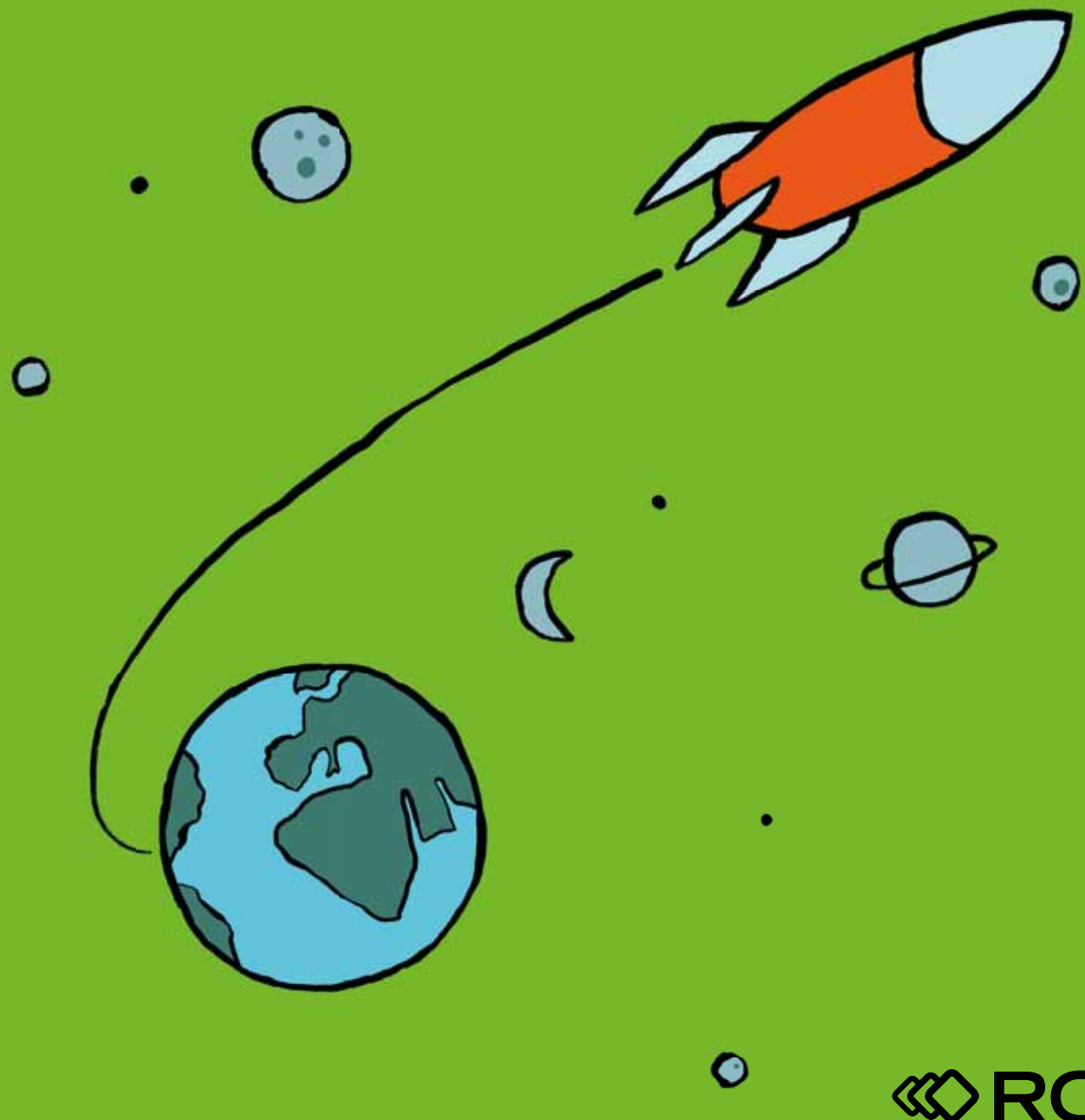
Issue 42

ROI DIALOG

OPEX IS KEY

How Operational Excellence Determines Success



ROI
MANAGEMENT CONSULTANTS

ROI DIALOG OVERVIEW – ISSUE 42

The complete DIALOG issue 42 is available in German at www.roi.de

SURVIVAL FACTOR: PERFECTION

Operational Excellence as an Engine of Increasing Value

By Hans-Georg Scheibe, Member of the Management Board, ROI Management Consulting AG

A profitable, efficiently organized company is similar to an expensive watch: no matter how accurate it is, there is always room for improvement in the mechanism's design. Companies also need to be constantly looking for new approaches that enable them to perfect their internal operations, i.e. their organizational and process structures, further. This is the only way they can survive in the age of a fast-moving, highly dynamic globalization.

One such approach is the use of 'Operational Excellence', or 'OPEX' for short. OPEX aims to achieve the ongoing improvement of operational structures and processes within the company. And not just in sub-areas, but across the entire value chain. The focus for this lies on efficiency (performing tasks / processes correctly) and effectiveness (performing the right tasks / processes). OPEX, however, is about far more than short-term profit gains or increased staff productivity. It's about the understanding of being part of a value circuit and about each individual constantly contributing towards its evolution, be it through process stability, ideas for improvement or inherent fault management. The focus also lies on the motivation to acquire and share knowledge and evolve towards new 'excellence' through all of the mistakes and successes. In ideal cases, autonomous value streams develop. And

> OPEX aims to achieve the ongoing improvement of operational structures and processes within the company along the entire value chain.

no matter where in the value chain disruptions or potential improvements occur, the staff responsible resolve or harness these directly without any intervention on the part of managers. Sounds too good to be true? In fact, there are a number of reasons why most companies might wish for operational excellence but only a few actually achieve it in practice.

