# The Future of Making Things

## – Ten Nordic Autodesk Customers on Product Development

AUTODESK.

# The Future of Making Things

We live in an ever changing world. As software producers, we need to understand not just the needs of our customers today, but also their needs tomorrow.

This quest is not unique for Autodesk. Every company with some aspiration for the future, struggle with their own analyses trying to forecast emerging trends, developments and user demands. The constant search for a proper and well defined glimpse of the future unites us all.

**In view of this**, it is my pleasure to introduce you to a number of our most successful Nordic customers! With energy and foresight they take on the challenges of tomorrow. These are companies with different markets, niches and realities, but joined in their efforts to find their own, perfected future product development.

With these companies – and many others – Autodesk have formed ties where we seek and get their feedback on a regular basis. This helps us to shape and define our offers for the future, to produce an increasingly efficient, integrated and meaningful Digital Prototyping portfolio and to fulfill those industry needs, that we just barely see emerging on the horizon.

**In this issue** of our Digital Prototyping Reference Magazine, you meet some truly inspirational customers. Read about Christian von Koenigsegg, last year's Innovator of the Year in Sweden, and his quest for the perfect, green hypercar. Follow the hard work of Norwegian companies Eureka Pumps, Rapp Bomek and Mento Service, all busy fulfilling the rigorous safety and security standards of the demanding offshore industry. Meet Valopaa, whose green LED lighting solutions are rapidly illuminating Finland. Find new answers to historic questions as Autodesk helps unvail the secrets of ancient Egyptian mummies. And more!

**Aiding us** and our innovative customers are as usual our strong and capable partners and resellers. Together we form the ecosystem necessary to build an ever better future for customers and end users. This future, we try to uncode every day. The future of making things.

**Enjoy your reading!**

Ulrika Nordström
Marketing Manager MFG Nordic & Baltic

# Content

*Perfecting the Megacar:*

# Electric transmission – Koenigsegg's new agenda

## Four engines. A hybrid drivetrain. 1500 horsepower. But no gearbox. Swedish race car manufacturer Koenigsegg keeps on surprising. When presenting their latest model in Geneva recently, plenty of industry eyebrows were raised. As always.

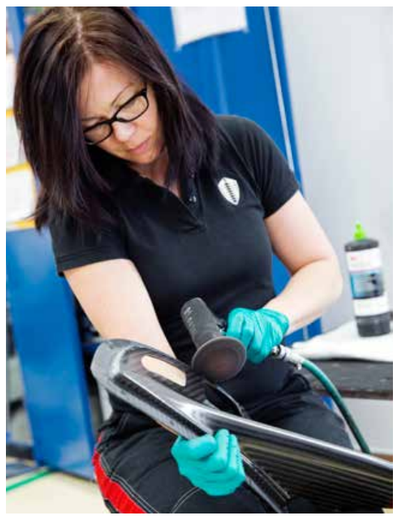
First came the record breaking CC8S and CCR models. Next in line was CCX – Koenigsegg's first model to be truly recognized all over the world. This immensely popular Roadster Hypercar combined the best of racing and leisure use, with its detachable hardtop roof and amazing luggage space.

A few years later, the Agera Hypercar hit the streets, paving the way for the One:1 model which would take the racing fans by storm. The world's first "Megacar" featured exactly one megawatt of power – 1 360 hp – and reached the dream ratio of one horsepower per kilo car.

And now, along comes Regera. Visually, sharing some DNA with its famous predecessors, yet completely different. As usual within Koenigsegg, the thinking is lateral. And the result both impressive, extreme and astonishing.

### A hybrid from scratch

Technical Director Jon Gunner is notably proud as he guides his Autodesk visitors around the workshop floor in Koenigsegg's modest former hangar outside Ängelholm in southern Sweden. He even allows a sneak peek into the prototype room.



Craftsmanship and attention to detail is everything at Koenigsegg. *Images: Leif Johansson.*

"We threw out all the preconceived ideas of hybrids and sports cars and started from a clean slate. And finally someone understood how to produce a hybrid for true performance", he says, nodding his head towards the creative innovator himself, Christian von Koenigsegg – who is presently occupied with an intense test of the new, stow-away wing system.

"Christian is a true innovator", Jon Gunner explains, smilingly. "He constantly comes up with the most amazing and crazy ideas, which ultimately becomes my job to realize".

### Complete electrical redesign

The new hybrid car called for a lot of amazing ideas. Instead of the traditional gearbox it was equipped with direct drive, providing a tremendous take-off and an unprecedented torque. Four engines, three electrical and one traditional combustion engine, combine the best of both worlds. And as a further result, the entire electrical architecture – the nervous system of the car – had to be completely transformed.

