

# ALPHA

THINK QUALITY

02/2022

An aerial night view of a city, likely London, with a prominent digital overlay of blue and white lines and nodes, suggesting a data network or cybersecurity theme. The city lights are visible against a dark sky, and the digital lines crisscross the scene, creating a futuristic, high-tech atmosphere.

SAFEGUARDING YOUR MACHINERY  
AND PLANT IN A NEW UNCERTAIN  
WORLD - AS A CHALLENGE  
AND A NECESSITY

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# EDITORIAL

Once again, we have a new issue of ALPHA's customer magazine in front of us, filled to the brim with interesting articles on all aspects of machine and plant safety. When we did the final editing for the last issue of our popular client magazine in January 2022, we could not have known how our world would change dramatically shortly thereafter. These changes are impacting all areas of life and, of course, our major topic of improving safety from planning to operation of machines, plants and critical infrastructure.

This drastic change should be an example: at that time, many of our customers did not realize that ALPHA OT is a trustworthy supplier on the market, who offers cybersecurity solutions tailored to the globally operating machinery and plant engineering. That security has often been reduced to the equally important functional safety, but now inquiries about cybersecurity, such as the frameworks according to IEC 62443, ISO/IEC 27001, NIST and others, are being boosted to ALPHA OT. It has become clear to us that not only the classic critical infrastructure such as water supply, power generation plants need to be better protected, but this protection starts with the design of machinery and equipment avoiding diabolic threats.

ALPHA has survived the last months of dramatical changes as well, not only because our long-standing customers have moved into new business areas with modern innovative concepts (Power to X as an example), but also because our customers have opened up new markets and in doing so have also developed further with ALPHA. Thus, in the last quarter we were able to win more projects in Uzbekistan, Kazakhstan, the Persian Gulf region, South Korea and China. Europe is also becoming increasingly interesting for us due to the concepts of reshoring and nearshoring.

Our consulting business has grown by 56% in the last two quarters. We have repositioned and modernized our sales business team by winning and recruiting experienced sales managers with engineering university degrees.

These changes are also reflected in the thematic selection of our customer magazine, whose articles have been written exclusively by employees of ALPHA and our partners in the ALPHA network.

Two articles on cybersecurity of machinery and equipment link to the above example and current requirements: in an editorial, the possible threats and attack possibilities on plants and critical infrastructure are presented, defense concepts based on international standards are explained and practical implementations are outlined. In another complementary article, the risk assessment of IACS (Industrial Automation and Control Systems) according to IEC 62443 is specifically addressed.

An additional significant editorial highlights another field of ALPHA's activities, namely consulting for machinery and plant manufacturers around quality, safety and sustainability. Here, the circular economy is not only presented from a scientific point of view, but also concrete practical implementation suggestions are given, which save time and costs and increase the reputation of your company.

Four significant articles answer currently pressing questions of the new focus of our work in a changing world: The conformity assessment procedure in emerging Uzbekistan is explained clearly and understandably. The fog between KOSHA, KEA, KGS is raised in an article about certification and registration of machinery and equipment in Korea.

Vietnam? Yes, ALPHA also consults here and the conformity assessment procedure in the article is combined with descriptions of the economic framework conditions.

In a very topical and important contribution, the functional safety of nuclear power plants and a consequent culture of safety is outlined - a topic in which ALPHA is active, but which has only in recent months again played a more important role in the discourses of engineers.

Interviews and spotlights from our audits and participation in international conferences round out our magazine. Despite of change everywhere, we are actively and unwaveringly involved in international committees and working groups on technical regulation, actively participate in industry associations, and have even further expanded this social and scientific activity.

You can say the world is changing and ALPHA is going with it, but that is too simple. ALPHA has changed, but the world falls back on solutions in the field of mechanical and plant engineering or the operation of plants, which have been in our portfolio as impulse and competence for years.

With this in mind, I hope you enjoy reading, gain new knowledge and insights for your important professional activities, regardless of what industry or country you come from or what position and goals you have. You are all important and equal to me and my team, we do care about you, and we do care about things that count for real - Think Quality!

Dr. Thomas Krause (CEO – ALPHA)



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# CYBERSECURITY

## DIABOLICAL DANGERS FOR CRITICAL INFRASTRUCTURES AND INDUSTRIAL PLANTS AND THEIR DEFENSE WITH ALPHA OT

Cybersecurity is a problem that has been known for years. Who hasn't heard of hacking into a company's databases or manipulating control systems? Every day we hear about new malware or new threats.

We in the companies really have to ask ourselves whether we are not just afraid and do nothing, or whether we are taking an active defensive stance here. The fact is, everyone knows about this topic, but it is still too often delegated from management to the administrator level. In addition, it is often seen as a financial risk, which is too short-sighted. It is also a technological risk, as this article will show later.

All of us - and that doesn't just include companies - have become much more vulnerable to attacks because we have integrated digital technologies into our everyday lives. On the other hand, attacks on critical infrastructure are becoming more complex and malicious.

Cyber risk incidents can have operational, financial, reputational, and strategic consequences for an organization, all with significant costs and reputational damage. Added to this is the vulnerability of our critical infrastructure, highlighted in particular by the political upheavals in 2022, which included destructive malware attacks and cyber warfare.

It sounds absurd: This has made the public and also management in companies aware that your assets are vulnerable from the outside, but self-critically you have to ask yourself whether the implementation has been successful.

Clearly, there is no such thing as 100% protection for your business. But ALPHA OT is committed to protecting your assets and your data, guarding against the threat of critical infrastructure attacks, and minimizing the potential for outages.

Security vulnerabilities lurk everywhere and in every corner. But ALPHA OT is convinced that a security concept tailored to you and your company will mitigate your risks, ward off threats you may not be prepared for, and prepare you for future attacks you may not even be thinking about now.

Together with you, we make cybersecurity planning a top priority. Human error cannot be ruled out, but a concept based on your and our experience and expertise, trained awareness of the dangers and constant vigilance can reduce the risks and protect you.

This article is intended to give you an insight into what threats are lurking and how to counter them. This may give you a small insight into the topicality of the issue. Finally, I would like to show you how we work and on what normative and technological basis we protect you, in line with our motto "Think Quality".

## CYBER ATTACK - WHAT DOES IT MEAN?

There are varieties of cyber attacks and only the most important ones should be mentioned here:

### ■ *Risks in connection with Internet services (including cloud services).*

Companies do not secure their Internet-based services. This also applies to cloud services.

### ■ *Phishing and social engineering-based attacks*

Attackers entice legitimate users with correct credentials to perform actions that open the door to unauthorized users and allow them to transmit information and data to the outside world (data exfiltration).

### ■ *Compromising accounts through passwords*

Software and other techniques are used to gain access to passwords in order to exploit systems, data and assets for the attacker's benefit.

### ■ *Network-related and man-in-the-middle attacks*

If network traffic is unsecured, attackers can redirect or cap the data. This is especially the case if the encryption of the messages does not work accordingly

### ■ *Fake news*

Authorized users inadvertently or intentionally disseminate false information or data to which they have lawful access.

### ■ *Attacks on the supply chain*

Partners, suppliers, or other assets are influenced or destroyed. This happens mainly in electronic supply chain management, especially in online databases.

### ■ *Denial of Service (DoS) attacks*

Attackers attack enterprise systems and cause a temporary shutdown or slowdown. Distributed DoS (DDoS) attacks also flood systems, but using a network of devices. These cyber attackers deploy DDoS attacks by using a network of devices to overwhelm enterprise systems.

### ■ *Ransomware*

This malicious software infects a company's systems and restricts access to encrypted data or systems until a ransom is paid to the perpetrator or another demand is obtained.

### ■ *Deep fake attacks and voice cloning*

In voice cloning, the voices of others, mostly superiors, are artificially generated to obtain sensitive information or to transfer sums of money to criminal recipients. With the help of AI, this can still be linked to "a real image of the person".

## CRITICAL INFRASTRUCTURES IN THE FOCUS OF ATTACKERS AND THE RIGHT ANSWERS FROM ALPHA OT

The term critical infrastructure is relatively broad, but facilities for energy production, transport and storage or water management are part of it in most countries of the world. In the heyday of the corona epidemic, we learned that the food industry and agriculture must also be included.

Not only are each of these areas critical to the proper functioning of modern societies, but they are interdependent, and a cyberattack on one can have a direct impact on others.

In addition, in many countries critical infrastructure is privately owned and the state has little access to ownership structures. Attackers here are increasingly opting for attacks on cyber-physical systems (CPS).

I would like to explain this briefly: CPS are electronic control systems that control physical machines such as motors and valves in an industrial plant. In a networked environment, the security of the physical machines depends on the security of the electronic control systems, but cybersecurity hardly plays a role in development here.

A holistic, coordinated CPS security strategy must be developed, taking into account the new security guidelines for critical infrastructure.

This sounds good in practice, but network-oriented and point tools cannot provide protection. The operational technology (OT) that connects, monitors and secures industrial processes (machines) has increasingly converged with the technological backbone that processes the company's information technology (IT) and thus the threat cannot be reduced selectively but only holistically or, at best, resolved.

This is where ALPHA comes in. We can provide you with an assessment of the current state and offer you holistic options for transformation into your facility or project. Screening your partners is also important, because only partners with a high level of data and information security are the partners for the future. IEC 62443 provides a good guideline for this purpose.

»

There are variety of ways to secure your facility, such as:

- Zero -Trust concept: Particularly important for us, because it replaces "primal trust" with adaptive trust in the user of my network, e.g. through multifactor authentication.
- Network security: Attackers can penetrate the internal network through vulnerabilities. Clever walls can limit this danger.
- Endpoint security: Endpoint security protects devices connected to the network, such as servers or notebooks.
- Risk culture in a company: Many companies need to be made aware that only a lived cybersecurity culture will protect them from attacks in the future. Above all, the human factor plays a role, because cybercriminals exploit human weaknesses, for example, to respond to malicious mails or download infected attachments. It must be remembered here that home offices and hybrid working make this danger even greater.

Further points from the technology side are data security and access management. Examples from the user side are firewalls, WLAN access points, or managed switches. Other simple options are to complicate passwords with a password manager or to purchase components with their own safety structure.

Something seemingly simple must be considered here: Is it not also possible to install access protection for critical components, such as locking control cabinets, separating production areas with different access authorizations or that only authorized personnel can enter the plant.

From the human factor side (risk culture in the company), the new forms of work and their changes in everyday working life in times of COVID - 19 , such as hybrid working or home office, must be taken into account. At first, the employees, detached from the operationally structured daily routine, are insecure, exhausted and do not concern themselves with the security guidelines on their own, private end devices (!), which are only insufficiently protected.

New communication tools like Microsoft Teams or Zoom increase the vulnerability. You quickly notice: the impacts are getting closer and closer.

However, a look into the future should be permitted. Those who already take cyber security lightly must be worried about the new tendencies. ALPHA OT is clear about this, but the manufacturers and operators must also be very concerned.

Networked systems (as in the case of an industrial plant or critical infrastructure) not only combine complex networks and architectures that can contain critical vulnerabilities, but they are designed in such a way that sensors, control, storage are combined with human interaction. So the risk is distributed even more, connected with human "weaknesses" and vulnerabilities are covered.