OPEX as an Extension of Lean

In view of the similarities between OPEX and Lean Management approaches, the terms are often used interchangeably. In reality, however, they differ. This difference ranges from the philosophy behind the approaches to, more importantly, the way they are implemented in practice. 'Lean', or the demand for 'streamlined processes' was once the watchword for boosting efficiency in production. Today, companies sometimes associate with this project concepts that operate on the basis of the "lawnmower method" (for example which are focused only on reducing costs) and which do not take into account individual industry requirements. Often, the frantic 1:1 adoption of Lean concepts from production into unsuitable areas of activity leads to meagre results. This is not so much the fault of the Lean principles, however, but rather their flawed implementation. In actual fact, Lean principles often provide a good starting point for achieving substantial improvements with OPEX.

This is because OPEX is a useful add-on for Lean. And not just because the term can be transported in a more neutral, less philosophically burdened way, and therefore applied more easily to very different areas of implementation. The key advantage is the larger methods kit. It contains solutions for companies of all industries who are experiencing growing cost pressure, overstrained resources or shortfalls in knowledge transfer – be they production companies, financial service providers or public institutions.

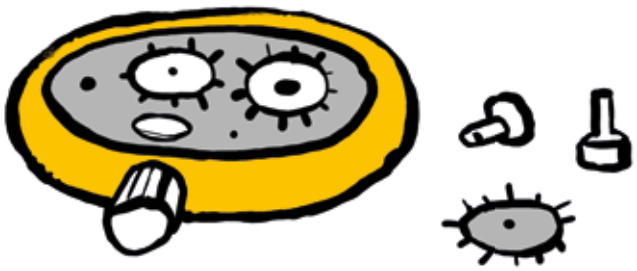
The cross-industry bonus of OPEX, however, lies in the fact that it does not involve improving efficiency through merciless cost-cutting. Costs do need to be cut to a sensible level in line with the market and maintained there long-term. They are however only one of many other approaches in a company without there being end points to these in the sense of 'project completion'. Of course, the results of OPEX measures are also measured against hard performance indicators such as returns on sales or customer complaints. The key difference to approaches such as Lean, however, lies in OPEX's aim of permanently improving the entire value chain. This ultimately also leads to a contemporary extension in terms of prospects: on highly volatile markets and during unpredictable events that cause business systems to drift in new directions on a weekly or even daily basis, five-year strategies simply no longer work.

> OPEX is a useful add-on for Lean – for companies in all industries.

Four Approaches for Operational Excellence

When it comes to implementing OPEX successfully, it helps to understand that OPEX cannot be prescribed. As with all far-reaching changes, it is easy to agree to the principle of constant improvement and error avoidance, but more difficult to actually implement it. OPEX takes some getting used to, which is why, when implementing an OPEX approach, there are four key success factors that need to be focused on:

- Management commitment at all hierarchical levels
- Integration of employees
- Results-orientated dialogue between experts
- Tailored tools



Hans-Georg Scheibe, Member of the Management Board, ROI Management Consulting AG

Management Commitment at All Hierarchical Levels

Senior managers should demonstrate through their communications and their actions that they are 100 per cent behind OPEX. They also monitor whether all managers are following the course in a top-down manner and are not afraid of confrontation if this is not the case. Ultimately for OPEX implementation, it is also important to realise that no time can be wasted when it comes to seizing opportunities for improvement and eliminating errors. All managers should therefore set out clear goals, check regularly that these goals have also been understood and communicate successes as well as failures in a clear and direct manner.

> When it comes to implementing OPEX successfully, it helps to understand that OPEX cannot be prescribed.

Integration of Employees

Employees' willingness to learn and change in relation to OPEX should be encouraged right from day one. This is because almost every employee can indicate offhand deficiencies or potential improvements. Unfortunately, popular patterns of experience show that precisely this is unwelcome or it 'fizzles out' without any noticeable consequences. Managers should therefore always keep an eye on the close relationship between cultural and structural aspects and strive to achieve a dialogue between departments and across the company as a whole. How can product quality be increased over the long term while at the same time reducing quality costs? Why does a particular department, an international office, a competitor or a supplier do it better?

Results-orientated Dialogue Between Experts

In methodological terms, best practice programs prove their worth time and time again, with individual employees acting as experts to encourage the exchange of information beyond company and national borders. Experts may also be external consultants with specialist know-how that is only required for a limited time in a particular project stage. And last but not least, customers are perhaps the most important experts who, through their complaints or the 'pull principle', should exert a direct influence on process improvements. Strictly speaking, therefore, every employee and customer is an expert in their respective role – and in the hectic world of everyday operations, it is therefore crucial to productively bring the flow of information of all of these types of expertise into circulation.

