



**Burckhardt
Compression**



OUR COMMITMENT TO QUALITY

Compressors for a Lifetime™

OUR APPROACH TO QUALITY



Offering customers premium quality is one of the central tenets of Burckhardt Compression's business philosophy. We will never compromise or cut corners when it comes to quality. Discover more about our commitment to quality in the pages that follow.

OUR LONG HISTORY OF QUALITY



Burckhardt Compression's highly qualified employees have been setting benchmarks in the gas compression industry since 1844.

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OUR GLOBAL UNDERSTANDING OF QUALITY



Asia has become the global hub of the shipbuilding industry, which is why we established a local assembly plant in Busan, South Korea, in 2015.

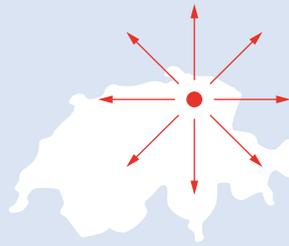
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DELIVERING QUALITY TO OUR CUSTOMERS



Providing consistently reliable and prompt on-site customer service around the world is obviously a challenge and, for us, a source of inspiration and motivation.

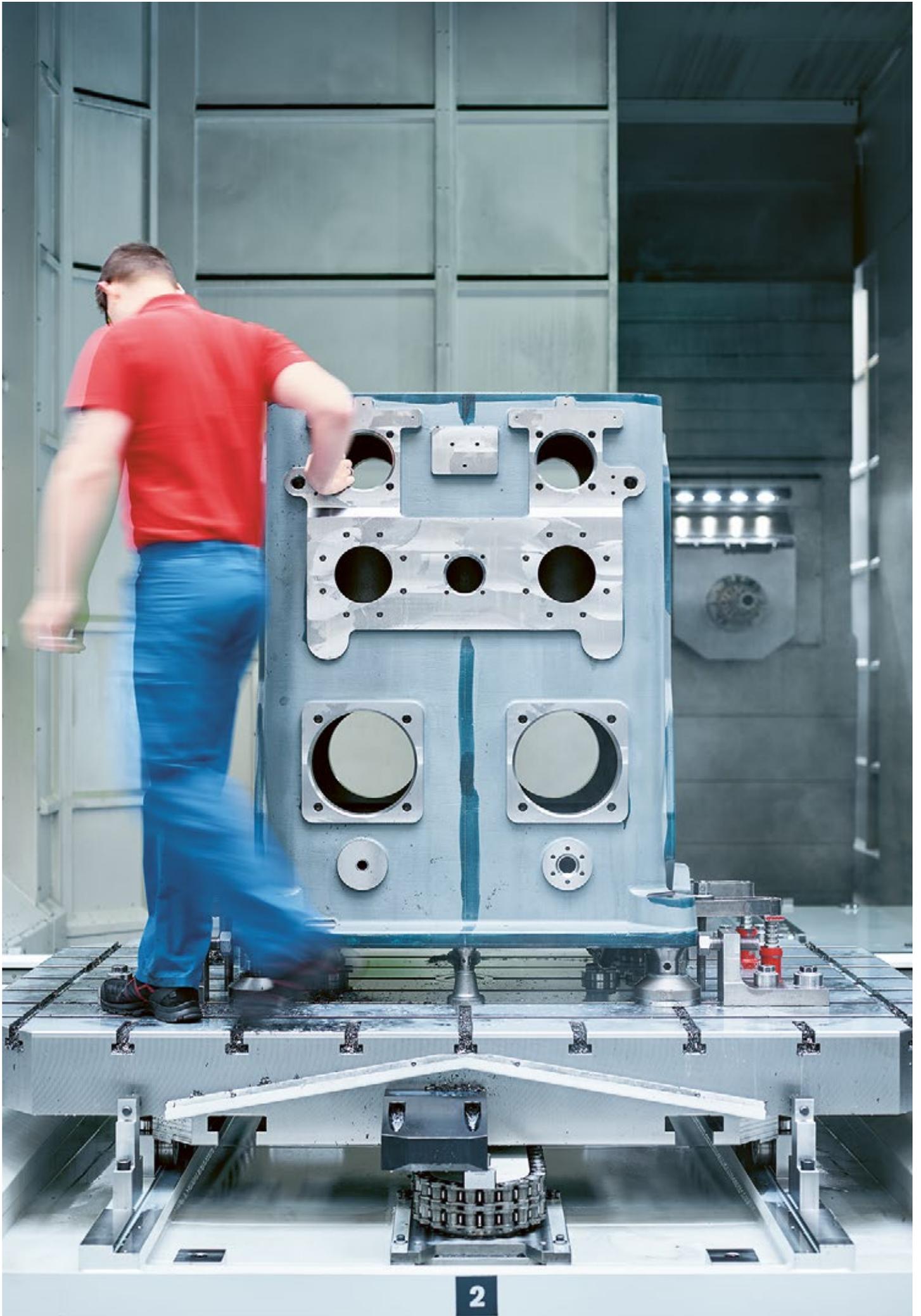
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Switzerland
Burckhardt Compression, Winterthur
733 Employees

