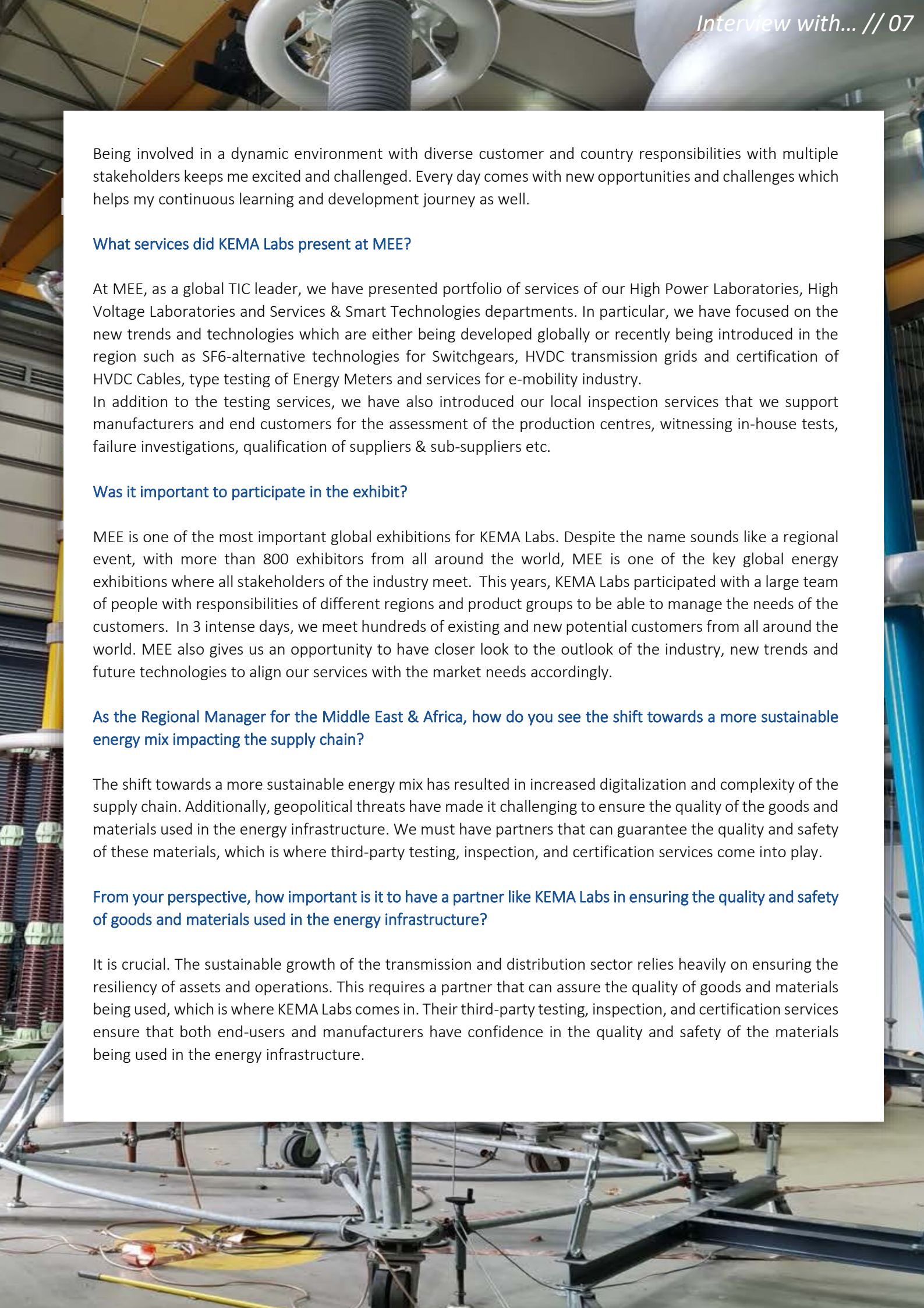
Regional Manager for the Middle East & Africa

- Shift towards a more sustainable energy mix
- Quality and safety of goods and materials

Muammer Levent Celikel is Regional Leader covering Middle East and Africa Region based in Dubai / UAE office. Working for more than 17 years in sales and project management in construction and energy industries. Started his career in project management at Arup as a project manager managing multi diciplinary teams for the construction and fit out projects, then moved to a sales career in Alstom Grid and worked as Regional Sales Manager for Power Transformers.

Can you tell us about your role at KEMA Labs?