Tailored Tools

The chosen measures are given the 'correct finish' with matching tools, especially for structuring and visualising the exchange of information. One very simple and useful structuring tool is the daily, five- to ten-minute discussion of performance. This discussion should establish a common understanding of goals, draw up detailed road maps but also create space for ideas and suggested improvements. Ideal for visualising OPEX-relevant information in production areas, for example, are display boards bearing performance parameters that focus on chronological indicators and the value flow.

Using All Aspects of OPEX

Anyone analysing individual stages of production, process workflows in their supply chain or creation phases in development down to the tiniest efficiency parameter already has a streets-ahead advantage over competitors that still more or less leave these processes to chance. Anyone who recognizes the relationship between these elements and harnesses this for constant improvements is already practicing operational excellence.

> OPEX professionals change sectors that lie below the perception radar.

However OPEX professionals achieve even more: they change sectors that lie below the perception radar. The interface management, for example, between individual functional links in the value chain. This relates to energy and resources management, for example. Some companies are already investing a lot of time and money directly into avoiding 'silent' waste in sub-sectors. The real rewards only come, however, with a look at the overall picture: Are there workflows that are efficient if viewed seperately, but which, if recombined and by avoiding interfaces, could be even better as a result? Are materials being disposed of as waste that could be recycled in other areas? The key to perfection lies squarely in these types of questions.

PRODUCTION WITH A PERMANENT BOOST

Efficient Workflows in Production and Logistics at MTU Aero Engines

Frequent flyers, occasional travellers and flying phobics all have at least one thing in common: they all most likely associate the words "ready for take-off" with the very distinctive feeling of anticipation as aircraft engines unleash their incredible acceleration power. And quite rightly so, since the engine on a typical Airbus holiday plane generates a thrust of up to 147 kN during take-off, burning just a few liters of kerosene per second, whereas a car with a 120 HP engine generates 1.6 kN of thrust and uses a lot more gas. Both manufacturers of car and aircraft engines are most interested in boosting the performance of new models and at the same time reducing consumption, harmful emissions, noise levels and production costs. With a technically highly complex product such as an aircraft engine, this is achieved not just through innovations in research and development, but in particular through efficient processes in logistics and production.

And it was precisely this issue that challenged the Munich-based aircraft engine manufacturer MTU Aero Engines. At the start of 2012, following negotiations with its partner company Pratt & Whitney (PWA), the 'program share' was increased. This increase also included the assembly of 30 per cent of the PW1100G engines that would in future provide the lift-off power for the Airbus A320neo.

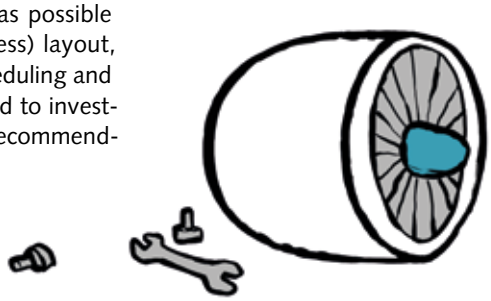
MTU is the German market leader for the development, production, marketing and maintenance of aircraft engines of all thrust and performance classes. The assembly of a civilian aircraft engine at the Munich site, however, is a first. Every year, around 160 to 200 aircraft engines have to be assembled as efficiently as possible. This is a huge challenge both for the production and the supply chain management teams, which the engine manufacturer accomplished in collaboration with ROI Management Consulting AG. In just five months, the project team produced variants that were ready for decisions to be made on a concept for engine assembly that takes account of all of the stages of the supply chain and a new production line.

Two starting conditions made this task particularly challenging: firstly, the product's considerable complexity – an aircraft engine is made up of over 5,000 individual parts – set narrow limits for concept variations. Secondly, each variant was to make minimal assembly work with minimal reserves economically feasible and ensure an adherence to delivery deadlines of 95% on the part of the supplier and the sites involved. For the manufacture of engines in particular, this is a very ambitious goal, not least due to the number of parts or components involved. The specification of minimal warehouse stocks is understandable in view of the high component costs; at the same time, however, there are no repair or replacement options like there are in car production. This is because every component manufacturer is certified and has to satisfy extremely high quality stand-

> “Challenging goals: a flexible assembly concept despite highly complex products and minimal stocks.”

Start phase: Checklist for Assembly

Similar to the perfect flight, the assembly processes must most of all be efficient. The project team therefore had to draft options for an assembly concept that ensured as flexible and smooth an interaction as possible between the various stages of production and the people involved. (Process) layout, timing, logistics, transport systems, quality assurance, assembly control / scheduling and the organization of work all had to be taken into account. The team also had to investigate the framework conditions for possible suppliers and ultimately submit recommendations with a plan for the project sequence and the costs of implementation.



Elmar Stichlmair,
Consultant Engineering
Assembly Civil Programmes,
MTU Aero Engines

ards; if one supplier drops out, there are very few alternative options. If a component fails to pass the upstream checks at MTU, it also has to be returned to the manufacturer for repair.

"The coordination of suppliers with assembly in Munich is in itself a real challenge – but by making all assembly take place at just one location, the challenge gets even harder. This is because all of the planning, scheduling, monitoring and procurement continues to be taken care of by PWA, whereas we in Munich will be solely responsible for the assembly and testing of the engine," says Elmar Stichlmair, Consultant Engineering Assembly Civilian Programmes and Project Manager at MTU Aero Engines. "This demands an especially high level of flexibility and effectiveness from the production teams."