In addition, the supplier chain in the supply chain with vulnerabilities will continue to exist, as these suppliers in turn rely on other suppliers who underestimate the importance of cybersecurity due to time, ignorance or even cost

savings, triggering high costs for your customers. Just one vulnerability in a supplier's software on the network can destroy or manipulate the entire supply chain. And something else simple but diabolical: The excess number of attacks makes it impossible to respond adequately to the threats. In practice, authorities and operators of industrial facilities mostly just react instead of proactively adapting to the situation.

It is clear that defense measures in the industrial sector must take all levels into account, be it the plant, the network or the data exchange system. IEC 62443 clearly describes the different roles of the product manufacturer, the system integrator and the operator of a plant in a comprehensible and very practical manner.

The sometimes cited ISO 27001 shows how this is implemented and, above all, audited in the company's process. There are many threats lurking, but our three-tiered approach to ALPHA OT can make your assets - whether greenfield or brownfield - safer.

ALPHA OT offers them services to provide comprehensive solutions for your project or asset. Everything must be lived to be successful, but the human factor is also taken into account and its weaknesses are minimized. You can only be successful as an asset builder or even operator in the modern world if you are aware of the importance of cybersecurity and you can make the best use of your compliant but functioning assets.



Dr. Thomas Krause  
CEO ALPHA CONSULTING GMBH

ALPHA OT helps you to achieve your goals, increase confidentiality and enhance your system and data integrity, ultimately securing the framework for your all-round economic success, in line with our motto "Think Quality!"

## HOW YOU MAKE YOUR ASSETS SECURE

### 1. Assessment:

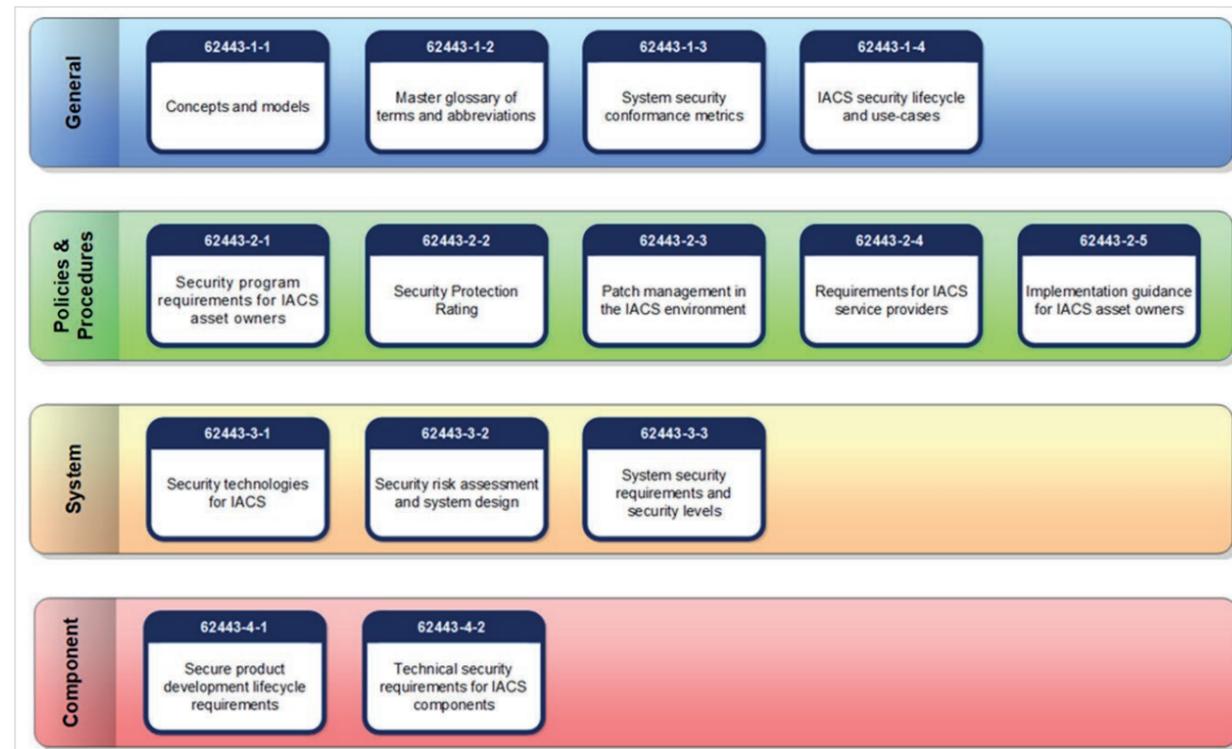
This means the evaluation of the actual state and for their projects abroad a professional review of national standards and norms

### 2. Implementation and Managed Service:

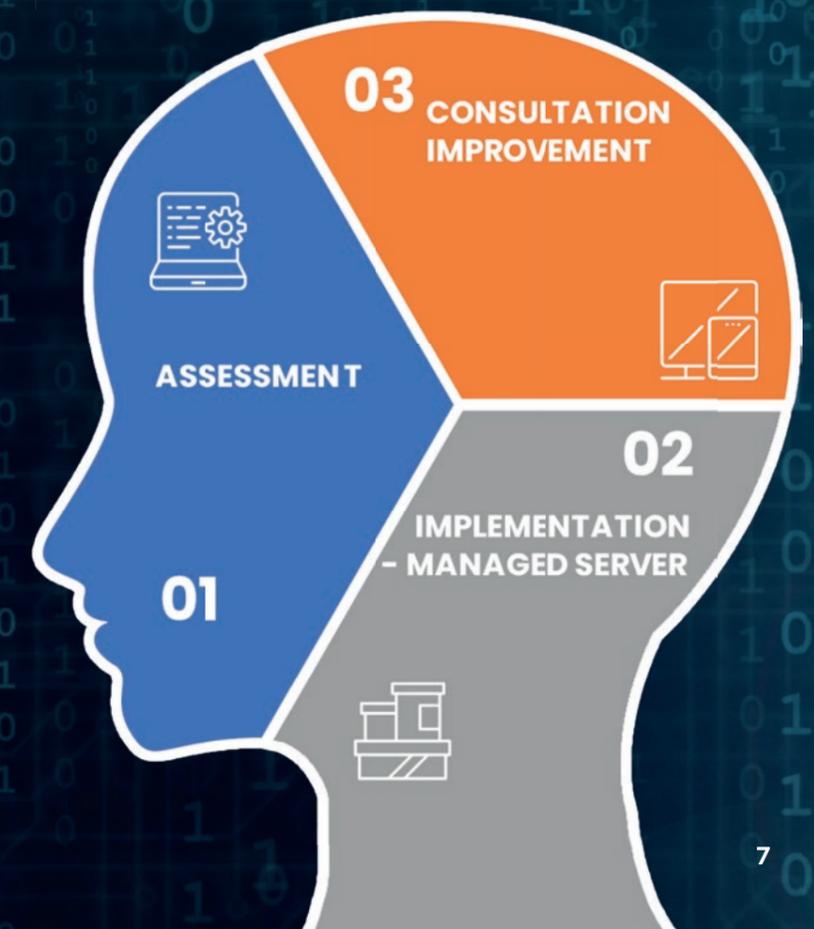
The results are integrated into their system and continuously monitored. This is the phase of technical implementation with a managed service system.

### 3. Consulting and Improvement:

Awareness is increased during ongoing operations and optimized through a continuous improvement process.



A diagram of the ISA/IEC 62443 standard series should clarify this for the practitioner and underline the standard-compliant approach of ALPHA OT. Copyright: ISA Global Cybersecurity Alliance (ISAGCA) - 2022