As a Regional Leader, my main responsibility is the sales activities of KEMA Labs services in the Middle East and Africa Region. However, in addition to the sales, I have been managing business development with the end users, handling the marketing including exhibitions, technical seminars and also being involved in the operational discussions. In short, I am a part of any activity where a customer from my region is involved.



Being involved in a dynamic environment with diverse customer and country responsibilities with multiple stakeholders keeps me excited and challenged. Every day comes with new opportunities and challenges which helps my continuous learning and development journey as well.

What services did KEMA Labs present at MEE?

At MEE, as a global TIC leader, we have presented portfolio of services of our High Power Laboratories, High Voltage Laboratories and Services & Smart Technologies departments. In particular, we have focused on the new trends and technologies which are either being developed globally or recently being introduced in the region such as SF6-alternative technologies for Switchgears, HVDC transmission grids and certification of HVDC Cables, type testing of Energy Meters and services for e-mobility industry.
In addition to the testing services, we have also introduced our local inspection services that we support manufacturers and end customers for the assessment of the production centres, witnessing in-house tests, failure investigations, qualification of suppliers & sub-suppliers etc.

Was it important to participate in the exhibit?

MEE is one of the most important global exhibitions for KEMA Labs. Despite the name sounds like a regional event, with more than 800 exhibitors from all around the world, MEE is one of the key global energy exhibitions where all stakeholders of the industry meet. This years, KEMA Labs participated with a large team of people with responsibilities of different regions and product groups to be able to manage the needs of the customers. In 3 intense days, we meet hundreds of existing and new potential customers from all around the world. MEE also gives us an opportunity to have closer look to the outlook of the industry, new trends and future technologies to align our services with the market needs accordingly.

As the Regional Manager for the Middle East & Africa, how do you see the shift towards a more sustainable energy mix impacting the supply chain?

The shift towards a more sustainable energy mix has resulted in increased digitalization and complexity of the supply chain. Additionally, geopolitical threats have made it challenging to ensure the quality of the goods and materials used in the energy infrastructure. We must have partners that can guarantee the quality and safety of these materials, which is where third-party testing, inspection, and certification services come into play.

From your perspective, how important is it to have a partner like KEMA Labs in ensuring the quality and safety of goods and materials used in the energy infrastructure?

It is crucial. The sustainable growth of the transmission and distribution sector relies heavily on ensuring the resiliency of assets and operations. This requires a partner that can assure the quality of goods and materials being used, which is where KEMA Labs comes in. Their third-party testing, inspection, and certification services ensure that both end-users and manufacturers have confidence in the quality and safety of the materials being used in the energy infrastructure.

Upcoming events

CIRED

June 12-15, 2023

Rome, Italy

CIRED, the Leading Forum where the Electricity Distribution Community meets, holds the major International Electricity Conference & Exhibition every two years in different venues in Europe with a worldwide perspective and participation.

ENERGETAB 2023

September 11-14, 2023

Poland

ENERGETAB is the largest trade fair of modern appliances, apparatus and technologies for power industry in Poland. It is one of the most important regular meetings of the leading representatives of the power sector.

INMR WORLD CONGRESS

November 12-15, 2023

Bangkok, Thailand

The INMR WORLD CONGRESS is a skills-building and technical enrichment event for engineers and other professionals in the field of power transmission & distribution. It is comprised of a 3-day Conference and PRODUCT & TECHNOLOGY EXHIBITION.

ENLIT EUROPE

November 28-30, 2023

Paris, France

Enlit connect industries, inspire action and help Europe to Evolve into one decarbonised and digitalised energy system for the energy transition

KEMA Labs is the CESI Testing, Inspection and Certification Division

Through its Division KEMA Labs, CESI is the world leader for the independent Testing, Inspection and Certification activities in the electricity industry. With a legacy of more than 60 years of experience, CESI operates in 70 countries around the world and supports its global clients in meeting the energy transition challenges. CESI also provides civil and environmental engineering services.

The company's key global clients include major utilities, Transmission System Operators (TSOs), Distribution System Operators (DSOs), power generation companies (GenCos), system integrators, financial investors, and global electromechanical and electronic manufacturers, as well as governments and regulatory authorities.

CESI is a fully independent joint-stock company headquartered in Milan and with facilities in Arnhem (NL), Berlin (DE), Prague (CZ), Mannheim (DE), Dubai (AE), Rio de Janeiro (BR), Santiago de Chile (CL), Knoxville (US) and Chalfont (US).

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