Gliding: Clear Structures Ensure Safety

The project team quickly identified two central starting points for an ideal assembly concept. First was the processing of the assembly sequence via flow production, and second was the precise analysis of all assembly processes and structures. "We very carefully considered whether dock assembly, i.e. individual workstation production, is practical for engines," explains Elmar Stichlmair. "That's because, unlike in flow production, there is no precise chronological coordination between the sub-operations with dock assembly. Ultimately, we preferred a fixed arrangement or connection of the pre-assembly and main assembly stations via a 'fishbone' system. With this system, five pre-assembly stations for components are arranged alongside five main assembly stations at which the engines are gradually produced. A pre-assembly station, for example, fits the fan hub with the blades, balances it and then passes it along in the appropriate sequence. With this manual system, we are not only able to manufacture inexpensively, but also respond very flexibly to rising or falling order volumes."

The project team arrived at this solution approach after various analyses: it divided the entire assembly process into its structural elements in order to identify as many potential improvements across all processes as possible. The highly complex product structure was not the only issue to be examined closely either. "For a perfect production sequence, the time factor is critical for us. This is why we worked out best practice assembly times with the ROI Operational Sequence Method, or ROM®," says Stichlmair. The design of the assembly structure along the lines of the 'fishbone' principle played a key role in this. This is because it not only provides us with a precise definition of the operational methods or cycle time management, but we can also clearly identify the stage of production of each engine, which would not be the case with individual stations. This reduces possible time lost through fault analyses tremendously and prevents the entire production sequence from grinding to a halt because of one assembly station."

Soft Landing: Learning Effects through Real Simulation

The principle of clear structures applies to the work sequences and framework conditions of production. As a result, no equipment or materials must take up any space on the assembly stations if the employees do not need them for their work. Materials are therefore provided via a nearby logistics facility mainly from outside, while replenishments are triggered by empty containers. The movement of lifting equipment required for assembly to finished modules or individual components also takes place in this area in order to avoid interruption of the actual production process.

"We are extremely happy with the result. The concept is already showing that a short and efficient assembly time will be completely possible. The floor space requirement of just 1,400 m² is also positive, since we initially had plans for additional 400 m². We haven't determined these results in theory, but rather in a very demonstrable manner with a 3 P (Production Preparation Process) workshop. In this, we built the assembly stations including an engine on a 1:1 scale using boxes – an ideal method for simulating specific operations, space requirements and pathways with all of the workers involved. The good stimulus from the concept will also be fed into a follow-on project in which we'll be building a new testing rig concept for the upgrading / downgrading and checking of aircraft engines," says Stichlmair.

> "The design of the assembly along the lines of the 'fishbone' principle played a key role in the production sequence."

MTU Aero Engines AG

MTU Aero Engines AG (MTU) is Germany's leading aircraft engine manufacturer. The company develops, produces, markets and maintains civilian and military aircraft engines of all thrust and performance classes, as well as static industrial gas turbines. MTU employs around 8,500 people and is represented through subsidiaries all over the world in all of the major regions and markets.
www.mtu.de

THE CHOICE OF COLOR DETERMINES LOGISTICS

Interview with Klaus Boog, Director, Member of the Management Board, REMMERS AG

DIALOG: *Mr. Boog, your company is regarded as a premium supplier in the building, wood and floor protection sectors and every year creates more than 80,000 order-specific paint mixtures that are shipped worldwide in quantities ranging from one liter to 2.5 tons. What does complexity management mean for you?*

KB: At Remmers, it's the everyday processes that generate a very high level of complexity. To deliver our services efficiently, we need components from all sectors of the value chain that are completely up to date in terms of their technology. This was brought home to us at Remmers back in 2008. Growing customer demands and our company's growth called for a general modernization. Plant structures needed to be re-designed. The challenge – a new, integrated logistics concept for the optimization of all processes, geared towards future increases in volume. The basis for this was provided by a plant structure concept created by the corporate consultancy ROI in line with Lean principles. Today, we have state-of-the-art solutions in all parts of our plant: The improved warehouse structure comprises a new logistics center, as well as three strategically distributed regional warehouses. The logistics concept is supported by a central goods management system that creates stock transparency, enables pan-European batch tracking and the just-in-time production of special colors. A modular packaging system and close collaboration with selected transport service providers add the finishing touches to the concept.

> "The modern plant structure today allows us to maintain control over complexity across the entire value chain in all manner of areas."

DIALOG: *What is the relationship between complexity and operational excellence in your company?*

KB: At Remmers especially, there is considerably complexity due to the tremendous variety of factors that influence the value chain. Apart from the usual technical innovations, in the last years we were increasingly facing shortages on the global raw materials markets.

As a producing supplier company to the construction industry, our success is based on our own products, services and system solutions that help professionals progress their construction projects and which satisfy or exceed customers' expectations in terms of quality, service and reliability in use. Nowadays, it is virtually impossible to avoid constantly boosting the company's own operational quality in order to develop this standard further. The problem with this, however, is the

constantly growing complexity. This means that operational quality will in future become harder and harder to achieve. Thanks to targeted logistics and organizational measures in particular, we have been able to increase operational quality and restrict the degree of complexity.