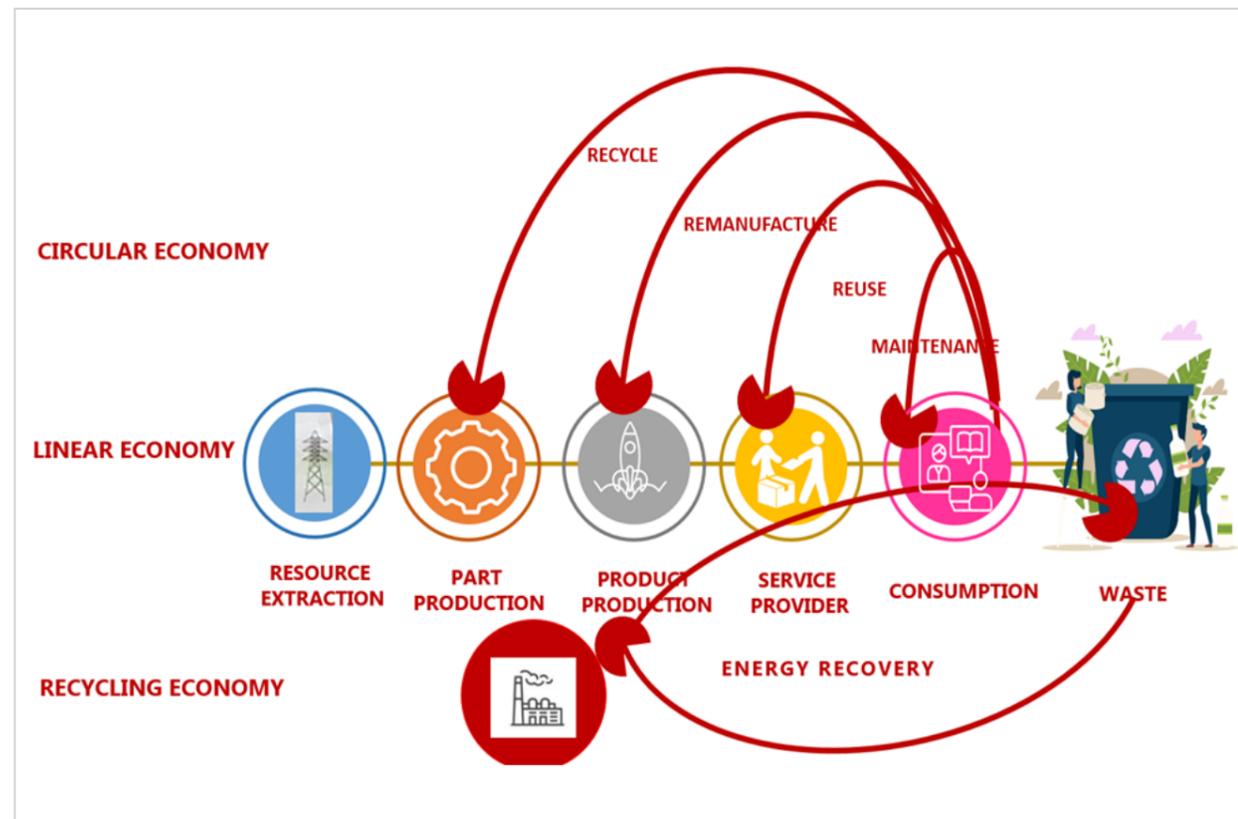
# RECYCLING, REMAKING, REUNDERSTANDING & REFUSING

CIRCULAR ECONOMY STRATEGIES IN MECHANICAL AND PLANT ENGINEERING

## THE ESSENCE OF THE CIRCULAR ECONOMY

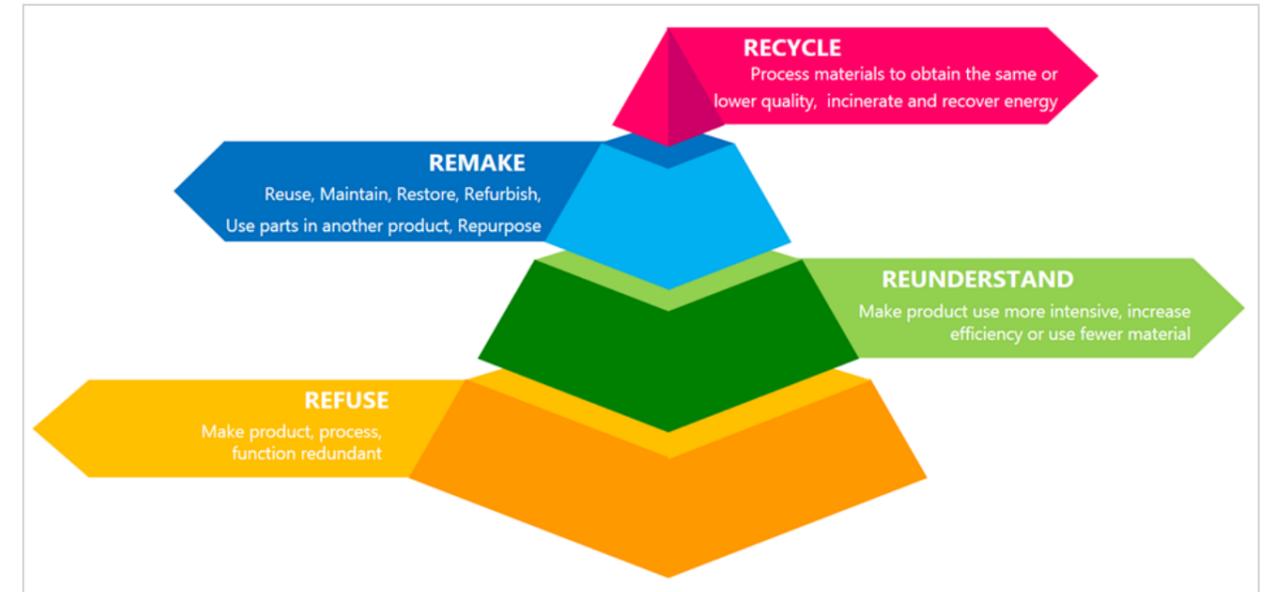
The term “circular economy”, which has been established in Germany more than 50 years ago, has only developed its true meaning and the essence of the idea in the new era in the course of the sustainability debate and is slowly taking on its true form.

This is because the circular economy is not primarily about recovering energy from disposed materials, but about strategies to leave these materials and, at an earlier stage, already products in economic use for as long as possible. The circular economy describes an approach that forms a closed material cycle and generates hardly any waste. These cycles can be of an ecological or a technical origin, whereby in the first consideration products are returned to the environment after consumption, while in the technical - it is a matter of returning the materials and parts for reuse. In both cases, the primary premise is to extend the life of the products as much as possible.



## 4-LAYER PYRAMID OF CE-APPROACH

The Circular Economy concept comprises some strategies, which can be divided into four rough areas:  
 1) **RECYCLING** - the most known to all of us and the one that has been on the agenda for those 50 years  
 2) **REMAKING** - different ways to reuse once manufactured products  
 3) **REUNDERSTANDING** - a very innovative approach to the whole topic of manufacturing and leading business  
 4) **REFUSING** - the basis of all considerations regarding the need for products, processes, or functions.



### RECYCLING APPROACHES

Traditional Recycling is a process that usually produces materials out of those that already exist with a lower value. It was done through mechanical recycling – an approach that neglects or is just unable to consider plastics – products that are usually the cause of pollution in the oceans and on beaches. Some companies, e.g. Covestro, have introduced a new recycling approach to tackling materials at their molecular level – chemical recycling. This allows us to address plastic products and solve the worldwide plastic pollution problem.

Another form of recycling focuses on energy recovery. This should be the last possible step in choosing the appropriate circular activity. This approach aiming at producing energy out of products and materials is very close to the linear economy, which ends up with products and materials destroyed and CO2 emissions produced.

### REMAKING APPROACHES

Remaking is about prolonging products life. This can be done in different ways. Through REUSING the product by other stakeholders, other industries or, in other countries, it is possible to extend the life of a machine or a plant. This approach is used by third-world countries due to the lack of possible investment power into new machines, which shows the sustainable issue of the problematic side of the medal. The reasons for not using the products by the origin owner might be also different: inefficiency because of energy costs, a lack of accuracy of a piece of equipment for certain production purposes, or even saturation of a certain fast-moving market.

In lots of situations, it is much easier for operators to throw away a defective product and buy a new one. Apart from possible economic savings, the ecological effect of such action should be taken into account. To prevent this, incentive systems should be

created that question this action, for example, by obliging customers to return products on the one hand and, on the other hand, clearly positioning themselves as manufacturers in favour of accepting the discarded parts, withdrawal of used parts, Dräger AG is doing. It is possible only if both parties manage to see the holistic view of the effort.

Recovering certain parts from a defective machine and using them in a new one is the basis of the idea of remanufacturing. This is not a matter of repairing the defective parts, but of using existing components as spare parts or components for a new production. A pioneer in this field of the circular economy is the company Caterpillar with its construction machines, which are marked “same as new” after completion from used parts and in this way credibly embody the idea of the circular economy.

The re-functioning of certain plant components requires certain creativity. Of course, an obsolete plant for

the production of a chemical agent cannot be reinterpreted as a plant for the production of pharmaceutical products, but under certain circumstances, pressure vessels can be re-used as storage tanks or oil tanks as rainwater cisterns, CFRP rotor blades of wind turbines can be converted into ergonomic and weather-resistant park benches.

## REUNDERSTANDING APPROACH

REUNDERSTANDING is a completely new and innovative approach to dealing with sustainability issues and requires a flexible mind and an open culture to changes in the economic and political worlds.

Reunderstanding means developing new innovative philosophies and ideas on how to use products more sustainably, allowing the required circulation of products and materials. Paying attention to the fact that long-lasting products create a positive impact on society and not loss of profit because of lowering the buying frequency of customers – should be that new approach while designing products and setting new targets for sales. Looking for new technologies and new materials that are more en-

vironmentally friendly is another step within innovation management that can contribute to the idea of CE.

“Rethinking” also refers to new business models such as the “sharing economy” or “product as a service”, where machinery and equipment are not offered for sale but rent. In such business relationships, the plant operators are “only” users in the sense of “pay per use”. These relationships enable more efficient operation, quick reparability, effective maintenance of the plants, and their successful recycling in the sense of the circular economy

Apart from refusing some materials, products, and functions, as well as innovative approaches to designing and leading companies, we have another – quite simple instrument – the minimising. By reducing the materials used as a result of an innovative design, and efficient organisation of certain processes in planning, production, logistics, or the management of goods or construction sites, the goal of the circular economy can also be achieved.

Especially in the era of the necessity of the reduction of energy consumption the choice of suitable suppliers along the entire supply chain, more

efficient technologies, optimal planning of logistical challenges, and the design of production halls where ventilation, heating, and lighting are provided by natural conditions and renewable energy sources are these topics unavoidable.

A range of digital tools can provide tremendous facilitation, for example, by using artificial intelligence to control certain operations and optimise procedures, using robots in the facilities to reduce the human error rate, and by using digital twins to facilitate planning and help identify potential complications before construction begins.

## REFUSING APPROACH

All those above-mentioned strategies on the way to a circular economy can be obsolete if there is no need for some products, processes, or functions in products and plants. Therefore, the first goal on the way to a circular economy is sufficiency.

This is an innovative step that leads to a radical rethinking in our “anything-is-possible society”. It is not just a matter of dispensing with certain amounts of energy for production,

propulsion, maintenance, or water for cooling systems, for example, but of trying to make certain machine and system components superfluous or to shift their functions to others. This would allow us not to have to produce certain components at all and thus save material, energy, and time resources. This is possible by keeping the functions of certain equipment and the existing infrastructure in mind already when designing products and plants. The uniform design of the complete plant, reduction of the number of possible variations, as well as the number of suppliers, modularisation of the equipment, standardisation of the requirements for quality and accuracy

of the equipment, and a holistic view of the existing structures and emerging new supply chains all contribute to keeping the complexity of possible solutions to a minimum and to reducing the complexity for the customer in operation, maintenance and testing.

The sufficiency approach refers to certain harmful materials that should be avoided, but also to some materials the extraction of which takes place in environmentally and inhumanly degrading situations. To address sufficiency in SCM different geographical, political, and technical specificities of freight transportation and packaging, must be taken into account.

Through the standardisation of products, connections, media, as well as procedures in the planning of plants, in the own production, but also in the operation at the customer’s site, other aspects of the sufficiency can be completed. Therefore, knowledge of the entire supply chain and existing structures in the investment business are crucial, and only through close cooperation with all stakeholders can the right decisions be made in the sense of the circular economy.

## CONCLUSION

From the linear economy, where waste was always formed at the end of the process, to the recycling economy, which shaped our thinking for almost 50 years, we have arrived at the true circular economy - where the goal is the “perpetual motion” of products and materials. The strategies listed above have a different impact on specific areas in the mechanical engineering industry. Especially REUNDERSTANDING and REFUSING provide innovative approaches that can provide a real impetus for the entire industry, and far further, considering the products from the planning of plants through to their commissioning up to the very end of the plant life cycle. The circular approach requires close cooperation from all players and expands the strategic goal of a machine or plant construction company from a pure product supplier to a multi-layered service provider. Successful implementation of the appropriate strategies requires holistic thinking and certain transparency towards all partners. This is also a prerequisite for the sustainable design of our economy.

**ALPHA**  
THINK QUALITY

**Attacks? Think Quality!**

ALPHA OT combines the expertise of ALPHA engineers in functional safety, plant engineering and operation with the skills of our OT/IT safety or critical infrastructure specialists.

→ ALPHA-OTSOLUTION.EU



### PROF. DR. JULIA KRAUSE SHORT BIOGRAPHY

Julia Krause holds the professorship for International Industrial Sourcing & Sales at the University of Applied Sciences in Dresden. Her teaching and research interests include issues of holistic sustainability in corporate processes and along the entire supply chain. These interests are based on her extensive experience in management consulting and international plant engineering. Julia Krause holds a bachelor’s degree in education, a diploma in philology, an MBA in economics with a focus on production management, and numerous other qualifications from various institutions and universities worldwide. She received her doctorate from the Technical University of Chemnitz at the Faculty of Public Law on regulatory issues in investment projects. Julia Krause is committed to the harmonization of standards and regulatory issues, as well as the timely addressing of technical compliance issues in international projects. She has also been involved in international projects of the Committee on Eastern European Economic Relations (as head of the working group “Quality Infrastructure”) or the Gesellschaft für Internationale Zusammenarbeit (GIZ) in Eastern Europe and Central Asia.

With her project “NACHTIGALL” - NACHhaltige Transformation Im GroßAnlagenbau Leiten” she promotes the “holistic” implementation of sustainability goals in different steps of global investment projects.