"Previously, most cables were connected to one single point. The new solution is a distributed system with several different power nodes, which saves a lot of weight and makes the wiring less extensive", says Jon Gunner.

### In search of speed

At Koenigsegg, speed is the target at all times. And not just for the car itself. Speed of development is also a must. The team is currently in-sourcing resources, to further enhance production flexibility. In these efforts, Autodesk solutions have played an integral part.

"Outsourcing is often a slow and inadequate path where changes take forever to implement. We do a lot of reverse engineering with very late design changes, this calls for real control and flexibility in-house", Jon Gunner explains.

### Seamless electrical engineering

Following a careful benchmark study, Autodesk Inventor and AutoCAD Electrical was found to be an ultimate software for Koenigsegg, even allowing some integration with their regular Catia platform. Mixing CAD platforms might not be a standard industry solution, but it works well for the efficient engineering team at Koenigsegg. The smart solutions of the Product Design Suite now take the intricate electrical structures from 2D schematics into full flare 3D, visualized in Inventor models "translated" from Catia origins.

"Autodesk was the only provider that could take us seamlessly through the electrical design process. This full package 3D solution makes us more dynamic and optimized", Jon Gunner says.

### Precise out-data

At Autodesk's reseller Cadcraft, sales engineer Daniel Marcus is keen to promote Koenigsegg's way of working.

"Only few companies use this clever software integration to its full potential. To do schematics in 2D and routing in 3D provide very precise out-data, saving time and material and enhancing quality for the production team", he says.

In the engineering department, Christian von Koenigsegg meets up once again. With the Regera just launched, he is keen to showcase all the news. What is his favourite feature?

"No doubt the direct drive", he replies. "It represents a complete new frame of mind. Now and again you stumble upon a car that makes normal cars feel prehistoric. I am hoping this will be one of them."



Back to content

Every part tailor made and handled with the utmost care – left, the superlight forged pistons, right, assembly of body parts.

> "Autodesk was the only provider that could take us seamlessly through the electrical design process. This full package 3D solution makes us more dynamic and optimized."
>
> **– Jon Gunner**
> Koenigsegg


Koenigsegg's latest model Regera marks the dawn of a complete new thinking regarding performance.

Christian von Koenigsegg studies the 3D routing of the electrical system in Inventor with electrical engineer Christoffer Lind.

Jon Gunner is happy to present Regera, the latest Megacar.

### Koenigsegg's technical leadership

Koenigsegg truly is a company at the forefront of development and production technology. A few examples are:
**3D printing.** In the efforts both to save weight and to produce in-house, many interior details are 3D printed before upholstering and leather/cloth covering.
**New materials and production methods.** The exhaust pipe of the new Regera is made of titanium which is 3D printed into one single part – one of the biggest ever.
**Carbon fiber chassis, body and rims.** For weight reasons, carbon fiber has become the standard material for most parts. The rear hood of the new Regera represents one of the world's most complex and probably the largest carbon fiber hollow component ever produced in one single part.
**Green technology.** Koenigsegg was the first "green" extreme car manufacturer with the release of the biofuel CCXR in 2007. The One:1 also runs on E85 biofuel, race fuel or normal gasoline and the Regera, as mentioned, is a hybrid.

**Watch the movie about Koenigsegg!**

### Autodesk Key Software:

**Product Design Suite** – an entire software suite developed to meet the manufacturing company's diverse needs. At Koenigsegg, the use of AutoCAD Electrical integrated with Inventor has been key to a most successful electrical development, also producing important data for the in-house production of tailormade cable harnesses. Inventor is also used to develop the powertrain.

Back to content

*The future of the past:*

# Digital mummy reveals news about ancient Egypt

Thebes, Egypt, some 2 300 years ago. The body of ancient Egyptian priest Neswaiu is being prepared for the hazardous journey into the afterlife. Amulets are placed on his body and he is carefully mummified and placed inside several coffins. His journey can begin.

Neswaiu's thorough embalmers certainly granted him a most intriguing afterlife. At Medelhavsmuseet in Stockholm, his mummified body has been digitally resurrected, using advanced 3D technology from Autodesk. Today, Neswaiu is the center of attention at the museum's new permanent Egypt exhibition.