OUR LONG HISTORY OF QUALITY

A strong commitment to quality is evident throughout our long history. It has become part of our corporate DNA. At the product or process level. At every company site. Worldwide. Quality you can trust.





The laser measuring room is kept cooled to a constant 19 °C (66 °F) to ensure precise results.



PUTTING OUR COMMITMENT TO QUALITY TO THE TEST

Compressors that function reliably for decades, smooth order process flows and adherence to the given cost and delivery guidelines – that is our quality promise.

The highest of standards everywhere. Burckhardt Compression is committed to upholding the highest of standards, in acknowledgement that there is no better way to maintain our position as one of the world's leading manufacturers of reciprocating compressors over the long run. Our quality assurance systems monitor every stage of the business, from product development and manufacturing to the final inspection prior to commissioning, which is sometimes performed under the eyes of our customers. Our quality standards are binding at all Group factories and locations worldwide. Whether in Europe, Asia or North America.

Rigorous hardness tests. Every part of every reciprocating compressor that Burckhardt Compression makes is tailored to individual customer specifications and then manufactured in-house or sourced from reliable suppliers. From the tiniest screw to massive castings. A variety of quality-related tests are embedded directly into the manufacturing processes. Individual components will likewise undergo numerous tests. A time schedule is set for every stage of the work process and it is continuously monitored so customers can always count on delivery according to schedule.

Quality translates into satisfied customers. Our far-reaching quality concept ensures that the compressors we deliver to our customers will meet all performance specifications for decades to come. Reliability, ultra-high availability and superior cost-effectiveness keep life cycle costs extremely low. Burckhardt Compression also stands ready to handle whatever problems may arise in the field, at customer sites around the world. A fast and reliable partner.

DID YOU KNOW ...

30–50

Burckhardt Compression's compressors have an average **SERVICE LIFE** of 30 to 50 years!



More than 60 years of **EXPERIENCE** in making high-pressure reciprocating compressors capable of up to 3'500 bar, as used for example in the manufacture of plastics.



Our compressor solutions

www.burckhardtcompression.com/compressor-solutions



“People, not systems, are the starting point for quality”

Interview with René Guthauser,
Vice President Quality & Infrastructure

You have been working for Burckhardt Compression as Chief Quality Officer for 12 years now. Do you need to be a stickler for rules and details in your line of work?

Quality consists of many different factors. Exactness is one of them. Throughout my entire professional career, as an engineering design technician, a project manager and in sales, precision has always been part of my job. But there are other aspects of quality management that I find interesting, too, such as analyzing processes or having the opportunity to work with so many different people.

What do you find most fascinating in your field of work?

Completely different specialties and disciplines come into play during the QA process. Quality is important at every stage of production, whether receiving goods and materials, making sure all deliveries are correct and on time, or conducting a final inspection of the finished product, when every function is again thoroughly inspected and compliance with customer specifications confirmed. Customer satisfaction with our products and services is our overriding objective.

What exactly do you mean by “quality” in a reciprocating compressor?