# CONFORMITY ASSESSMENT IN UZBEKISTAN:

## HOW DOES IT WORK?

It is well-known that all participants – be it a manufacturer, regulator, importer or a consumer regardless of their role and objective agree on that fact that certain safety framework should be in place in the market. Certainly, regulatory framework for product safety and quality assurance may differ from country to country, one trade block to other, yet all share common principle. In this setting, ensuring the needs of the market while balancing competitiveness, safety, quality, and sustainability is the foundation of a robust quality infrastructure system. Conformity assessment together with standardization, metrology, accreditation, and market surveillance activities constitute pillars of Quality Infrastructure.

Similarly, Uzbekistan – one of the biggest economies in Central Asia with GDP\$ 69.2 billion at growth rate of 7.4 % per annum, is experiencing a wave of economic reforms and building own quality infrastructure to meet customer needs and stakeholder interests. It is worth to mention that reforms and transformations so far gave promising results, and this can be demonstrated by Uzbekistan's beneficiary status under the EU's Generalized Scheme of Preferences (GSP+) arrangement, that trade turnover between the EU and Uzbekistan in 2021 has reached to \$ 3.9 billion, in which Germany, Lithuania and Italy are the biggest trading partners, exporting much of equipment and technology to Uzbekistan. In such context, understanding the current Uzbek regulations and demonstrating compliance to safety and quality requirements through testing and certification is an important factor to consider.

### LEGAL FRAMEWORK

Often, questions arise amongst manufacturers and distributors concerning recognition of certificates of conformity issued to products in Russian Federation, Kazakhstan, or manufacturer's declaration of conformity as per applicable EU Directives in the territory of Uzbekistan.

Uzbekistan has its own institutional, legal and regulatory framework for conformity assessment activities - certification, testing and inspection activities, in particular. Thus, answer to the above question lies in the laws and regulations governing conformity assessment and certification activities.

The Law of the Republic of Uzbekistan on Certification of Products and Services adopted in 1993, defines general provisions for certification of products, services, manufacturing processes, management systems and other associated procedures, and stipulates rights and obligations of those involved in the certification process. While the Law on Conformity Assessment (currently under review) adopted in 2013 with twenty-year gap from legislation on certification of products, reflects developments in the conformity assessment principles and practices and contains main terms and definitions to serve as a foundation. Key points and take aways from above two legislations are as follows:

- The conformity assessment framework covers both voluntary and regulated sphere where products, processes, systems and services must demonstrate compliance to specified technical requirements through the third-party assessor or declaration of conformity;

- Regulators such as the Ministry of Health, Ministry of Construction, State Nature Committee and other authorities together with Technical Regulations Agency of Uzbekistan relying on risk – based approach to identify products subject to mandatory certification;

- Only the competent bodies accredited in the National Accreditation System of Uzbekistan as per applicable international standards may engage in any type of conformity assessment activity (e.g. testing, certification, inspection etc.), including granting certificate of conformity to products;

- Conformity assessment policies and procedures are applicable to all market operators, regardless of their legal status, type of ownership and domicile, when placing a product to the Uzbek market.

### INSTITUTIONAL FRAMEWORK

Institutional reforms in par with the legislative provisions are critical to maximize the positive impact to sustainability, economic efficiency, trade, environmental and social concerns. Thus, fundamental changes in the eco – system have created distinct institutions – Standards Institute of Uzbekistan, National Metrology Institute (O'zMMI) and Uzbek Center for Accreditation (O'ZAKK), as well as private and public entities providing various types of conformity assessment services ranging from testing, calibration, certification to inspection.

The Cabinet of Ministers as a part of Executive branch of the government pursuant statutory acts may adopt

Decrees, which serve as implementing mechanism of legislative provisions in the National Quality Infrastructure taking into consideration of public interest, national security, health and environmental factors. The list of products subject to obligatory assurance of conformity in the territory of Uzbekistan, which is endorsed by the Cabinet Decree #43 of 30 Jan. 2021, serves as a prime example of Government's status in the quality infrastructure.

The Technical Regulations Agency of Uzbekistan (UzTRA) is the authority to oversee adherence to conformity assessment policies and procedures and has overall responsibility for developing and operating the National Quality Infrastructure. The UzTRA is a apex body regulating

and controlling compliance of products through market surveillance mechanism. Furthermore, the UzTRA is the legal owner of the Mark of Conformity of the National Certification System and retains database of issued certificates of conformity. The role of accrediting body in the conformity assessment process is particularly important, hence the accreditation is considered one of the pillars of the Quality Infrastructure and assumes greatest responsibility for ensuring trust in the market.

It is appropriate that Uzbek Center for Accreditation (O'ZAKK) – has been designated by the government as the sole accreditation body in Uzbekistan, operating in full compliance with ISO/IEC 17011 Conformity assessment —

Requirements for accreditation bodies accrediting conformity assessment bodies and other internationally adopted principles.

The accreditation services in Uzbekistan have been fundamentally transformed to serve stakeholders and market operators, ensure confidence in the market and demonstrate competence by providing access to the latest information about the status of accredited testing, calibration laboratories, certification and inspection bodies at O'ZAKK's website - [www.akkred.uz](http://www.akkred.uz). Currently, over 130 accredited testing laboratories and 68 product certification bodies are operating to offer conformity assessment services, such as in food, health care, engineering and construction sectors.

## PRACTICAL ASPECTS AND CONCLUDING REMARKS

What practical implications above described system may have to market operators, especially for manufacturers, distributors and end – users? Firstly, Uzbekistan's national quality infrastructure is undergoing structural and legislative transformations, with greatest focus on risk based approach to market regulation. Therefore, it's expected that more improvements will follow, facilitating better collaboration of private – public partnership in market regulation, increased transparency and reduce duplication of testing and certification procedures with possible recognition under the international conformity assessment systems.

Secondly, the role of regulators in the health care, construction, environment and energy sectors together with the UzTRA is prominent in identifying, classifying and determining regulated product/product groups. Hence the conformity assurance procedure now covers both voluntary and regulatory (obligatory) certification against the technical regulations or standards adopted in Uzbekistan. Thirdly, both private and public organizations may participate in the conformity assessment infrastructure and offer services. Interested parties and stakeholders may select competent conformity assessment bodies accredited by O'ZAKK with relevant accreditation scope for any conformity assessment services they require.



### SHAHNOZA YULDASHEVA SHORT BIOGRAPHY

*Mrs. Yuldasheva graduated from the Business School of the University of Edinburgh in 2006 with an MA degree. In addition, she studied part-time at the Technical - Economics Professional College in Bekabad (Uzbekistan). Having additional qualifications in ISO, quality infrastructure and accreditation, she is also an author of scientific articles.*

*From 2004 she worked at Uzstandard as International Relations Coordinator, from 2015 as Manager at Scientific Research Institute for Standardization, Metrology and Certification in Uzbekistan, then moved to TPE LCC in Tashkent (a technical service provider for equipment manufacturers) as CEO until 2019. Since 2019, Ms. Yuldasheva has held a senior position at Uzbek Center for Accreditation (O'ZAKK).*

# FUNCTIONAL SAFETY AND SAFETY CULTURE OF THE NUCLEAR POWER PLANT

The realities of economy and ecology, despite of tragedies of Chernobyl and Fukushima, forced the humanity to return to the priority development of ecologically pure electric power. Nuclear energy provides access to clean, reliable and affordable energy, mitigating the negative impacts of climate change. It is a significant part of the world energy mix and its use is expected to grow in the coming decades [1]. Together with the expanding renewable energy sources and fuel switching from coal to gas, higher nuclear power production contributed to the levelling of global CO<sub>2</sub> emissions at 33 Gt in 2019 [2]. Given that energy generation currently accounts for 66% of worldwide greenhouse gas emissions, nuclear energy is considered as important resource in managing atmospheric greenhouse gases and associated climate. Clearly, nuclear power as a dispatch able low carbon source of electricity can play a key role in the transition to a clean energy.

Thirty countries currently use nuclear power and 28 are considering, planning or actively working to include it in their energy mix. The advantages of nuclear power in terms of climate change mitigation, energy security, environmental and socio-economic policies are key reasons why many countries intend to introduce nuclear power or expand existing programs. The European Nuclear Society (ENS), representing academia, research institutes and industry, issued a statement regarding the significant contribution of nuclear energy to the achievement of European climate goals and the need to position nuclear energy as a sustainable economic activity in accordance with the methodology of the Technical Expert Group (TEG) of the European Commissions. This is stated in an open statement by the ENS addressed to European parliamentarians.

"We are ready to make efforts and also contribute to the achievement of the goal of reducing CO<sub>2</sub> emissions by at least 55%, approved recently, on December 11, 2020, at the EU summit. We are convinced that these short- and long-term goals of the EU can only be achieved through all low-carbon technologies, including nuclear power," the statement said.

The EU Technical Expert Group concluded that there is clear evidence that nuclear energy contributes significantly to climate conservation. According to the ENS, the criteria for Do-No-Significant-Harm (DNSH) ("Do No Harm") in the assessment carried out by TEG should be based solely on technical aspects for all energy technologies, and the assessment itself should be carried out by qualified experts, free from political and any other beliefs.

There are currently 437 nuclear power units in operation in 32 countries, which generate electricity with a total installed capacity of 350 GW (6% of all energy generated in the world). 42 power units are under construction, including those in countries that did not previously have nuclear power plants (Argentina, Brazil, India, Iran) [3,4].

Long-term observations have shown that during normal operation and compliance with the rules of functional safety of nuclear power plants, emissions of radioactive products into the atmosphere are much lower than the standards and are more than 5 times lower than in the areas of ash dumps of coal thermal power plants [5]. However, for nuclear power plants, as for any complex

technical system, there is always the possibility of failure, which can lead to an accident, that is, 100% reliability cannot be guaranteed.

The development of nuclear energy has taken place and is taking place in a fierce competition both with traditional technologies to produce electricity and with alternative (renewable) sources. The key issues of such competition in the 21st century are safety and economy (price for electricity produced).

The desire of each state for a sustainable, stable, and independent existence in the long term requires the identification and development of a stable basic source of electricity. Regarding large-scale nuclear energy, they are formulated by the IAEA as fundamental:

- unlimited reserves of fuel raw materials;
- safety of nuclear power plants, functional safety;
- invariability of the radiation background of the earth;
- ensuring the non-proliferation regime.

Nuclear safety (or simply safety) is the reach of reliable operational minds, accidents are protected, or weak-

ened by accidents, the reason why the protection of the personnel of the site, the population of the most important environment in the face of unacceptable radiation insecurity [6]. Functional safety in general is the part of the overall safety of a system or piece of equipment that depends on automatic protection operating correctly in response to its inputs or failure in a predictable manner (fail-safe). The automatic protection system should be designed to properly handle likely human errors, systematic errors, hardware failures and operational/environmental stress.

Functional safety of the nuclear is based on the BS-EN-61513 "Nuclear power plants. Instrumentation and control important to safety. General requirements for systems". Instrumentation and control (I&C) systems important to safety may be implemented using conventional hardwired equipment, computer-based (CB) equipment or by using a combination of both types of equipment. IEC 61513:2011 provides requirements and recommendations for the overall I&C architecture which may contain either or both technologies. The main technical changes with regard to the previous edition are as follows: - alignment with the latest revisions of IAEA documents;

- alignment with new editions of IEC 60880, IEC 61226, IEC 62138, IEC 62340 and IEC 60987; - alignment with significant advances of software engineering techniques; - integration of requirements for staff training.