Along with five other mummies from the museum's collection, Neswaiu was recently digitized in a groundbreaking 3D project. For the first time ever, a complete digital replica of a mummy has been produced. Using extraordinary software technology and an interactive touch table, any visitor can unwrap the many layers, covers and ornaments within his coffins, see the hidden treasures inside, unveil body, intestines and skeleton and even explore possible causes of death – an experience that has created queues of visitors to the museum.

## Health and fate

"Our new exhibition focuses on the human aspect and offers new perspectives on ancient Egypt", says Sofia Häggman, Director of Medelhavsmuseet.

"3D digitization technology enables us to describe both the health and fate of individuals in quite some detail, and also allows us to learn more about the Egyptians' beliefs about the afterlife."

Together with curator Elna Nord, Sofia Häggman is one of the initiators behind the new digital experience. The mummies were brought to Medelhavsmuseet more than a hundred years ago, but the old exhibition was outdated and the experience of the mummies rather dull and uninformative. In order to realize the new bold plans of digitization, a team of many carefully selected key players had to be formed.

## State of the art team

First of all, the Swedish research institute Interactive Institute Swedish ICT (TII) in Norrköping were signed up for the project. Their Studio Director Thomas Rydell led the impressive digitization project.

Secondly, the Center for Medical Imaging and Visualization at Linköping University, CMIV, were signed up for the difficult task of CT scanning the delicate mummies using the latest double-energy technology.

British 3D tech expert FARO helped capture the outsides of the coffins and mummies using the latest in high precision 3D measurement technology and photogrammetry, and Autodesk supplied the new, cloud-based software needed to capture the data from the 3D models.

## Unveiling hidden treasures

Last but not least, all of the data from Neswaiu, the mummy that was chosen for public display because of its richness of interesting features and details, were finally combined in Inside Explorer, a real-time volume rendering software developed by TII. The result is a complete 3D model of the mummy, from the outer coffin down to the smallest bones inside – displayed on a touch table where the mummy can be explored layer by layer by any visitor, unveiling the hidden treasures within.

Not only have the mummies been digitized without disturbing a single cloth. Their wrapped-in jewelry and amulets have also been brought to life using a combination of modern 3D scanning and printing technology. One example is Neswaiu's falcon amulet, which has been 3D printed as an exact replica, in its original material bronze.

Thomas Rydell at Interactive Institute Swedish ICT has been the project leader for the entire digitization of the mummies:

"This is a really exciting example of how to use the latest design and digital prototyping technology for entirely new purposes. With this project we hope to inspire other museums to work with 3D digitization, interactive visualization and 3D printing to make their collections accessible in new ways. In this project we worked with mummies, but the same technology could be used on a variety of objects and for many different purposes," he says.

What lies within? The digital unwrapping of mummy Neswaiu, an ancient Egyptian priest, revealed among other things a multitude of amulets and adornments hidden inside the linen. *Images: Interactive Institute Swedish ICT (TII).*



Neswaiu's outer coffin is set up for a photogrammetry session at the studio in Norrköping. Using the cloud-based software Autodesk Recap, the multitude of images from the session is used to generate a complete 3D model of the coffin.

An interactive touch table from Interspectral AB allows the visitors to explore the mummy on their own.

"This technology enables our visitors to gain a deeper understanding of the once living man behind the linen bandages. Layer by layer, we can unwrap the mummy and gain knowledge of his sex, age, health, living conditions and beliefs. With technological help, our mummies help enhance our understanding and knowledge of the past."

– **Elna Nord**
Exhibition Producer at
Medelhavsmuseet in Stockholm

The latest double-energy technology in CT scanning were used to document the inside of the mummies.

A digital resurrection grants an intriguing afterlife for six mummies of Medelhavsmuseet in Stockholm, at the museum's new permanent Egyptian exhibition. Above, the beautifully ornamented coffin of the priest Neswaiu.

**Autodesk Key Software:**

ReCap – a cloud-based, reality capture and 3D scanning software – was one of several key components used to capture data in this groundbreaking project. The software uses advanced photogrammetry technology that can generate a 3D model from, for instance, a series of photographs.

View BBC's story of the mummies here!

Listen to Autodesk's Tatjana Dzambazova as she presents the technology behind the mummies!

# Autodesk Nastran In-CAD – success recipe for Mento Service

## Increasing market demands. New safety regulations. And extreme environments where products need to work faultlessly day in, and day out. Specialist offshore supplier Mento Service needed advanced simulation tools – and found Autodesk Nastran In-CAD.

When Bergen based Mento Service in Norway develop their tailor made equipment for the oil and gas industry, they need to verify every little part of the solution, down to the smallest bolt. Customers, industry organizations and governments keep raising industry standards and the certification process for new products becomes more and more detailed. In the engineering department, this translates into a massive amount of testing, validation and verification, supported by hundreds of documents.