Quality determines the operational life and the life cycle costs of a reciprocating compressor. A low-quality compressor will require considerable maintenance, which can lead to additional service costs or even production shutdowns. Reciprocating compressors made by Burckhardt Compression are known for their exceptionally low life cycle costs.

Will compressors be self-testing at some point in the future?

Thorough and effective testing processes and procedures that are defined and continuously monitored by people are still needed on the manufacturing floor. Beyond the manufacturing stage, though, some compressors already offer self-testing functionality. Integrated sensors detect whether tolerances with regard to vibration, pressure or temperature levels, for example, have been exceeded and that information is then reported to a monitoring and diagnostics system. Service technicians analyze the data and advise compressor operators on what to do to avoid unscheduled downtimes and protect the compressor from possible damage.

People and technology: How do they come together at Burckhardt Compression?

People, not systems, are the starting point for quality because so much of what we do involves quality-related issues that employees can influence. That said, the better the interplay between people and technology, the smoother production will be. We are pleased to have many talented, long-serving employees who are extremely good and efficient at building our products using state-of-the-art tools.

As a mountain biker, René Guthauser places very high demands on the equipment and technology he uses. He knows he needs reliable equipment to successfully ride challenging trails.



All compressors are tested on a test bench. This is also where customer acceptance takes place.



TO KEEP DOING A GOOD JOB, WE NEED TO ALWAYS GET BETTER

PULL@BCAG is not some secret code, it stands for team-based process quality and as such represents a work philosophy.

DID YOU KNOW ...



-90%

90% **REDUCTION IN TIME** needed to process small parts thanks to a decentralized Kanban-based storage strategy of stockpiling parts right where they are needed.



10 INFO BOARDS AT 8 DEPARTMENTS

The predefined key data points are easily obtained and informative and are used to increase transparency.

Focus on shorter lead times. The program was launched in 2009 and is now a fixed part of our Design & Manufacturing unit. Supervisors and employees receive some basic training in lean and change management but most of the program activities revolve around project teams and their workshops. These interdepartmental teams work on creating specific solutions together with lean coordinators and then implement these solutions in their everyday work. The main objective is to constantly reduce lead times through sustained business improvements. Each project is described in detail and project outcomes are measured against clearly defined criteria.

One example of the many benefits this program has provided is workspace optimization. Instead of keeping certain tools at a central warehouse, for example, many workspaces are now individually equipped with the tools that are needed to get the job done. No more time is lost walking back and forth for tools, employee satisfaction has increased and efficiency has improved. Together with a new planning concept, a significant reduction in lead times has been achieved.

Furthermore, a one-piece flow or continuous connected workflow method consisting of five steps was introduced for certain stages of the manufacturing process. Groups of employees work on one compressor at a set pace as it passes through various production stages and they have a certain degree of autonomy in how they organize their work. This change also led to a reduction in calculated standard times and therefore reduced lead times while increasing output.

The introduction of the Shopfloor Management and Ship It tools improved transparency at various points of the order processing flow. Planning details, work in progress, and interfaces are posted on information boards and status reports are reviewed daily. Traffic light labels provide an immediate





1



2

- 1 Joint solutions are developed in various workshops.
- 2 Teamwork is at the heart of PULL@BCAG and holds the key to fully exploiting the potential for optimization.