The objectives of Functional Safety Management certification are: To define the technical activities required during the life-cycle phases of a safety-related product or process in order to achieve a defined safety integrity level and systematic capability.

When it comes to the safety of nuclear plants, a possible nuclear accident is reflected in the mind of a person, what may happen and the consequences of its impact on a person and the environment.

Safety in all cases of life in modern society is assessed by risk. The degree of risk to a person is the only universal measure of safety, universally recognized throughout the world. In modern society, whenever there is talk of safety, not only its qualitative value (low, high, incomplete, etc.) is indicated, but also its numerical value. Moreover, in any field of activity, according to modern legislation, all risks must be identified, their values estimated, the final (total) risk determined, and its value must be made public (declared). Declaration of safe-

ty and risk insurance have become the main principles -we have been regulating safety and preventing accidents in developed countries since the beginning of the 70s of the last century. Increasing security, by definition, occurs when reducing risk, that is, the concept of security is concrete and has certain numerical values. Risk is a quantitative measure of danger, which is determined by the function of two variables - the probability of an undesirable event and the amount of damage from it.

The following is stated in the general safety provisions of nuclear power plants: "Safety culture is a set of rules and features of the activities of organizations and individuals, which establishes that the safety problems of nuclear power plants, as having a higher priority, are given attention, determined by their significance." The first definition is given in the IAEA document INSAG-4: Safety culture is such a set of characteristics and peculiarities of the activities of organizations and the behaviour of individuals, which establishes that the safety problems of nuclear power plants, as having the highest priority, are given attention due to their importance. This gives the definition of safety culture as a complex qualitative concept. At the same time:

- It is recognized that the safety culture is formed both by organizations (by carrying out certain activities) and by individuals (also by certain actions).
- It is determined that NPP safety issues have the highest priority.
- NPP safety issues are given priority due to their importance

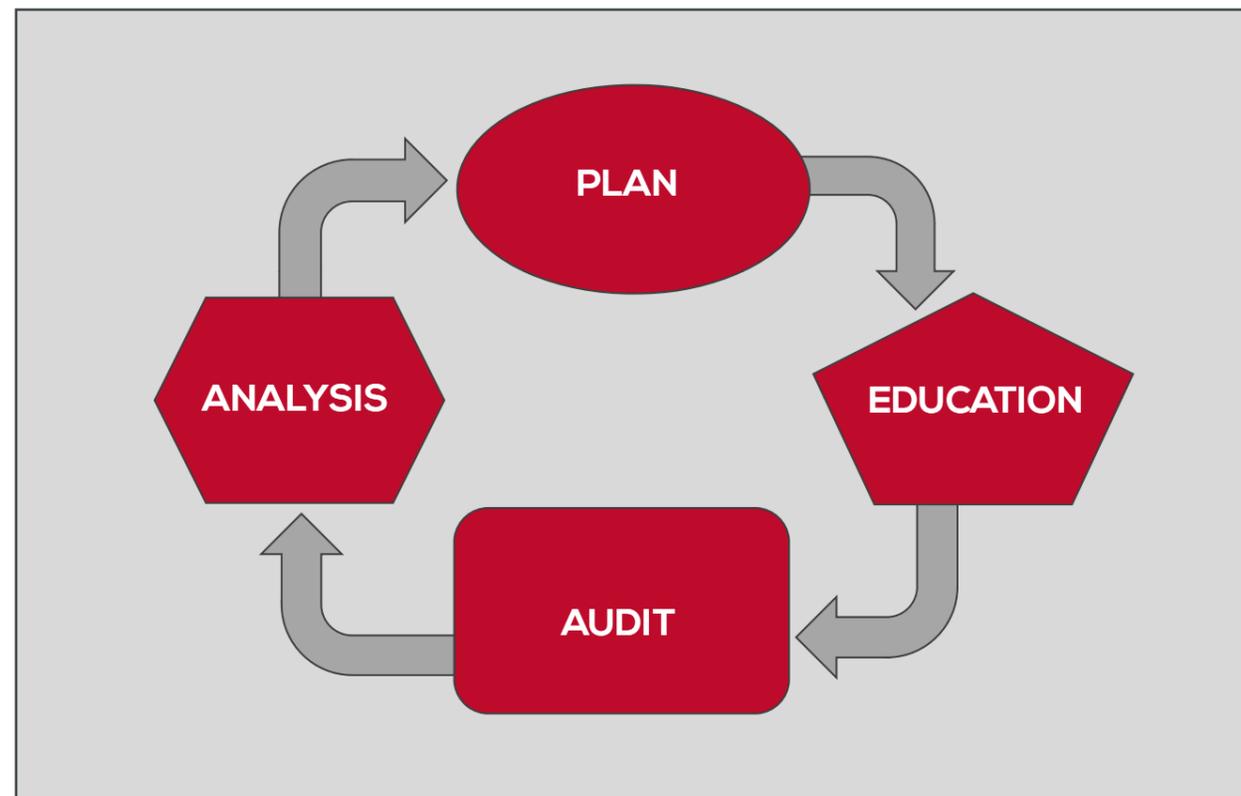
The concept of safety culture was introduced and recommended by the IAEA, the text from the introduction to the INSAG-4 document [7] is symbolic in this context: "All problems that arise at nuclear power plants, except for those that are sometimes said to be "God punished", in to some extent due to human error. However, the human mind is very effective at identifying and solving possible problems, which makes a very important positive impact on safety. For this reason, a heavy

burden of responsibility rests on humans. In addition to strictly following certain procedures, they must act in accordance with the concept of a "Safety Culture". Organizations operating nuclear plants and all other organizations responsible for safety must develop a Safety Culture in such a way as to prevent human error and benefit from the positive aspects of human activity."

Safety culture training at NPPs is part of the general modern process of ensuring safety, recommended by IAEA regulatory documents. The principles of safety culture are the basis of the modern concept of NPP safety. The training objectives are defined as an overview, generalizing course on nuclear power plant safety with an emphasis on safety issues. At the same time, practical issues of the operation of NPP equipment and systems, their interac-

tion in emergency situations and the role of the human operator in this case are studied. The procedure for analyzing violations at the NPP is being studied. Parameters, variables and indicators of safety culture are studied. Specially formed knowledge, education in the field of safety is the foundation of the safety culture of the future nuclear energy specialist. Safety audit issues are considered in an even greater approximation to practical activities, i.e. methods of assessing the state of safety based on observed operational indicators, organizational factors in safety management, causes of accidents, modern international principles of safety management, experience of countries with an even more developed nuclear industry, security psychology. A thorough understanding of the listed issues is responsible for the stable and functional safety of the NPP.

Fig.1. Scheme Principals of Safety Culture



Safety culture, as an effective fundamental principle of safety management in the industry, was born on the basis of the existing safety principles of all safety areas: occupational safety, fire safety, civil protection and nuclear safety. A strong safety culture is a vital factor in every area of safety. At the same time, if the safety culture of the industry is properly developed, then there will be excellent performance in all areas of safety.

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### IULIIA KUPRIANOVA SHORT BIOGRAPHY

Iuliia Kupriianova (Dipl.-Ing.) has been working as a Project Manager in Alpha Consulting GmbH since September 2018. From 2004 to 2018 she held the position as Junior research fellow of the National Scientific Centre "Kharkiv Institute of Physics and Technology", Institute of solid-state physics, materials science and technologies Kharkiv, Ukraine. Since 2017 she has been a Member of Ukrainian Nuclear Society. From 2017 to 2019 she held the position of the Head of Ukrainian Nuclear Society in Kharkiv. In 2016 awarded "Best scientific article of the young scientist" and in 2017 "Member of Ukrainian Nuclear Society" for a contribution to the work of the Ukrainian Nuclear Society. Mrs. Kupriianova was a participant of the international partner's projects for the study of the structural materials features for nuclear power plants: STCU (The Science & Technology Centre in Ukraine) - USA-EU, STCU-Canada and CRDF (The US Civilian Research @ Development Foundation).

In April and October 2017, she took part as an official speaker on Meetings Euratom-Ukraine in Kharkiv. Kupriianova I. is an author and co-author of more than 10 scientific articles and reports.

# VIETNAM

## EXPLOITING HIGH POTENTIAL FOR PLANT ENGINEERS IN MAINTAINING TECHNICAL COMPLIANCE

What do you spontaneously think of when you hear Vietnam? Of an exotic vacation destination, the menu of your favourite restaurant, or a friendly greengrocer on the corner?

Yes, all that is true, but there is much more. Vietnam is a country that has a similar past as Germany as a divided country. The division was overcome in 1975 and despite different development in North and South Vietnam, a nationwide economic growth began, which according to the German Society for International Cooperation (GIZ) is currently between 5.5 and 6.5%. Even in the pandemic period of 2020/21, growth was still 2.6%. This makes Vietnam one of the fastest growing economies in Asia. According to published statistics, per capita gross domestic product (GDP) will be USD 3,724.50 in 2021 and will increase to USD 4,121.50 in 2022. The forecast for 2027 is USD 6,682.42.

The reason for the irrepensible will to develop is the people in this incredibly beautiful and diverse country, shaped by an advanced civilization that is several thousand years old.

Vietnam has always been open to changes in social and economic terms. It was the only country in Southeast Asia to introduce Latin letters in the course of the work of Dominican missionaries, starting in 1527. From the middle of the 17th century, under French influence, the Vietnamese alphabet was transferred into Latin letters to make it easier for the Vietnamese to learn European languages and to communicate beyond the Asian region. Example: VIETNAM = VIỆT NAM

Even today, the Vietnamese mentality is characterized by the will to achieve, discipline, thoroughness,

punctuality, hunger for education, ambition, sense of responsibility, business acumen and creativity in every respect.

Thus, prospective students can already be trained in the German language in Vietnam in order to be able to apply directly to German colleges and universities with the B1 and B2 language proficiency examinations recognized in Germany or to register for the study semesters. Highly educated specialists have not only very good chances for their employment in Germany, but also when they return to their home country.

### THE „TIGER LEAP“ SINCE 1986

When one sees today that Vietnam developed from a developing country to an emerging market in 2011 and brought about a veritable economic miracle, one automatically asks oneself, how is that possible? After all, it was a socialist state with a communist one-party system.

True to the motto: “A good communist can also be a good capitalist,” many Vietnamese, even party members, see no conflict between private enterprise and a socialist market economy. They understand too well the principle that you first have to work for something in order to be able to distribute it afterwards.

Since 1986, the socialist state has been driving Vietnam’s development into an industrial nation with the economic reforms “*Đổi Mới*” (Economic Renewal) and realizing the transformation from a centrally administered economy to a socialist market economy. The model for this is southern Vietnam, with its tradi-

tionally successful economic development under French and American influences at the time.

The successes speak for themselves: while in 1996 53 % of the population still lived below the national poverty line, in 2016 the figure was just under 10 %. In 1993, only 14 % of all Vietnamese households had access to electricity. Today, 99 % do. Vietnam has one of the lowest unemployment rates in the world. It is part of everyone’s understanding in Vietnam that there is no “government hammock” for unemployment. First and foremost, everyone is responsible for themselves and their families.