DIALOG: *Your logistics concept, which this year won the European Award for Logistics Excellence from the ELA, ensures that every order within Germany is shipped within 24 hours. The production, IT and logistics systems must therefore interact seamlessly with each other. What are the major challenges associated with this?*
KB: Imagine an extreme scenario: an order comes in at 14:59 for a single tin of paint in a special color. Attached is a sample of wood with the instructions: enclosed is a color sample, deliver to a building site somewhere in Germany. We call this a 'customer-specific special order'. Of course, it is a huge challenge for us to stay true to our delivery promise of 'From order to delivery in 24 hours' when it comes to an order like this.

We handle such orders in minutes and just-in-time, thanks to one of the most advanced IN-Can special color systems there is. Products can as a result be produced on the very same day, quality-checked and loaded onto the van for shipping.

DIALOG: *In the industrial SME sector especially, high product quality and innovation have been the most important factors in the global competition for many years. Do you believe this will be sufficient for the future too?*
KB: High product quality and innovation remain of central importance for market success. But any company that fails to back these up with comprehensive services may find themselves marginalised, no matter how good their products are.

The success of the Remmers group has not just been achieved through innovative products, but through customer-focused service too. 200 specialist representatives and 40 application engineers in Germany alone are the industry's densest network of advisers providing expertise at local level. The Bernhard Remmers Academy also delivers other valuable services for the professional development of everyone involved in construction and the Remmers specialist planning company. Alongside the application technology department, it is responsible for drawing up object-specific specifications.

These services are supplemented with our integrated logistics concept, complete with the promise that 'Whether it be 1 liter or 2.5 tons, orders received today reach the customer tomorrow'. It is a true unique selling point.

DIALOG: *What role will operational excellence play in relation to competitiveness and profit margins in future?*
KB: The implementation of the '< 24 hour logistics concept' has raised the awareness of everyone involved with the process regarding potential weaknesses within the process chain. The objective is quick identification and elimination. This is the only way in which we can increase our operational excellence and profit margins in the long term without, on the other hand, increasing costs. In this context, our skilled staff base is of considerable advantage. With regard to Remmers, I believe that operational excellence can be summarised as follows: the optimization of processes from raw materials procurement, warehousing and production to distribution form the basic requirements for our sophisticated and forward-looking logistics concept.

> "The objective is the rapid identification and elimination of weaknesses. This is the only way that operational excellence can be increased in the long term."

DIALOG: *Mr. Boog, the processes in Remmers' supply chain are already highly optimised. Have you set any other development objectives for the next few years?*
KB: Of course there are still development objectives. This does require us, however, to be constantly at the cutting edge in terms of staffing, expertise and technology if we are to remain able to respond appropriately with flexibility and in good time to future changes.

For the future, we want to expand the almost flawless level of service that Remmers has already achieved in Germany to other neighboring countries too. This is a challenging task, because the basic conditions in the various countries differ markedly.

Klaus Boog,
Managing Director Finance, Processes and IT

WATER ON: EXCELLENCE LEVELS OF EFFICIENCY IN PROCESSES AND ENERGY GENERATION

Andritz Hydro Improves its Development of Generator Products

The energy transition in Germany cannot be successful with wind turbines and solar modules alone. While wind and solar energy are still struggling with infrastructure issues and changeable weather, gross energy production through hydroelectric power is already accounting for a solid proportion of Germany's clean energy production. In 2012, it accounted for 27.4 billion kWh in Germany, produced by run-of-the-river and storage hydro power plants, including pumped-storage hydro power plants. They also achieve a particularly high level of efficiency: with their turbines and generators, up to 90 per cent of the usable hydropower can be converted into electricity.

Hydro-generators are therefore a particularly attractive technology for eco-friendly energy generation the world over. A manufacturer's market success with a particular model of generator does not just depend on the generator's performance data, however. Products only achieve long-term market success if there is efficient back-up of the technical solution from the first sketch to the power-generating generator. This comprises a high level of efficiency as well as global service and easy maintenance. This is achieved not just through innovations and the constant development of expertise on the product, but also through prevention.

Andritz Hydro, a company that provides electro-mechanical equipment and services for hydroelectric power stations under the motto 'Water to Wire' and which is the market leader in hydraulic power generation, also faces this challenge. In a nine-month project, Andritz Hydro, together with ROI Management Consulting AG, re-shaped the review process from the enquiry to the project completion of its hydro-generators in order to spot future technical risks, weaknesses and opportunities for improvement in the generator design in a timely manner.

Trickle or Waterfall? Analysis of Voltage Sources

The entire project comprises three phases, the first two of which – the production of an actual analysis with an outline concept and the drafting of a detailed concept – are already complete. The operational implementation of the concept in the third project phase has been running since June 2013.

In order to obtain as comprehensive a picture as possible of all of the operational steps involved in generator development, the focus at the start of the project was on the actual processes. The project team, comprising seven Andritz Hydro engineers and one ROI consultant, determined for example how the content of the designs was checked in the reviews, and at what points in the project sequence the reviews took place.