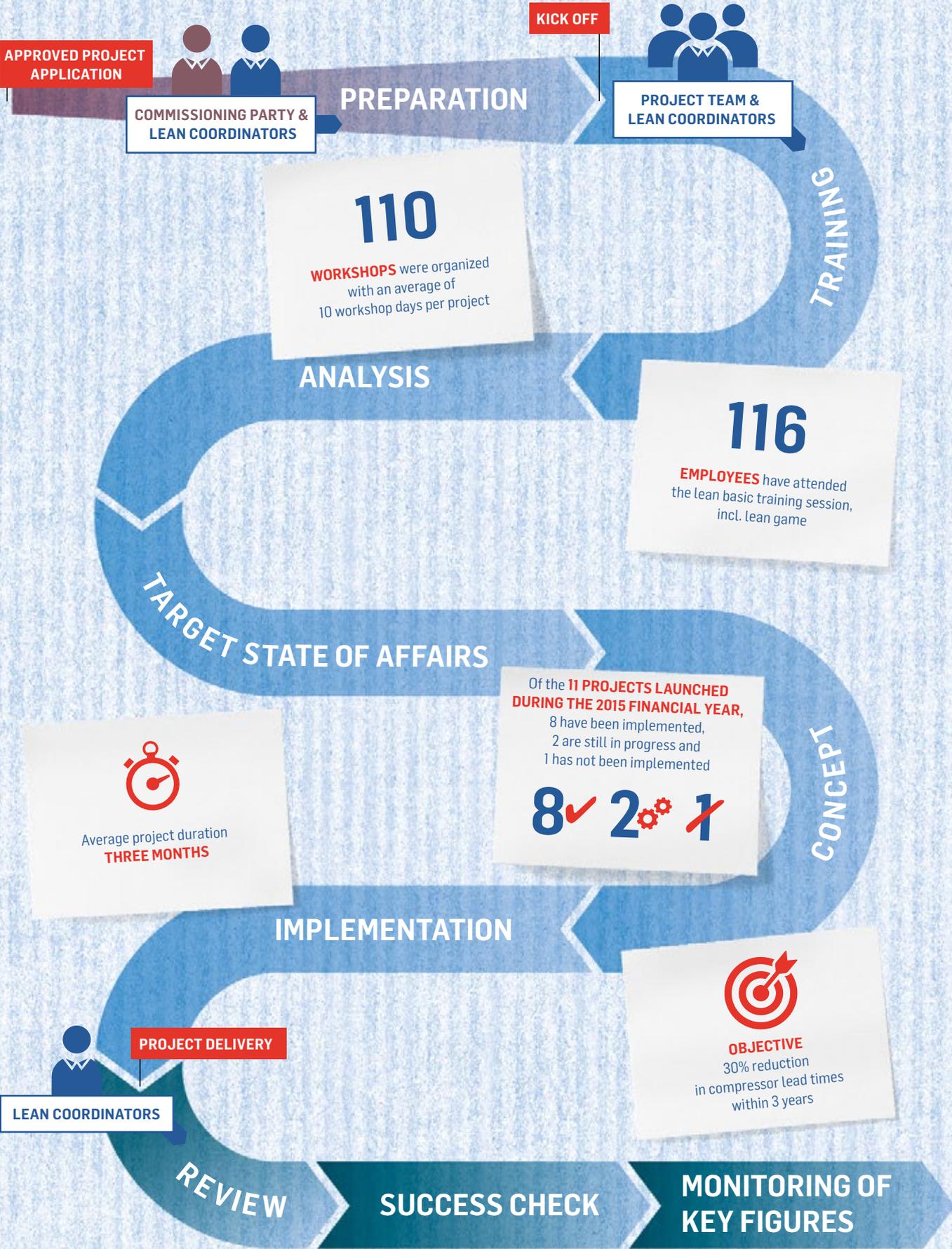


overview of delivery schedule adherence, lead times and efficiency. This serves as a coordination tool during shift changes or in brief workgroup meetings, and the given KPIs are used to target further improvement potential.

The common objective of every project is to reduce lead times, improve efficiency and ensure delivery schedule adherence while maintaining if not improving overall quality. This concurrently promotes a greater sense of cohesion in the workforce. The most striking evidence of the success of PULL@BCAG is the large number of projects that have already been implemented.



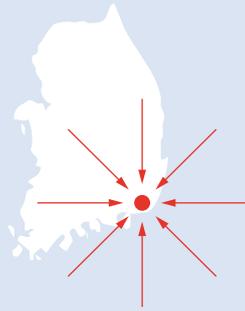
- 1 The compressors are assembled on the test bench and put through their paces in the subsequent test run.
- 2 The individual stages in the process and the testing procedures are logged in reports.
- 3 Each component is tested individually.