Of course, in such a rapid economic process, the negative phenomena cannot be overlooked. The state and society are still fighting corruption, although significant successes have been achieved in recent years. Along with the economic successes, the gap between wealth and poverty is also widening. A major problem for general living conditions is still the enormous air pollution. Here the country ranks 114 out of 180 (!). These are enormous challenges for the country, but the society is facing up to them.

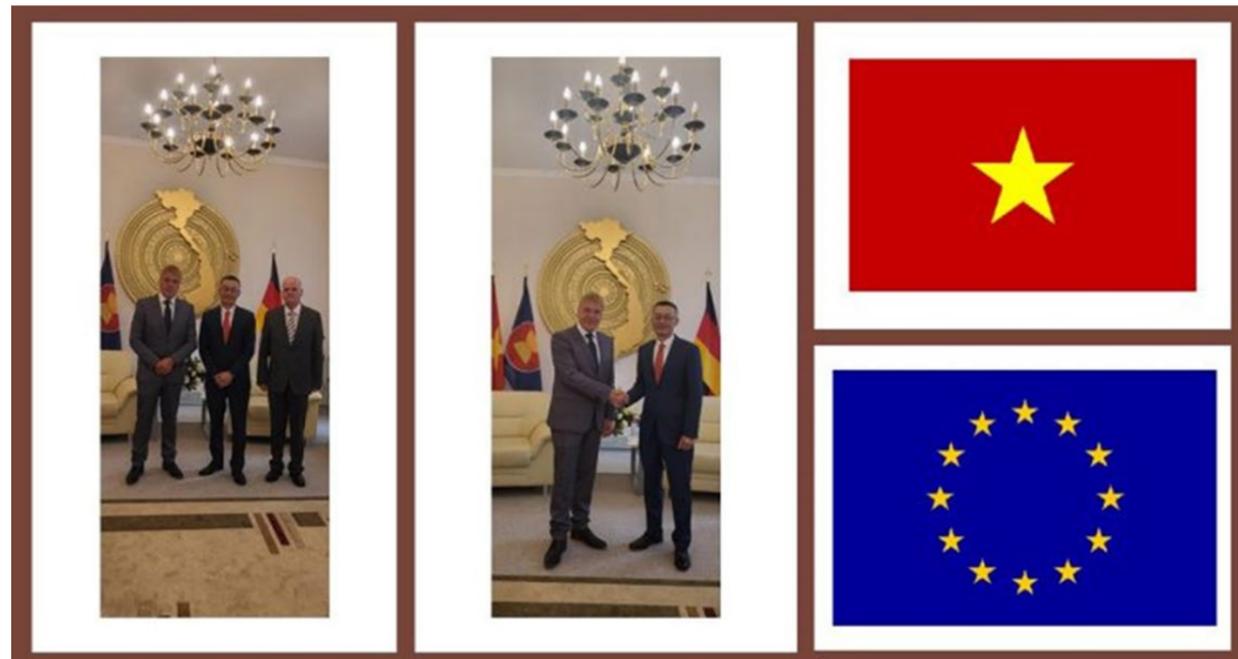
### WORTHWHILE INVESTMENTS FOR FOREIGN PLANT MANUFACTURERS

Vietnam has established itself as an attractive investment location and now plays a key role between the superpowers USA and China and the Asian countries Thailand, Malaysia, Singapore, Indonesia, Philippines, South Korea, Hong Kong and Taiwan.



Important in this regard were the conclusion of a number of free trade agreements with the aim of bringing import tariffs for machinery, equipment and facilities to 0%. China’s ongoing trade conflict with the USA is increasing their import tariffs, so Vietnam is benefiting from this when using their free trade agreements. Vietnam is making great efforts to use government incentives to attract foreign investors and their production facilities to the country and to support them in the long term. Favorable framework conditions play a major role in this:

- Low labor costs (400-500 USD for an engineer/manager is already a top salary in Vietnam);
- Labor laws correspond to the Western level;
- Extensive state investment subsidies;
- Provision of industrial parks;
- Reliability, pragmatism, stable framework conditions and clear guidelines from the Vietnamese authorities are appreciated by German investors;
- Convenient location for supplying the entire Asian region;
- Electronic customs declarations through reformed customs;
- Current import duty on machinery, plants and equipment 0-5 %.
- Foreign-owned enterprises produce 70% of all the country’s export goods for the world market
- Vietnam seeks further free trade agreements (such as 2019 with the EU)



German machinery and equipment benefit from an excellent reputation in Vietnam, as they stand for safety, quality and reliability. However, they are often too expensive for local companies. If, for example, German products (have to) be offered at even higher prices due to the current energy crisis, it is to be feared that Vietnamese customers will opt for the cheaper goods from Asian countries. In this case, large foreign companies based in Vietnam would be more likely to import these machines and equipment or bring them themselves straight away.

Since Vietnam is very much characterized by a medium-sized economy with new emerging companies, there are also promising cooperation and investment opportunities for German companies for a production location. Economically attractive fields of activity already exist in Vietnam, which large companies (e.g. SIEMENS, Intel, BASF, PEPPERL+FUCHS, Kärcher) but also a large number of smaller medium-sized companies have already been recognized and successfully established themselves locally.

## CONFORMITY ASSESSMENTS FOR MACHINERY AND EQUIPMENT

ALPHA has been active in the field of industrial - and plant safety in Vietnam since 2010. Projects so far have been mainly for the approval of compressor plants and equipment for the booming power generation industry. A highlight was the approval of key equipment for the Long Son petrochemical complex in Ba Ria-Vung Tau province. The design of industrial equipment must always comply with national standards, e.g. the Vietnam Industrial Standard, the Vietnam National Building Code (682/BXD/CSXD) or for gas equipment the Vietnam Gas High Pressure Gas Safety Management Law. ALPHA helps you make your built-in instruments and equipment compliant with the

rules, too. You have to know: Vietnam is not a member of IECEx, but partly IEC standards, ANSI, API, UL, NEMA are recognized. The same question is in dealing with ASME or Chinese TSG regarding the registration of pressure vessels and pressure bearing parts.

Low voltage equipment requires a CR Mark (QVCN Product Certification for Technical Regulation Vietnam). CE is not recognized there.

To address these and other important issues, ALPHA always conducts a thorough conformity assessment procedure. This must always be the first step, because a wide variety of international norms and standards are used in the supply chain, which require different recognition procedures. If one has a clear picture here, conformity to regulations and time and cost savings are achieved. In

addition, compliance with national technical regulations such as QVCN or TCVN is ensured. In a second step, we carry out the certification in the supply chain and the document management together with our network.

## HUNGRY FOR ENERGY

With increasing economic upswing, a very high energy demand arose. Electricity consumption is increasing by 10-12% annually. As in Europe, the construction of new coal-fired power plants in Vietnam is controversial because it is not environmentally friendly.

Therefore, renewable energies such as solar energy, on-shore wind energy, bioenergy and even the production of "green hydrogen" are increasingly coming into focus. It is interesting to note that Vietnam does not take the "prerogative" of wanting to go

through the same development stages as in old Europe for reasons of cost, but is very openly oriented towards the most modern standards.

In addition, the Southeast Asian countries committed to achieving a 23% share of renewable energy by 2025, according to the ASEAN Action Plan for Energy Cooperation.

In June 2022, the Vietnamese Ambassador in Germany, Mr. Vu Quang Minh, welcomed Managing Director of ALPHA Consulting GmbH, Dr.

Thomas Krause and the Sales Manager, Mr. Norbert Gies at the Vietnamese Embassy in Berlin.

The aim of this successful meeting was, among other things, the presentation of a concept for the qualification of Vietnamese business and industry associations as well as companies for sustainable energy production within the framework of a transnational Green Deal with appropriate consideration of the EU taxonomy.

With the implementation of internationally recognized sustainability goals, successful economic trade can continue to succeed in all of Vietnam's industrial sectors.

The country is well prepared to face the major economic and infrastructural challenges.

*LET'S BE THERE.  
BE BRAVE!*



## NORBERT GIES SHORT BIOGRAPHY

Norbert Gies joined ALPHA GmbH in March 2022 as Sales Manager for small and medium-sized manufacturers for the markets of the EAWU and Asia. After his military studies from 1982 to 1986 in Moscow and a university degree in economics and last assignment as a public officer in the German Armed Forces, he has been working in the operational area of the logistics companies DACHSER, BAHNTRANS/ABX and Kraftverkehr NAGEL since 1992. He gained specific experience as a project manager in the certification, delivery, assembly and commissioning of chemical, pharmaceutical and food plants from 2007 to 2022, among others, at the company Glatt Ingenieurtechnik GmbH in Weimar.



ALPHA  
THINK QUALITY



## Member States of the Gulf Cooperation Council and North Africa

We have won a project there and deliver our machines or even a whole plant! ▶ **Fantastic!**

We have to comply with the regional technical regulations and certify our equipment! ▶ **Absolutely!**

We are reaching our limits! ▶ **ALPHA will definitely help us! Sure!**

We contact ▶ [info@alpha-consulting.eu](mailto:info@alpha-consulting.eu)

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# RISK ASSESSMENT FOR IACS ACCORDING TO IEC 62443

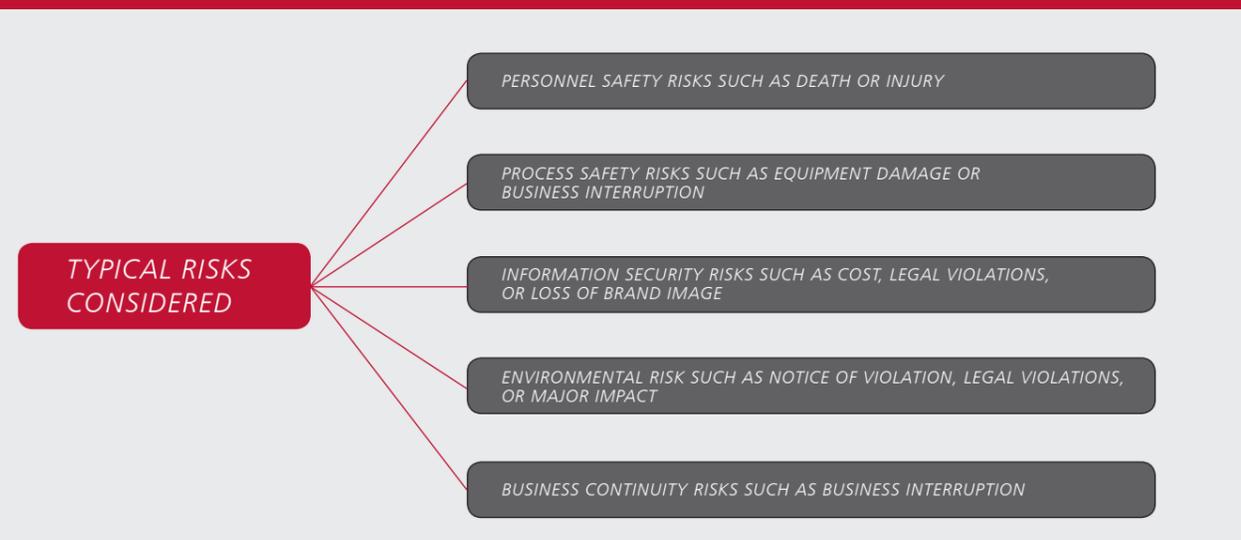
When we talk about Industrial Automation and Control Systems (IACS) security, one question comes to our mind: can't we just completely isolate the premises where IACS is used, to make it secure? Yes, we can, but it's just not reasonable. After all, the company would then become completely inflexible, which would make some technological processes totally unavailable. Each IACS presents different risks to an organization depending on the threats to which it is exposed, the likelihood of those threats occurring, the inherent vulnerabilities in the system, and the consequences if the system is compromised. Also, every company that owns and runs an IACS has a different level of risk tolerance. This is because risk management is a crucial step for a company to secure IACS on the one hand and to run technological processes efficiently on the other hand. And the key step in risk management is risk assessment, which is the main topic of this article.