Bjørn Tore Ekerhovd, development manager at Mento Service, had a vision. He needed a complete, easy to use CAD solution that would help his engineering team solve their development issues more effortlessly, take products faster from order to completion and verify and document them better in the process.

### Digital prototyping a must

"In our world, physical prototypes are out of the question. Our products are tailor made one-offs and highly specialized for their respective customers. This means we depend on virtual testing and validation, where we strive to use digital prototyping solutions as much as possible", says Bjørn Tore Ekerhovd.

As a highly specialized niche supplier, Mento Service often works with hi-end materials like titanium and super-duplex and strives to be ahead of competition in all respects. Their high quality mechanical products – manifolds, pipe spools, pressure vessels, filter applications and subsea equipment – are found on oil rigs, supply ships and in the oil and gas industry in general, both in Norway and on the international market. Autodesk's Product Design Suite, featuring Inventor, forms the basis for their development environment.

### Simulation in Inventor

Bjørn Tore Ekerhovd brought his vision to his CAD partner Ove Hjelle at NTI Cadcenter in Bergen, Autodesk's local reseller. Together with Autodesk, Ove Hjelle suggested a range of competitive products to solve Mento's issues – among them a brand new simulation software, Autodesk Nastran In-CAD.

"Mento had a very clearly specified list of advanced simulations that they needed to do. This included stress analysis on parts, but also load analysis, deflection and vibration analysis, and bolt and thread calculation. With Autodesk's new Nastran application, all of this can be handled within the familiar environment of Inventor", Ove Hjelle explains.

### Efficient CAD environment

The solution proved an immediate success at Mento Service. After a few days of introduction and education, Bjørn Tore Ekerhovd and his engineering team managed the different types of analyses in Autodesk Nastran InCAD on their own. Working also with 3ds Max for visualizations of products and suggested solutions, and Vault Professional for advanced document handling, the CAD environment at Mento Service became more tailored to the team's specific needs.

"We see a much improved, faster workflow and an instant raise in quality", Bjørn Tore Ekerhovd states. "This new combination of software provides shorter lead times over all, more qualified and clear-cut design suggestions to customers and a much improved verification process."

### FEA in Inventor

Working with FEA, Finite Element Analysis, directly in Inventor was a major step, Bjørn Tore Ekerhovd concludes:

"We had been working with simulation software before, but most of them meant export of files to external software with quite extensive lead times. Now we can handle it in the stride, in our normal Inventor workflow, and in-house."

Today, the team looks forward to new levels of efficiency. Implementing the new digital prototyping system, with Autodesk Nastran InCAD, Vault Professional and 3ds Max to support the standard Inventor environment, is just a first step on the road to a much enhanced workflow.

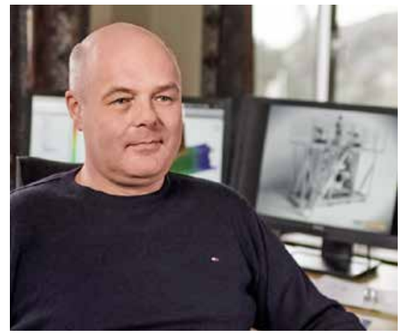
"We see several steps ahead of us before we reach the goals set in our vision", Bjørn Tore Ekerhovd explains. "Now we need to fine-tune our methodology and move on with integration of systems in order to reach the full potential of new business advantages."

Above and right: Production and assembly at Mento Service is handled at two top quality production units close to Bergen in Norway. *Image: Mento Service AS.*

*Image: Mento Service AS.*

"Today we can handle advanced simulation in the stride, in our normal Inventor workflow, and in-house."

– **Bjørn Tore Ekerhovd**
Mento Service AS



Bjørn Tore Ekerhovd, Mento Service AS.

Details of Mento Services products, like the filter unit in this image, are simulated using Autodesk Nastran In-CAD. *Image: Mento Service AS.*

The standards and demands in the oil industry are extremely high. For Mento Service and other suppliers, this means a lot of testing and validation.

### Mento Service AS

Mento Service AS is a company in the Mento group, providing engineering, product development, production, rental and maintenance of industrial equipment for the oil & gas industry. At two locations near Bergen in Norway, some 70 employees develop, rent out and produce mechanical solutions as manifolds, pipe spools, pressure vessels, filters & strainers, frames & structures and subsea equipment.