PREPARATORY ACTIVITIES

PROJECT SCHEDULE

FOLLOW-UP ACTIVITIES



South Korea
Burckhardt Compression, Busan
25 Employees

OUR GLOBAL UNDERSTANDING OF QUALITY

Our quality standards are crucial for our success. Therefore they must be adhered to worldwide, at every company site. Which includes our new assembly plant in South Korea focused on Asia's growing marine compressor market.





The first compressor of our assembly plant in Busan is prepared for loading. It will be used onboard a ship.



QUALITY TRANSCENDS BORDERS

The construction of our new assembly plant in Busan, South Korea, provided an opportunity to design the entire site in accordance with the principles of lean management right from the beginning.

We were able to integrate the positive results achieved through the PULL@BCAG program in Winterthur in the preconstruction planning phase. Production lines are based on the one-piece flow principle and are absolutely lean.

This is but one of many aspects that ensure that our assembly plant in Busan meets the same quality standards as in Winterthur. Employee training is equally important. South Korea has a long machinery manufacturing tradition, particularly in building ship engines. The employees there are therefore well qualified and have considerable technical know-how.

Before the assembly plant was completed, a group of these South Korean employees attended an intensive two-month training program in Winterthur. They first received introductory training at our in-house training center and then worked with employees on the assembly plant floor, where they were also familiarized with all the details of our reporting and operating processes. Direct integration of continuous quality control at the very start of the production process was an important aspect of this training. This method guarantees continual quality control in addition to individual inspections of quality at the end of key stages of the compressor manufacturing process. It helps to anchor the aspect of quality as an integral part of the production process.

DID YOU KNOW ...

2'000²

square meters of **FLOOR SPACE** dedicated to assembling Laby®-GI compressor systems for Asian shipbuilders. The first testing system for bringing Laby®-GI compressors up to operating temperature globally.



In November 2015:
the new factory in Busan
WENT INTO OPERATION after
a one-year construction period.

NOV
2015

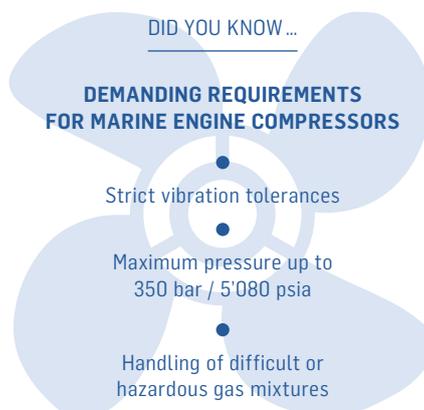


Your local contact
www.burckhardtcompression.com/locations



The team in South Korea is now operating independently and efficiently. Every employee is responsible for the quality of their work. Thanks to the targeted promotion of quality awareness and ongoing training, the quality standards at Busan are identical with those in Winterthur. The employees in Busan can, of course, still count on the full support of their colleagues at the Winterthur headquarters in the event of any problems or uncertainties.

Our philosophy of continuous improvement is also practiced at the Busan site. Its operating procedures and production processes are reviewed and optimized on a continual basis, just like at every other Group site worldwide. Employee suggestions for improvement are also welcome as an integral part of the quality management process.



1

- 1 Teamwork and individual responsibility play an important part in successful cooperation.
- 2 Ultimately, it is the employees who are responsible for quality. Measuring equipment can only provide support.
- 3 Quality consciousness is a top priority in South Korea, just as it is at any other branch of Burckhardt Compression.
- 4 Our bright assembly shop in Busan boasts state-of-the-art infrastructure.



2





“I was impressed by the know-how”

Interview with Youngsoo Ye,
Technical Department Manager
Burckhardt Compression Busan

You have been working for a Swiss-based company for more than one year now. What cultural differences do you see between Swiss and South Koreans?

A big difference is that we have more freedom in our daily work here at Burckhardt Compression in Busan than employees of other South Korean companies do, but more freedom also means more responsibility. Each of us is judged by the quality of his and her daily work and that equates with more responsibility. I have always worked in the ship engine industry but I have never experienced this kind of a working atmosphere nor have I ever been given so much responsibility. I am not being constantly controlled by my supervisor either. I appreciate that very much. Having this responsibility motivates me to do my best and therefore I set high standards for the quality of the work that I do.