Herbert Glaser,
Engineering Hydro Generator,
Andritz Hydro

"One central element of this project phase was internal benchmarking of our generator reviews with the turbine reviews," reports Herbert Glaser, Engineering Hydro Generator and Project Manager at Andritz Hydro, on the first phase of the project.

Out of a total of three possible alternatives, the project team chose a maximum model for the hydro-generator reviews that best corresponded to the highly individual requirements. With the aid of this model, the team restructured the framework conditions for the product development process from the perspective of engineering. From the receipt of the

> "Quality gates will in future simplify project processing in the product development process."

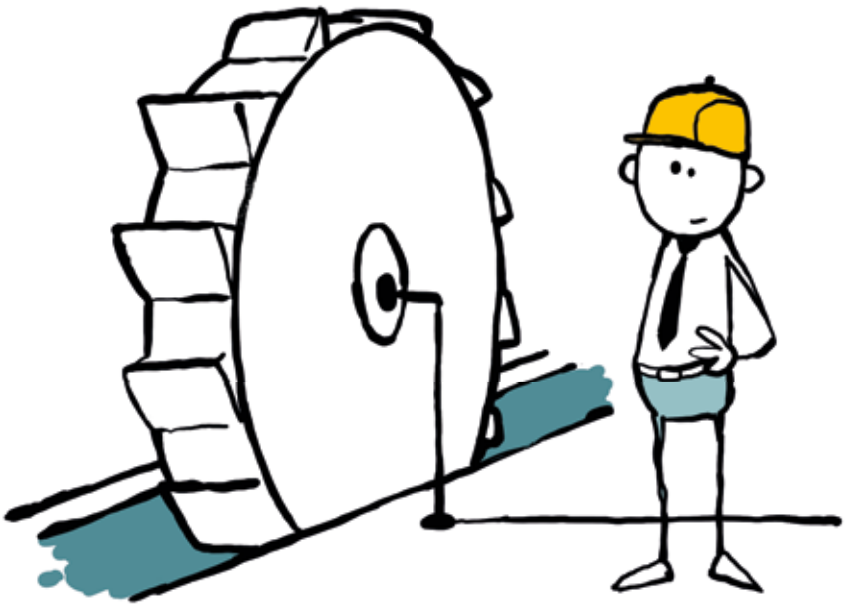
enquiry to project completion, five reviews and two quality gates were defined. "Even in the outline planning, we were able to define the core rules for the new review process. The quality gates are intended, among other things, to simplify onward project handling by ensuring that the minimum requirements are clearly mapped in the requirements specifications, and that the machine layout is 'frozen' before the detailed development stage. This not only reduces unnecessary loops and errors, but also reduces the amount of work required and therefore the overall costs," says Glaser.

In the second phase of the project, the team worked out the reviews and quality gates in more detail, especially with regard to the issues of purpose, preparation, procedures, expected results, the participant group and roles and responsibilities. The team also comprehensively revised the essential review checklists, which in the past formed a repository of expertise and experience. "It is important to closely adhere to all of the technical and customer-specific requirements right from the first sketch, since every hydroelectric power plant makes completely different demands on a generator's performance. For this reason, the checklists in maximum form also play a vital role in the review preparation. In the review itself, the crucial issues can then in future be discussed in a focussed manner by a committee of experts," explains Glaser. "The second stage of the project ran particularly efficiently, since we were able to reflect the results in our project goals thanks to the highly precise review concept and ultimately give the go-ahead for implementation."

Drips or a Reservoir? The Factors for Success

Just as even a few droplets can alter the quality of an entire reservoir of water, so too can even the tiniest detail deviations in the generator design affect the quality of the end product. The project's key success factor therefore turned out to be the right level of detail in the review model, a requirement that is absolutely essential for a highly complex product. A generic review model and generic review checklists would not have safeguarded the technical solution since they did not reflect the product-specific adaptations adequately enough.

> "The project's key success factor turned out to be the right level of detail in the review model."



ANDRITZ HYDRO

supplies electromechanical equipment for hydroelectric power plants. With more than 170 years of cumulative experience and after supplying more than 30,000 turbines with a total capacity of around 400,000 Megawatt, ANDRITZ HYDRO is one of the world's leading suppliers of hydraulic power generation. Its portfolio of services comprises the full product spectrum, including turbines, generators and auxiliary equipment of all types and sizes.

"Even before implementation, it became clear that we had chosen precisely the right level of detail – and given the shortness of time and the volume of parameters we had to take into account, this already represents a real project success," confirms Herbert Glaser. "We now have a comprehensive review model that extends from the offer to the experience obtained from the start-up. In the first two project phases, we have also acquired valuable experience for mapping a clean transition from information obtained from various locations from the offer to the order phase and for safeguarding the layout before detailing by our experts. This was primarily due to the highly practice-based work, in which all of the team members constantly focused on the most important tasks and process steps. But the in-depth professional experience from ROI also played a crucial role in helping the project to succeed."

The excellent team work at Andritz Hydro was also reflected in the tremendous interest and dedication of the design engineers when it came to collaborating on the design of the reviews and checklists. The project also serves as a trailblazer: In order to achieve even more efficiency in the generator development process, Andritz Hydro is now keen to harmonise the entire engineering process, the role of the design engineer and the simultaneous engineering processes from the project outwards.