**Watch the movie about Mento Service AS!**

### Autodesk Key Software:

At Mento Service, a combination of Autodesk software provide a tailor made engineering environment.
**Autodesk Nastran In-CAD** software is a CAD-embedded finite element analysis (FEA) tool powered by the Autodesk Nastran solver. The software offers a wide range of advanced simulation for multiple analysis types.
**Product Design Suite Ultimate** provides a full range of design software, featuring Inventor.
**Vault Professional** provides solutions for Product Development Management, PDM, and advanced document handling.
**3ds Max** is a 3D modeling software providing comprehensive tools for modelling, animation and rendering of products and environments.

*Perceptual design facilitates the sale*

# Smart 3D visualization takes storage to the next level

## Faster from concept to complete sales pitch. Higher quality and a much enhanced communication with the customer. For Constructor Finland Oy, Autodesk Factory Design Suite has become a small revolution.

Factory Design Suite is a complete software package that includes 3D design software for factory design and tools to design and simulate manufacturing equipment. For Constructor Finland Oy, a provider of comprehensive warehouse solutions, these tools have supplied new business opportunities.

"Especially the sales process has improved immensely. Today we are able to show the customer a complete, authentic visualization of the suggested solution, early on in the process. This takes our communication to entirely new levels", says Kimmo Lempinen, Development Manager at Constructor Finland.

### Leading supplier picks up speed

Constructor Finland Oy is part of the Constructor Group, Europe's third largest supplier of storage solutions and the largest supplier of archive and office storage solutions. Guided by their witty slogan "Think Inside the Box", the company provides a complete range of storage, archiving and logistics solutions for a wide variety of industries.

With its market leading products, Constructor's Kasten brand allows for many products and solutions in just one storage plan. However, interpreting the suggested solutions may be quite a difficult task with a presentation in 2D. A smart feature in Factory Design Suite is the possibility to work both with a "flat" layout overview version in 2D, and when needed, have the objects visualized in 3D.

"For the customer, the 3D presentation is a revolution. We really appreciate the range of smart software within the suite, which among other things means that we can take our visualizations one step further into a more photorealistic view. This brings a new understanding and lays a far better foundation for our discussion, and we can utilize the visualizations in our marketing efforts", Kimmo Lempinen says.

### Digital Prototyping at its best

The three-dimensional presentation highlights the different shelf solutions, height differences and the overall impression of the storage space. Factory Design Suite also brings colors to the designs. In addition, it allows the use of animation for presentation, as well as advanced post-treatment of plans and rendered still images.

Michael Nyman at reseller Cad Quality Finland, is pleased with Constructor Finland's use of the software.

"This is a nice example of what you can achieve with Factory Design Suite. It is all about Digital Prototyping, where you can see, experience and test objects and designs before they even exist", he says.

The combination of 2D and 3D design brings an abundance of new advantages, Michael Nyman explains:

"The software increases both the quality and standardization of work. Objects for your design are chosen from a company-specific object library which increases speed and versatility, while at the same time eliminating mistakes and enhancing overall quality."

### Staying ahead of competition

For Constructor Finland, with its impressive 125 year track record in the storage industry, the prospect of staying ahead of the competitors is equally important.

"There is fierce competition. The more we work with Factory Design Suite, the better we differentiate ourselves from our competitors", Kimmo Lempinen states.

Constructor Finland bought its first Autodesk Factory Design Suite license in 2012. Today, new licenses are added to the portfolio, new features of the software are explored and more and more employees are sent to be educated by Cad-Q.

"We constantly see new opportunities", says Kimmo Lempinen.

"3D presentation brings advantages also to the installation phase and in our marketing efforts. And it does not stop there. In the future, I think the benefits of the 3D models will be leveraged even after delivery."

> "It is all about Digital Prototyping, where you can see, experience and test objects and designs before they even exist."
>
> – **Michael Nyman**
> Cad Quality Finland Oy



Back to content

By using the software in the Autodesk Factory Design Suite, Constructor Finland can suggest and showcase new environments in great detail. Above, a solution visualized in 3ds Max. *Images: Constructor Finland Oy.*

Above, below and left: Complete and authentic visualizations of customer solutions can be developed in many different ways, early on in the process.

> "The more we work with Factory Design Suite, the better we differentiate ourselves from our competitors."
>
> – **Kimmo Lempinen**
> Constructor Finland Oy

Kimmo Lempinen heads up the development team at Constructor.

### Constructor Finland's Inside the Box solution:

Smart warehouse optimization – that is the concept described as Thinking Inside the Box. At Constructor Finland, the development team aims to reduce costs, save space and time and reduce inventory for the customers, while still keeping safety as a first priority.