You were a team member right from the beginning of the buildup, even before the factory in Busan was finished. What were your experiences during the construction phase?

When I started working for Burckhardt Compression on March 1, 2015, the factory was not yet completed so I was able to contribute some input during the final phase of construction. We had many meetings with our colleagues from Winterthur and shared our know-how and experience. It was impressive to see how much has to be done to have a fully functional factory up and running. We collaborated very well and I was impressed to see how committed everybody was. This was an extremely good experience for me.

Are you proud of being one of the first employees at the assembly plant in Busan?

I am very proud of this. We started with a small team of ten people and nine are still with Burckhardt Compression. This ensures that the know-how stays within the company and stable processes can be implemented. Some of us received more than two months of training in Winterthur before we started working in Busan.

Youngsoo Ye likes to play golf during his time off. Good tactics, the right choice of club and precision shots are his key to success. Motivation and personal responsibility are essential, just as they are in his everyday work.

You received training in Switzerland when you worked for Burckhardt Compression. What were your impressions from this training?

I was impressed by the know-how. I knew that Switzerland is famous for a high level of technical excellence, one need only think of Swiss watches. I was trained to use the Laser Tracker, for example, an incredibly precise measuring instrument that we are now also using in Busan. This measuring instrument has a standard tolerance of less than 15 µm and also happens to be made in Switzerland.

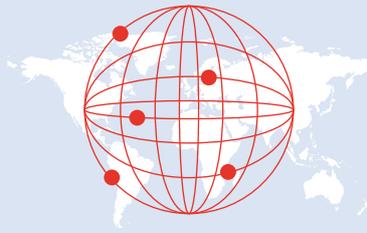


The Tracker's laser beam detects the reflector on the workpiece to be measured itself. This allows measurements to be taken quickly and with extremely high precision.





**THE FIRST COMPRESSOR
BUILT IN BUSAN,
A LP250, WILL BE USED
IN A LNG CARRIER.**



Worldwide
Burckhardt Compression
1'432 Employees

DELIVERING QUALITY TO OUR CUSTOMERS

Being close to our customers means
we can guarantee ultrarapid response times and
top-quality service.





“I believe teamwork is essential”

Interview with Benjamin Grice,
Technical Support Engineer

What is the number one challenge in the service business?

A quick response time is critical because downtime or, if worse comes to worst, a complete shutdown of production can have serious repercussions for our customers. So it's very important for us to be close to where our customers are and to offer them solutions tailored to their needs.

What can you say about Burckhardt Compression's relationships with its service customers?

Knowledge sharing is important for understanding each customer's process-specific needs. We have built strong and deep partnerships with many of our customers, especially those who've been operating our compressors for 30 years or more. This leads to a win-win situation. Often these long-standing relationships have fostered good friendships as well.

How do you prevent mistakes from being repeated?

We have two main processes that ensure the reliability and quality of our products. One is the 8D process, the other the knowledge-sharing meetings. Knowledge-sharing meetings help us to feed field experience and practical know-how into our continuous improvement process. The 8D process, which is also used in the automobile industry, is initiated through a root cause analysis or in response to a particular customer specification. It is a cross-functional process used to formulate defect elimination measures and process modifications that are then presented to customers.

So working on teams and with different departments is very important to you?

I believe teamwork is essential for meeting today's customer demands. Without smooth and efficient collaboration between our different operating units, our service response times would not be as fast as they are nor would the quality of our solutions be as good as it is. I was recently talking with a customer in Sweden about Burckhardt Compression's reputation and was pleased to hear that we are one of their top three service providers. He especially praised the close collaboration we have and our customer commitment!