BLACK BELT FOR VALVES

Interview with Claire Barboni, Global Project Management, HOERBIGER Corporation of America Inc.

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DIALOG: *Ms Barboni, your company is known as a global leader in the fields of compression technology, automation technology and drive technology – a very competitive environment. What significance did the Six Sigma project have at Pompano Beach, Florida/USA, set up to improve the quality and cycle times for finishing of polymer plates, for your company?*

CB: Using the principles from Six Sigma we were able to accomplish several things. Lapping is a critical operation because almost all products go through this process. It can easily become a bottleneck, which is why the decision was made to make a lighthouse project. The first obstacle was standardising the process. It became clear that with the existing tooling and training, the operators each had their own method for operation. Using the scientific approach we, as a team, were able to find the best process for operation and make it a standard. By creating a standard procedure we have a more efficient process that better utilises 'up time' and decreases machine 'down time'. By focusing and thoroughly reviewing the area, we discovered ways to make further improvements.

"Lapping is a critical operation and it can easily become a bottleneck. This is why we made it a lighthouse project."

DIALOG: *Your site and project team underwent a SixSigma Black Belt certification. From your perspective, what positive impact have the six sigma principles had on the operational excellence of your production site?*

CB: The team was made up of myself, an operator, the plant manager, and with the guidance of ROI master black belts. I went through black belt training and the plant manager went through green belt training.

Claire Barboni, Global Project Management, HOERBIGER Corporation of America Inc

Through the training we learned how to use the tools of six sigma: to quantify a problem and analyse the current state as well as develop a plan to tackle the issue most effectively while keeping in mind the critical points of customer and quality characteristics. Clear instruction on how to run a project with steps in a proper sequence to reach a solution was very important. Too often we try to tackle a problem with a solution in mind and this prevents us from seeing the whole picture. Six Sigma teaches us to look at all the facts before drawing conclusions and implementing a solution.

DIALOG: *Were standardisation and modularisation of products and processes a relevant question for the project?*
CB: The Six Sigma Lapping Project was all about both of these topics. First we had to standardise the improved machining process so that everyone was working the same. Then we were able to continue improvement by modularising the cell (moved the machines for multi-machine operation, changing emulsion to remove the washing process, best practice sharing for grinding technology, improving the tools – carriers – necessary for proper grinding).

DIALOG: *At HOERBIGER, are the development of technology roadmaps and the search for alternative raw materials a regular process?*
CB: Yes. HOERBIGER is continuously striving to achieve improvements by researching cutting-edge technological developments. The company has teams of very bright engineers and managers who help inspire the team. Sometimes it is a challenge with plastic to source alternative raw materials because our blends are proprietary and highly engineered. However, our procurement team works in conjunction with engineering and processes are in place for testing materials.

DIALOG: *You were awarded the STEP (women in Science, Technology, Engineering and Production) Award this year. The initiative promotes the role of women in the manufacturing industry e.g. in reference to education. How important are training programmes at HOERBIGER and what impact do they have on operational excellence?*
CB: HOERBIGER has shown a strong commitment to training knowing that further education will only make the company stronger. The HOERBIGER Corporation of America wants to make sure everyone has the tools they need to succeed and continuous training is a very important tool. HOERBIGER's commitment to training is part of its culture of continuous improvement – it is key to the company's achievement of operational excellence.

DIALOG: *HOERBIGER is a multi-national group. How do you organise the exchange of expertise between different sites and secure the realisation of synergies worldwide?*
CB: I believe that the exchange of expertise and creation of worldwide synergies is extremely important for the company. The annual production conference two years ago kicked off a global initiative (brought together by ROI) to establish Best Practice Sharing. Over the last two years, the company has reorganised the project teams so that we each report our findings, technological advances and successes to centralised leadership. This allows us to not only know what is going on in the other locations, but to share the information and improve HOERBIGER as a whole worldwide.

"The exchange of expertise and creation of worldwide synergies is extremely important for the company."

HOERBIGER

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INSPIRED BY THE PHOENIX – THE ROAD TO RESILIENT PRODUCTION

By Prof. Dr. Werner Bick,
CEO ROI Management Consulting AG

If the concept of resilience were to require a symbol, then it would probably be the phoenix. The myth of an immortal bird that regularly returned was first created in ancient Egypt. The phoenix is the ultimate example of resilience; a creature that even after being destroyed is able to return to its original form.

A system's ability to return to health after external disruptions and to absorb the shock of these largely unharmed has become a criterion for survival in recent years in complex, highly interdependent structures. This applies in equal measure to countries, individuals, ecosystems and production systems. In global production networks especially, we are confronted with numerous uncertainties: Rapidly-changing market demands, high levels of volatility, shortage of resources and external shocks call for a degree of flexibility and 'pliabilty' for which most companies are not yet adequately prepared. On this background, the issue of resilience in production takes on strategic significance.

Recognising the Signs and Spreading Risks

One central factor for resistibility is the ability to anticipate forthcoming developments and be prepared for different scenarios. The speed with which the markets and their external framework conditions change is increasing rapidly. As a consequence, classical planning approaches and tools are speeding towards the limits of their capabilities. The establishment of early-warning systems, urged by management theory for decades, is therefore gaining critical importance. After all, only companies that are able to spot weak signals early on and adapt structures and processes quickly will have considerable competitive advantages and safeguard the sustainability of their own business model. The establishment of early-warning systems is therefore closely linked to risk management. The paradigm of a resilient organisation is not the exclusion of risks, but most importantly the attenuation of the effects of extreme events.