Using both their own and external storage systems, Constructor's experienced analysts and engineers improve their customers' warehouse efficiency. The Factory Design Suite tools save valuable time and increase ROI, both in-house and with customers, whilst maximising supply chain efficiency.

### Autodesk Key Software:

Factory Design Suite – an entire software range in 2D and 3D for factory planning, design and visualization.

Back to content

# Designing their way into future markets

## A few years ago, Aquajet distinguished themselves at a design workshop with Autodesk partner Cadcraft. Since then, all of their products have become smarter, more functional and sharper looking.

Aquajet's hydrodemolition robots are versatile and made for tough use. Left to right Aqua Cutter 410A for light work, Aqua Cutter 710H for horizontal work and Aqua Cutter 710V for all applications. *Images: Aquajet Systems.*

For Aquajet, the look and feel of a machine is crucial. Inventor and VRED Design are key software when this small company strengthens its remarkable position as world leader on hydrodemolition.

What is the best way to refurbish a concrete construction? Ask anyone at Aquajet Systems, and you will immediately hear the word hydrodemolition. The 22 employees at this family-owned, Småland-based company have developed industrial machinery for the smartest, most sustainable way to remove deteriorated concrete from constructions, for well over 30 years. Today, they are the undisputed world leader, selling their cutting edge technology all over the world.

"The market for hydrodemolition is growing rapidly and we are growing with it. Last year was incredible and this year looks even better", says Ronnie Hilmersson, Design Manager at Aquajet Systems.

### From bridges to nuclear plants

Originally the products were designed for bridge refurbishment. Over time however, the areas of use have multiplied. Today the advantages of hydrodemolition technology are becoming increasingly apparent at airports, harbours, power plants, dams and petrochemical industries.

"Recently our machinery was used to cut a perfectly shaped, oval hole in the rounded roof of an American nuclear plant", Ronnie Hilmersson explains proudly.

"This would have been a tricky task using any other kind of technology, but with our equipment it was smooth operation. The customer was really impressed and has since bought more equipment from us."

### Tries the latest

Despite the fact that their products are hardcore industrial machinery, the team at Aquajet Systems wants them to look super sharp and to display that well thought through functionality for the user. When the team recently updated their software, reseller Cadcraft suggested adding the latest addition to Autodesk's visualization and digital prototyping portfolio, VRED Design, to their system. Adam Erlandsson, design engineer at Aquajet, was granted the exciting task of being 'test pilot' for the new software:

"VRED adds a lot more functionality that enables us to very neatly produce market material, promotion imagery and product information on a high professional level. It also enhances our product visualizations in general. You might think that it is an overkill to engage in great design for a piece of equipment that becomes soiled the very first time you use it, but we find otherwise. Good design displays the thought and care that you have invested in the product", Adam Erlandsson says.

Ronnie Hilmersson seconds that thought immediately.

"Design is all about functionality and that is our prime goal. Equally important are the ergonomic details for the user. On a more pedagogic note, we also appreciate the new possibilities to produce detailed technical visualizations of features that are hard to photograph, for instance cross sections", he adds.

### Structured approach

At Cadcraft, technical design specialist Mikael Rajaniemi appreciates the way Aquajet incorporates design and visualization into their processes.

"Most manufacturers of industrial machinery see the advantages of design and understand that it is an important factor to take into account. But only few have like Aquajet identified it as key to their business, dedicated the necessary resources and taken a deeper and more structured approach to it", Mikael Rajaniemi states.

For Aquajet, the market continues to open up. Custom made products are now becoming increasingly common.

"Working with customer specific solutions further enhances the need for advanced Digital Prototyping and to be able to visualize things that are not yet complete. All the way through the development process this provides easier communication, both within the development team and in discussions with the customers", Ronnie Hilmersson concludes.



An Aquajet hydrodemolition robot in action at a berth in Gothenburg harbour.

Above and below: Sturdy extensions for the robots provide the range necessary for difficult tasks out of the ordinary reach.

> "Only few companies have like Aquajet identified design as key to their business, dedicated the necessary resources and taken a deeper and more structured approach to it."
>
> – **Mikael Rajaniemi**
> Cadcraft

Stefan Ewers, Anders Billred, Ronnie Hilmersson and Adam Erlandsson make up the design and development team at Aquajet.