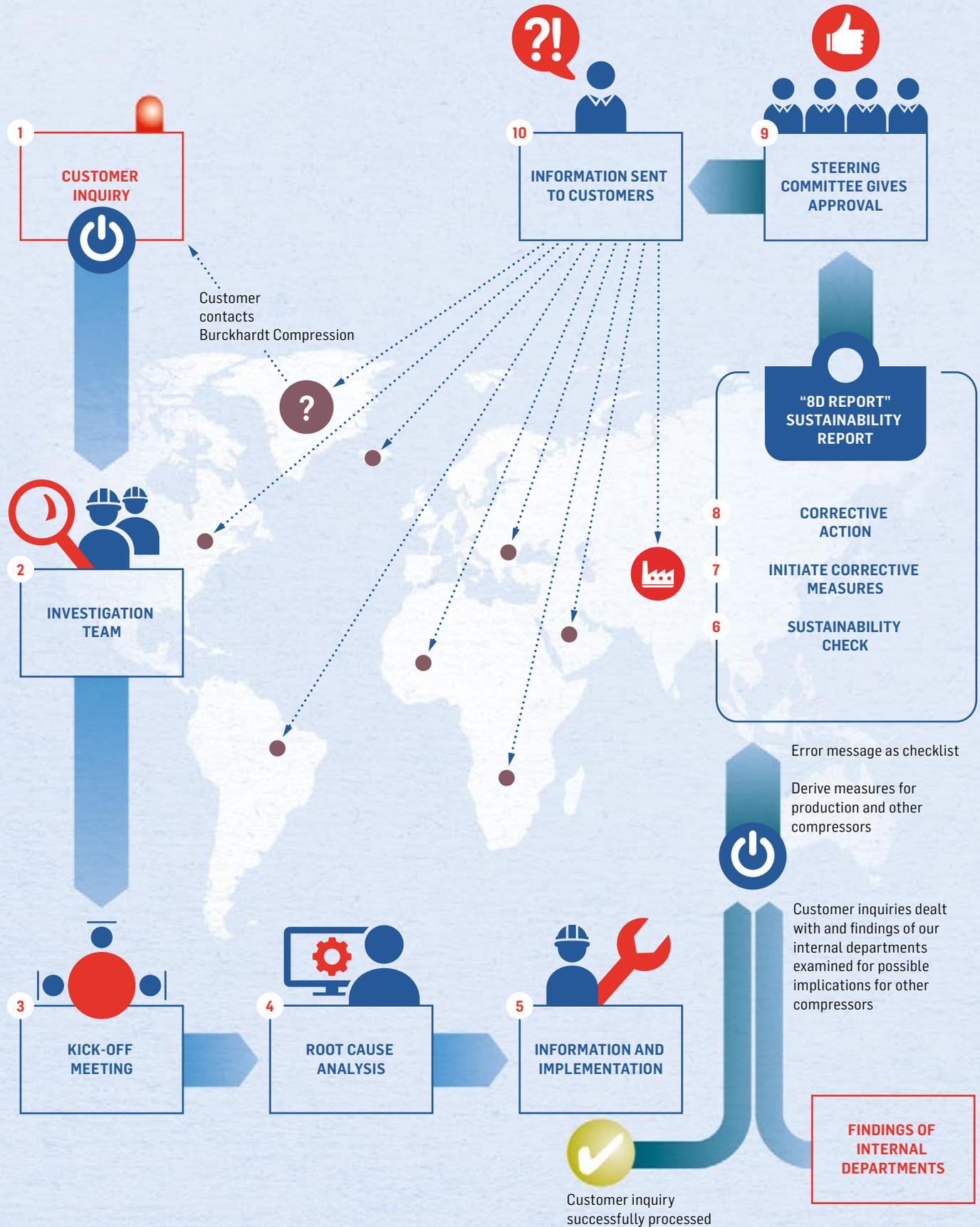
Benjamin Grice likes to go freeriding in the mountains and surfing during his time off and his professional attitude to work carries over to these hobbies. Good preparation, flexibility and a reliable back-up plan are vital.



Your next service center

www.burckhardtcompression.com/service-center

CONTINUOUS IMPROVEMENT PROCESS



- 1** Customer inquiry assigned to appropriate evaluation team
- 3** Kick-off meeting held to discuss how to successfully process inquiry. Conclusions set out in analysis of causes (**4**)
- 6-8** Countermeasures or process changes defined in 8D report
- 10** Customers and Burckhardt Compression subsidiaries informed of changes and provided with appropriate training

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