> The key factor of resilience Is the ability to anticipate forthcoming events and be prepared for different scenarios.

The most important levers for this are:

- Consistent diversification of the service portfolio and globalisation;
- The creation of localised structures and the avoidance of dependency on individual customers or suppliers;

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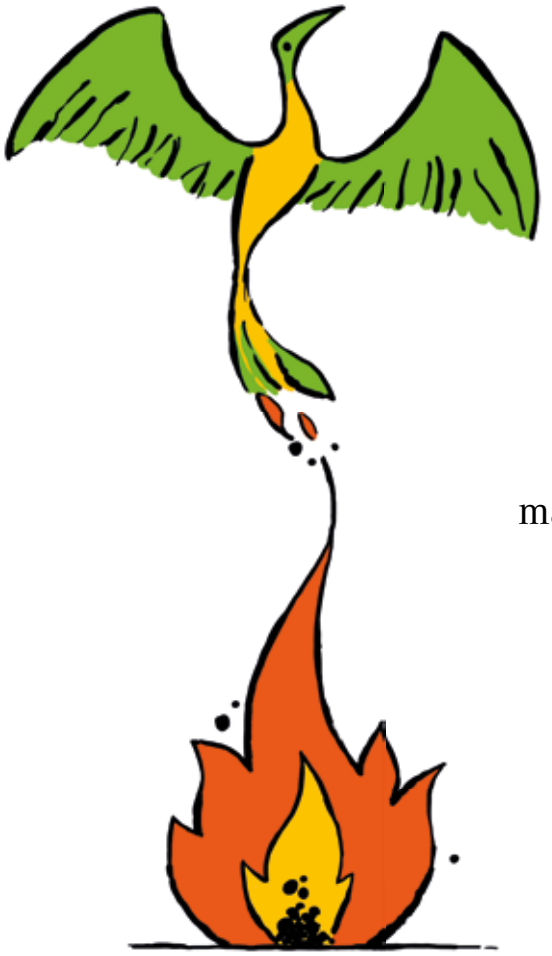

- The constant checking and adjustment of the individually appropriate real net output ratio;
- The definition of company-specific appropriate redundancies in production and logistics.

Essential for the effective use of these measures are the active and thorough integration of risk assessment in the design of value chains and the development of a comprehensive supply chain management strategy.

Clear Structures, Transparency and Consistent Performance Management

The resilience of production systems, however, is not just a question of foresight and risk management, but also a question of implementation. To also be able to implement the necessary adaptations effectively, technological and business management-related prerequisites have to be put in place too. These include, for example, short throughput times across the organisation or even the right stock allocation – for example by decoupling stock from critical sources and reducing finished products in favour of pre-materials, which leads to considerably more flexibility in the value chain. One approach that offers considerable potential is the consistent standardisation and modularisation of products, machinery, tools and processes. But the continuous training and development of employees also has a considerable role to play. In global production networks especially, this represents a major step towards greater resilience for production. Although resources and capacities can fluctuate within the network in line with market requirements, external disruptions and distortions can be buffered much more effectively than in rigid systems.

The stable basis of a resilient company is excellent transparency in terms of clear organisational structures, processes and responsibilities, an integrated and homogeneous IT landscape and low levels of organisational complexity. One aspect that should not be underestimated in all this is the definition of a few key performance indicators (KPIs) that will facilitate focused and efficient performance management. As the level of complexity grows, companies tend to develop complex KPI systems to go with it. Possibly, these may reflect every aspect of entrepreneurial activity and be appropriate for all of the stakeholders within the organisation, but they cannot handle the requirements of a production system geared towards efficiency and resilience.

One Approach that offers considerable potential is the standardization and modularization of products, machinery, tools and processes.

Establishing a Culture of Resilience

Safeguarding the resilience of production systems, however, requires more than just process-related and structural adaptations. First and foremost, it is a question of leadership principles and the culture that dominates within the organisation. This most importantly means accepting the general unpredictability of the future and the inevitability of risks and consistently focusing on the efficient management of unknowns. This can be achieved through constant learning, rapid decision-making processes and intensive horizontal and vertical collaboration. A resilient organisation is therefore no less exposed to economic, environmental or political developments, however it can handle extreme events and their impacts much more quickly and effectively.

A 'culture of resilience' also makes the company capable of learning and evolving, thereby safeguarding its competitiveness and its survival. Such a company might even, like the phoenix, have no need to fear fire.

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About ROI

With over 1,000 successful projects, ROI Management Consulting AG is one of the most prominent specialists in the planning, development and management of global value chains. ROI supports large corporations and leading family-led companies, especially with the integration and optimization of development, production and logistics, in supply chain management and in the company-wide implementation of lean management principles.

ROI has won numerous major awards for its highly implementation-oriented projects. The company has more than 80 employees at its locations in Munich, Beijing, Prague, Vienna and Zurich and is represented by partner offices in Italy, France, the United Kingdom, Thailand and the USA.

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