### About hydrodemolition

**To protect and preserve**
Hydrodemolition is the sustainable way to protect and preserve concrete constructions. The method is ideal for removing deteriorated and damaged concrete from any construction in need of refurbishment. With hydrodemolition equipment you leave a sound and good surface, ready for reinstatement with new material. Aquajet's products work with precision control of the high-pressure water jets, which also ensures that the rebars remain intact after the operation.

### Autodesk Key Software:

**Product Design Suite** – an entire software suite developed to meet the manufacturing company's diverse needs.

**VRED Design** – a specialized visualization software enabling advanced and photorealistic imagery.

# Roulunds Braking accelerates business with PLM 360

## Not very long ago, PLM was complex, expensive and for really large corporations only. Then there was PLM 360. Disrupting the industry, Autodesk made cloud-based PLM affordable, accessible and easy to use. Just ask Roulunds Braking.

As one of the world's leading providers of braking systems to the automotive industry, Roulunds Braking has been successfully using Autodesk PLM 360 lifecycle management software as its central source of information. As the company expanded, a Product Lifecycle Management solution was necessary in order to store all information for the company's many products.

"PLM360 is the only solution of its kind. The ability to rapidly deploy the system and provide all users with access to real-time data has significantly minimized development errors and improved development time", says Mark Lawrence, development engineer at Roulunds Braking.

### Global made easy

"What time zone are you in?" This is the first question Mark Lawrence asks when you try to book a meeting. It reveals just how global Roulunds Braking is. With co-workers, production units, sales offices and customers all over the globe, the need for a flexible cloud-based system is self-explanatory.

"We produce and reverse engineer parts in Europe, India and China. PLM 360 has eliminated a tremendous amount of e-mailing and version checking when engineers sign off on new designs", says Mark Lawrence.

### Growing number of users

Since the introduction of PLM 360 in 2012, Roulunds have almost doubled its business. To a large extent because of loyal customers buying their excellent products (claims are minimal), but also because of good pricing and outstanding service. The company has also made some acquisitions, which translates into more users to introduce to PLM 360.

"We started with 20 users of the system. Right now there are 80. Many users who are working at home and travelling a lot use the system both in their iPads and laptops. And a large number of the users are actually our customers", says Mark Lawrence.

### Transparency all the way

Yes. Roulunds allow the clients to log in and review the latest design schedules and modifications. A unique transparency that eliminates heavy e-mailing and even DVDs mailed across the globe.

"Our customers tell us they prefer to be able to help themselves acquire our most current design information and request changes while proceeding with their designs. The ability to use Autodesk PLM 360 to selectively reveal up-to-date engineering data was a major selection criteria for us," Mark Lawrence explains.

### Clone and go

With so much functionality, consulting costs must have rocketed? Actually, no. After embedding the system with a little help from Autodesk, Mark Lawrence is able to handle everything quickly and easily himself, no matter what the task.

"I can literally clone complex workflows in two minutes. Even large operations, like when we acquire a new company or go from private cars to heavy commercial vehicles. I just copy a product, make some adjustments and we're ready to go. It drastically reduces deployment time", he says.

### Always a clear view

Roulunds Braking has expanded rapidly over the past few years and now supplies original equipment manufacturers (OEMs), original equipment suppliers (OESs) as well as the after-sales market with their products. In total there is over 12,000 well documented articles. In spite of this, it is easy to find the needle in the haystack.

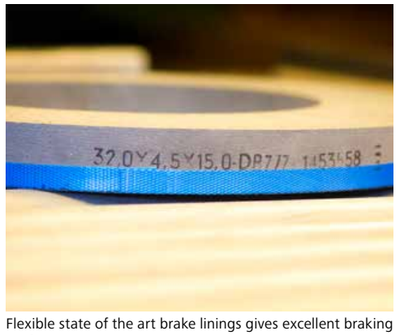
"From the moment you log on, everything is intuitive. I can easily set up a filter and find exactly the one part I am looking for. And instead of presenting CAD-data the system generates nice, clear and informative images in an instant", Mark Lawrence states.

### Business the 360 way

Up until today, the only manual moment still in operation with Roulunds has been to migrate relevant design release data to a company-wide ERP system using excel sheets. But those days will also soon be a thing of the past.

"It's easy and cheap to handle this manually. But the risk for keystroke errors is enough to make us want to automate the process. And now we have found that both PLM 360 and our ERP system are well prepared for this. When this integration is finished, we will have a fully automated system that successfully covers every angle of our business", says Mark Lawrence.