One of the leading standards for securing IACS is the IEC 62443 a set of security standards for the secure development of IACS, which was developed by the ISA99 committee and adopted by the International Electrotechnical Commission (IEC). Based on this set of standards, I will try to explain how a risk assessment is carried out for facilities that employ IACS.

Information on risk assessment can be found in IEC 62443-3-2. For a start, we need to familiarize ourselves a little bit with the terminology. So, what is a risk, and what is a risk assessment? According to IEC 62443-1, "Risk is the expectation of loss expressed as the probability that a particular threat will exploit a particular vulnerability with a particular consequence." And "Risk assessment is a process that systematically identifies potential vulnerabilities to valuable system resources and threats to those resources, quantifies loss exposures and consequences based on probability of occurrence, and (optionally) recommends how to allocate resources to countermeasures to minimize total exposure." Well, after we have familiarized ourselves with the terms, let's move on to the risk assessment itself.

IEC 622443-3-2 breaks down the risk assessment into seven steps which comprise 7 ZCRs (Zone and conduit requirements):

- ZCR1 – Identification of the System under consideration (SUC).
- ZCR2 – Initial cyber security risk assessment.
- ZCR3 – Partition the SUC into zones and conduits.
- ZCR4 – Initial risk exceeds acceptable risk? (Decision)
- ZCR5 – If initial risk exceeds tolerable risk, then a detailed cybersecurity risk assessment shall be performed.
- ZCR6 – Documenting cybersecurity requirements, assumptions, and limitations.
- ZCR7 – Asset owner approval.



## ZCR1

At the very beginning of the risk assessment, it is necessary to understand what is included in the SUC (PLC, DCS, SCADA, IIOT, etc.). This may require Initial system architecture diagrams and inventories. It is necessary to review existing cybersecurity programs, to know the level of acceptable risks for the facility.

## ZCR2

For the initial risk assessment, it is necessary to consider the existing Process hazard analyses, other relevant risk assessments, and the corporate risk matrix.

## ZCR3

The organization groups the IACS and associated assets into zones or conduits based on risk. Grouping is based on the results of the initial cybersecurity risk assessment or other criteria, such as asset criticality, operational function, physical or logical location, required access, etc.

## ZCR4

At this stage, it is necessary to compare whether the initial risk is at an acceptable level for the enterprise or whether it needs to be mitigated. If the risk is within the normal range, you can go straight to ZCR6.

## ZCR5

Here a detailed risk assessment is performed. After completion, residual risks are documented and SL-Ts (target security level) for each zone and conduits are determined.

## ZCR7

This is the last step, when all the above work, after documentation, is submitted to the Asset Owner for approval.

Different methodologies (such as ISO 31000, NIST SP 800-39, and ISO/IEC 27005) can be chosen to conduct a risk assessment. It is important to pick one source of initial risk assessment methodology and detailed risk assessment methodology, to produce logically consistent and coherent results. Since new risks and vulnerabilities might occur, the risk assessment should be conducted on a regular basis.

The bottom line is that the risk assessment can be difficult to conduct, however, once you have done it, it will give you a lot of information about the weaknesses of your organization and help you to build an efficient risk management system.

# KOREA

## CONFORMITY ASSESSMENT AND CERTIFICATION FOR YOUR MACHINERY AND EQUIPMENT

Many of our customers in the field of mechanical and plant engineering face various hurdles in projects in Korea, which slow down more and more projects in the schedule or cause high additional costs. Of course, the decision makers in the companies know the situation and try to adjust in advance for projects in target countries, but nevertheless Korea is a special case for various reasons: KOSHA, KGS, KEA, test approval or not..... a jungle of different regulations, which are however understandable and logically structured with a systematic approach. The fact is, the protection of humans, animals and the environment is also a top priority in Korea and is treated with severe penalties in the event of violations. According to Article 67-2 of the Occupational Health and Safety Act, a violation of the Safety Certification can be punished with up to 3 years in prison or a fine of up to 20 million won.

Prior to 2009, there were 13 different certifications, some with overlapping content, with more than 100 different test marks. With the Korean Electrical Appliance & Consumer Goods safety Management Act

2009, the Ministry of Trade, Industry & Energy (MOTIE) unified the certification market into the KC system, which also describes KCs (KOSHA).

In this KC system, different areas are divided, such as electronics, electromagnetic compatibility, low voltage, safety of components and equipment (KOSHA), energy efficiency (KEMCO, KEA), MFDS (Food & Drugs). In addition, there are certification and testing bodies for equipment under special observation, such as KGS with the approval of gas equipment. The assignment system is not uniform. Approval bodies define their inspection catalog by technical parameters, by product categories or by customs tariff numbers. For example, some products must pass several approvals and tests, while other certificates are recognized in Korea through recognition agreements with national approval bodies (for example, with the German PTB).

Roughly speaking, the procedure is always similar: application (often by a legal entity in the territory of Korea), examination and / or recognition of product testing, factory inspection (sometimes even a design

approval), registration and marking. Certification will be performed either at the "Korea Testing and Research Institute" (KTR), the "Korea Testing Laboratory" (KTL) or "Korea Testing Certification" (KTC). The Korean authorities "National Radio Research Agency" (RRA) and the "Korean Communications Commission" (KCC) are responsible for all EMC-related certifications. The industrial safety certifications KCs and KOSHA are carried out either by the "Korea Occupational Safety and Health Agency" (KOSHA), the "Korea Gas Safety Corporation" (KGS), or again at the "Korea Testing Laboratory" (KTL).

### KOSHA - CERTIFICATION

When talking about certification in Korea, KOSHA (Korea Occupational Safety and Health Agency) is on everyone's lips. Nevertheless, you need competent partners like ALPHA who bring their expertise to your project to save time and costs.

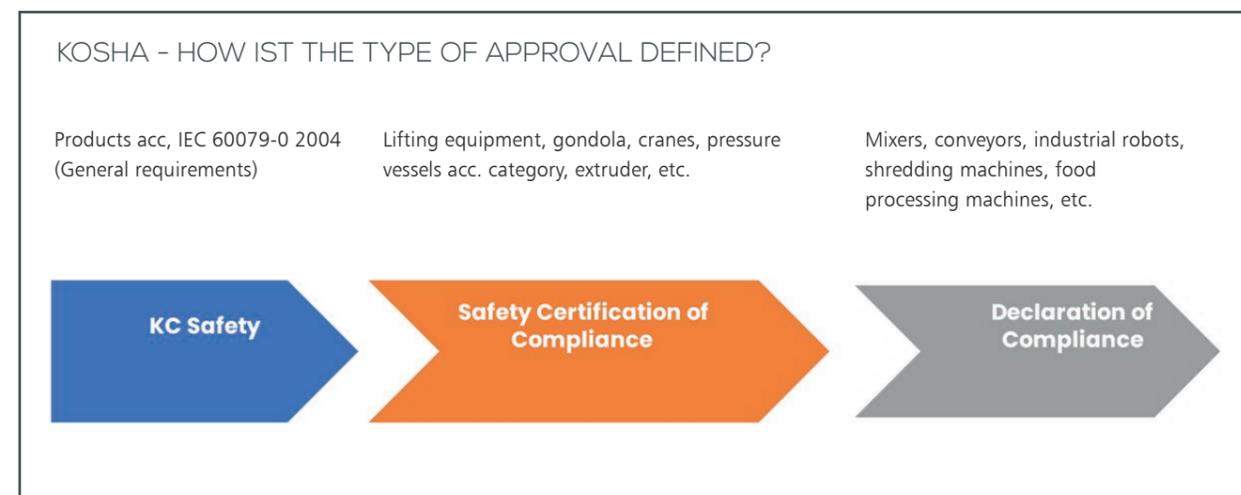
The product groups are divided into 3 different approval procedures here, as the overview shows:



**Roughly speaking, here can be assumed with the following documents:** Application, document audit, possible factory inspection and / or product testing in accredited laboratories, positive decision and registration, KC marking and regular follow-up audits.

However, the following important points must be observed by the manufacturer:

- 1** Import certification:  
A one-time import of up to 10 pieces can be requested by the importer with minimal documentation. The realization depends on the later operator of the machine or plant.
- 2** Recognition of examinations:  
KC standards are developed by KATS (Korean Agency for Technology and Standards). This is a subdivision of MOTIE (Ministry of Trade, Industry and Energy). Many Korean standards are harmonized with international standards or international standards have been adopted because KATS is a member of ISO or IEC. However, this does not mean that all tests of a manufacturer are necessarily recognized in Korea. Analyzing the differences ahead and adapting your project management is very important.
- 3** Formal registration costs are very high, despite partial recognition of tests (IECEX):  
There are products whose regulation has not been completed in Korea, for example with regard to hydrogen production and storage, but this is still being clarified internationally. Here, the factory audit is given priority and tests are not carried out in Korea.



## KGS (KOREAN GAS SAFETY COOPERATION)

ALPHA utilizes its knowledge and experience in boiler and pressure vessel codes to provide inspection and engineering services for most major boiler and pressure vessel codes. Korea generally accepts ASME code equipment Ex. ASME Sec. VIII, Div.1. However, they require a manufacturer's approval (license) issued by the Ministry of Trade, Industry and Energy (MOTIE). There are different regulatory authorities depending on the application of the equipment, so the manufacturer may even need to contact the end user in Korea to find out the name of the relevant regulatory authority and any additional requirements to the ASME code used. KGS registration is intended to ensure that certain standards and regulations are adhered to. For this purpose, the design production processes and the quality assurance in the manufacturing process, but also questions of the product life cycle are checked and documented in a manufacturer audit lasting several days.

The classification of the gas equipment is made as follows:

### KGS Factory Approval - Product Categories

High-Pressure Gas Cylinders etc. (subject to the High-Pressure Gas Safety Act)	Gas appliances (subject to the Safety Control and Business of Liquefied Petroleum Gas Act)
<ol style="list-style-type: none"> <li>1. Cylinders (excluded if internal volume is less than 300ml)</li> <li>2. Cylinder Accessories (valves and safety valves)</li> <li>3. Storage Tanks</li> <li>4. Pressure Vessels (Heat Exchanger or Drum, Tower, Reactors &amp; others) (applies to pressure vessels whose value of multiplying design pressure (MPa) and volume (m<sup>3</sup>) exceeds 0.004 as the pressure or if the design pressure is 0.2 MPa or more for liquid gas at 35 °C and 1MPa or more for compressed gas at 35 °C)</li> <li>5. High-Pressure Gas Tanks Fixed on Vehicles</li> <li>6. Emergency cut-off devices for high-pressure gases</li> <li>7. Safety valves for high-pressure gases</li> <li>8. Valves for toxic gas pipes</li> <li>9. Specified equipment for refrigeration: Compressors, Condensers, evaporators and pressure vessels</li> </ol>	<ol style="list-style-type: none"> <li>1. Pressure Regulators</li> <li>2. Automatic Shut-off Device for Gas Leakage</li> <li>3. Filters for Governor Stations</li> <li>4. Governors for Underground Use</li> <li>5. Hoses for Gases</li> <li>6. Valves for Pipes</li> <li>7. Gas Cocks</li> <li>8. Joints for Pipes</li> <li>9. Forced Mixing Type Gas Burners</li> <li>10. Gas Burning Appliances</li> <li>11. Multifunctional Gas Meters</li> <li>12. Loading Arms</li> <li>13. Gas Fuel Cells</li> <li>14. Multifunctional boilers</li> </ol>

The peculiarity of KGS approval is that the manufacturer must not only have his production facility inspected, but also a quality manual (KGS standards) must be written, as well as the design documentation, his testing instruments and equipment, technical drawings are submitted. In addition, the list of suppliers must also be certified.

The following important points must be observed by the manufacturer:

- Carefully select the list of suppliers. Change after registration is not possible.
- Often KGS decides on an additional test for suppliers of certain critical components. Plan for buffer time and costs.
- KGS may discover defects during the inspection. These can only be remedied with a new document audit (minor defects) or a repeat audit at the manufacturer (major defects).
- For certain pressure vessels, additional KC (KOSHA) certification may still be required for KGS registration.
- If changes are made to the equipment or new standard categories are used in design to final inspection, the manufacturer's audit must be repeated.

## CONCLUSION

Even though many norms and standards have been harmonized or adopted, technical compliance in Korea is not easy to achieve. Manufacturers of machinery and equipment should seek professional support, which, as in ALPHA's concept, not only considers certification in isolation as a building block, but also considers conformity assessment as a puzzle piece of the overall process to achieve the highest possible safety of machinery and equipment while minimizing time and costs.

## DMITRIJ PONOMAREW

# MUSIC IS NOT ONLY PASSION, BUT ALSO AS A LIFESTYLE

My family is very musical. My mother completed her music studies in Tajikistan and was able to work as a piano teacher in Germany. At the age of 7 I was allowed to attend classical concerts, which fascinated me and awakened in me the motivation to do something musical.

I started with a classical vocal training at the age of 7, the following year I became interested in playing the guitar. I ended up sticking with the guitar because the more I practiced the instrument, the more excited I became about the guitar's versatility. The sound of the guitar also felt warm and heartfelt. At the age of 12 I came home from school every day and played the guitar for 5 hours.

I rehearsed classical compositions well beyond my ability until I got them down. I remember as if it was yesterday when I was allowed to perform a composition in the school hall on the occasion of a celebration. It felt great and made me feel as a celebrity.

Basically, I can recommend anyone to play the guitar. Due to the versatility of the guitar, you can get excellent tones out of it even with little experience. Today I'm glad I have practiced the guitar, so I can play and sing something for any occasion. Be it a birthday, a company's event or a cozy get-together around the campfire. You can relax and enjoy the moment.

After graduating from high school and few detours, I went on to study economics. During my studies, I responded to an advertisement and thus came into contact with Alpha. I have now been working at ALPHA for almost 3 years and at the same time taking a dual course of study at the FOM University of Applied Sciences in Leipzig.

I was warmly welcomed and was able to become a full member of Alpha team very quickly. After I had mastered the necessary work steps, I quickly started working on projects. At ALPHA I am responsible for ensuring a secure and customer-oriented certification process. My expertise focuses on the certification process of systems working in potentially explosive atmospheres, their technical conformity and consulting services for the preparation of compliance documentation.

At ALPHA, I have also been given the opportunity to continue my education in the form of a dual study program, for which I am very grateful. For me, ALPHA is not only an employer, but also an international family whose members support each other.



## DMITRIJ PONOMAREW

After studying at the Technical University of Chemnitz, Mr. Dmitrij Ponomarew continues his studies as Bachelor of Science at the FOM University of Applied Sciences in Leipzig. While studying, he has been working at ALPHA since 2020 as a project manager for certification projects, especially in the fields of low voltage and electromagnetic compatibility.



## INTERVIEW WITH

GALINA  
SHAVALIEVA

After studying chemical engineering at the Siberian Technological Institute and getting a degree in engineering, Mrs. Shavaleeva worked in various companies in Russia in the field of process engineering. After moving to Germany in 1998, she worked mainly in the areas of quality control and logistics. She has been employed by ALPHA as a certification engineer since 2009. She is a DGQ quality supervisor, internal auditor and has qualifications in the field of commissioning of process plants and ASME pressure vessel approvals.

Hello Ms. Shavaleeva, we have known each other professionally for a long time and you were one of the first employees of ALPHA. You have worked in many ALPHA projects. Others may not know you yet. Can you please briefly introduce yourself, where are you from and what are your professional qualifications?

My name is Galina Shavaleeva. I came from Russia. I studied chemical engineering in Russia and gained my first work experience there. It was a factory for plastics with about 4,000 employees. The products were intended for the shoe industry. My tasks, among others, included the final inspection of the product. I used to check, whether the product complies with the norms and standards, whether it has the properties it should have. After moving to Germany, it was necessary to acknowledge my diploma in chemical engineering in order to have more professional opportunities in the future.

That sounds exciting and, above all, like a goal-oriented life. I remember when you introduced yourself to us as an employee, back then still at the Chemnitz Technology Center. How did you hear about us back then and what were your expectations when you came for the interview?

It was a long time ago, in 2009, but I do remember our conversation very

well. I can't say it was series of random coincidences, but I was convinced that with my qualifications I would have a good chance to get the job.

After three years of work in an export company, I was practically out on the street due to the economic crisis, and I sought help from the employment agency. Later on, a vocational training was suggested to me. It was remarkable that it was not only "dry" lessons, i.e. theory, but it also included a three-months practical training. I looked for companies for my internship, which cooperate with Russia or former Soviet republics. That's how I discovered the company ALPHA GmbH in the Technology Center Chemnitz. Their work profile of finding solutions for companies in the field of technical conformity and certification fascinated me and I wanted to be a member of their international team.

And what happened next? They invited me for an interview and since then I've been here, at ALPHA GmbH. Today I am responsible for certification projects in the Eurasian Economic Union and Central Asia.

Are you excited or disappointed after the years of collaboration?

In any case, I was never not disappointed by the work. It was and is always exciting. First of all, there were rules for the conformity of equipment,

for example GOST. Then GOSTs were replaced, in part by technical regulations. It was not only necessary to understand everything for yourself, but also to explain it properly to the manufacturers how the conformity assessment of the equipment is carried out. This was "terra incognita", it was a huge task, but associated with gratitude from our customers. I am always particularly happy about that.

Over the years, you have managed many certification projects in the EAWU. What are the most exciting moments for you in the projects?

Actually, all customers are exciting for me. The best moments for me in the projects are meeting with new people and transferring my knowledge into implementation of the projects. In any new project, you have to gain trust from the customers. When the equipment is certified for the first time, sometimes the representatives of the manufacturer do not know what to expect along the certification process. They are experts in their field, but without the appropriate approvals / permits, the equipment will not be put into operation. It also happens sometimes that manufacturers underestimate the certification importance. Then it is also my job to guide our customers into the right direction. Because of our work experience, we

know that not all manufacturers have direct delivery contracts with the customer, but we can ultimately track where and to which plants the equipment is going to be delivered. The feeling of contributing to "transformation through trade" motivates me especially.

What is it actually like with inspections and acceptance tests? Perhaps a silly question: Are you accepted as a woman in the "male domain of the process industry"?

Again, it is always interesting. Although everything is prepared in advance, nevertheless, we all (inspectors, manufacturer's employees and sometimes we) are excited. All documents must be prepared in perfect order, designations / names of the equipment in all documents should match. The documents themselves must meet the requirements of TR CU. The best moment during the acceptance is the completion of the hydraulic test and everyone congratulates each other on its success. This means that the work carried out in the various phases of the manufacturing process has been performed correctly. This applies both to the procurement of materials and skilled workers, for example, welders. And yes, as a woman, I am accepted in the "male domain of the process industry". In the end, experience and knowledge play the biggest role.

At ALPHA, our motto "Think Quality" is all about service. What is it like with inspections? How are they prepared and followed up by you?

The preparation of the inspection stands on two "pillars": firstly, the organizational part (arrangements of test date, hotel reservations, tickets, visas, etc.) and secondly, the preparation of audit documentation on site. During the inspection, one must be prepared for questions from both the inspector and the manufacturer. The manufacturer is often interested in background information on the individual standards. I enjoy sharing my experience here with our customers. Follow-up also consists of various elements. These include processing of the documents on time, meeting deadlines, submitting the documents to the authorities and the certification bodies. But at the same time, we are in constant contact with the manufacturer, explaining why and what is being done at a particular moment.

Interesting, in which countries have you already carried out inspections? That would be exciting to know!

Germany, Poland, Romania, Italy, Austria, Spain, Switzerland and Belarus.

Finally, a personal question. After so many years in Chemnitz, what connects you with our city?

Since 1998 I am in Saxony and since 2007 in Chemnitz. I am a Saxon, I am a Chemnitzer. During my business trips I tell with the pride about Saxony and Chemnitz. This is where my children graduated from high school and studied. Here are my friends. Here is the company ALPHA GmbH, which brings the solutions with the slogan "Think Quality" and there I am!

Many thanks for the insight into your work and how you implemented our motto in the process. It is clear that a lot has happened since 2009, but the basic ideas of technical compliance according to the rules have rather changed into a complex service since then. This is also shown by your professional life at ALPHA and your customer loyalty, which you have repeatedly expressed in our conversation today.

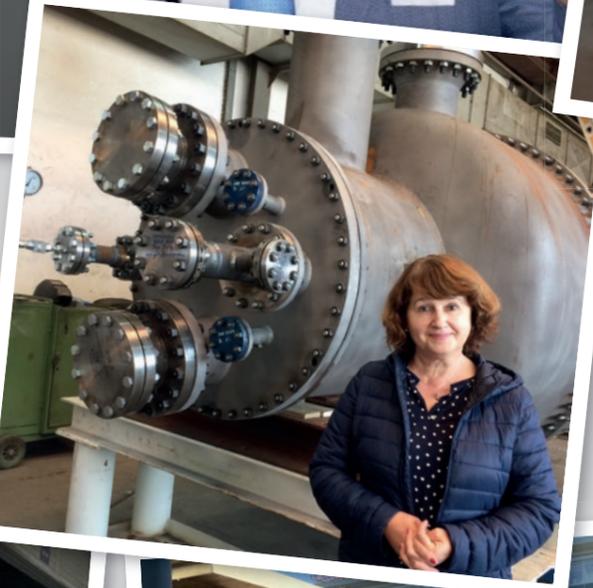
Dr. Thomas Krause &  
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