Instant updates world wide with PLM 360s cloud based service. *Images: Halil Ayhan Belek.*



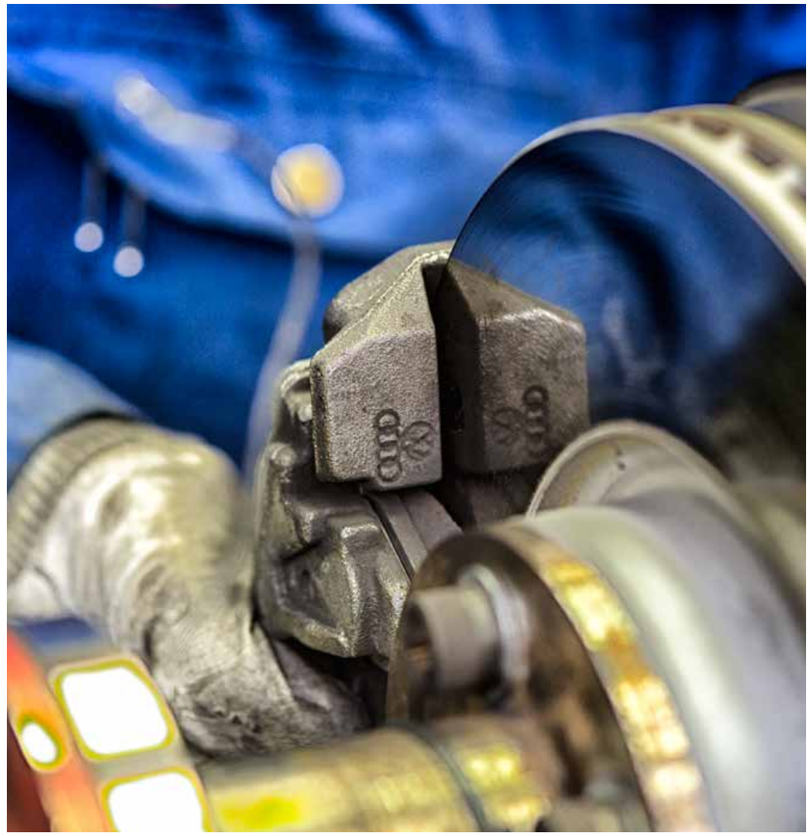
Flexible state of the art brake linings gives excellent braking performance.



Back to content

Mark Lawrence.

> "I can literally clone complex workflows in two minutes. I just copy a product, make some adjustments and we are ready to go. It drastically reduces deployment time."
>
> – **Mark Lawrence**
> Roulunds Braking



Brake discs are under constant control throughout the production process, and together with the design specifications these products match original equipment (OE) quality and performance.

After friction and noise testing, the materials are mounted on a vehicle. Testing is carried out in various locations and several test tracks in Europe and North America, including the Stelvio, Grossglockner and Mojacar.

### Roulunds Braking

Roulunds Braking is one of the world's leading manufacturers of high quality friction materials to the automotive industry, with sales and customers worldwide. The company's product portfolio includes flexible brake linings, brake pads, brake shoes, brake discs and brake shoe kits, for passenger cars, light commercial and heavy commercial vehicles.

Roulunds Braking is part of MAT group and has manufacturing facilities in India, China, France and Denmark, with over 2,500 employees worldwide, with steady growth.

### Autodesk Key Software:

Autodesk PLM 360 is Autodesk's cloud-based product lifecycle management software. It streamlines business processes in an affordable, intuitive, and easy to deploy system. Autodesk PLM 360 is part of the Digital Prototyping solution which helps companies of all sizes develop, manufacture, and deliver products more efficiently.

# Perfectly imperfect, 3D printed jewellery

## Boardroom presentation. Cocktail hour. Red carpet soiree. There is a Lumitoro jewellery for every occasion. Surprisingly, these exquisite pieces are designed and produced using Autodesk Fusion 360 and 3D printing.

Roberto Chaves needed a present for his girlfriend; a unique piece of jewellery, something very personal. As an accomplished 3D designer, he made his own. He 3D printed it. His girlfriend loved it. A brand was born.

A busy and diversified worker, Roberto Chaves is the essence of the modern DIY person. Software developer and computer programmer, high end photographer, industrial designer, pattern designer for IKEA, jewellery innovator, problem solver and constant thinker. But he does not like to label himself as one or the other.

"Inspiration is everywhere. I have a tendency to deep dive into things that catch my interest", he claims.

Such as flight comfort. Travelling home from Autodesk University in Las Vegas, where he was recently invited to showcase his first Lumitoro collection "Shapes", he spent the first hour and a half on board the plane scribbling down 23 tangible ideas about how to improve the cabin space.

"Instead of complaining I would rather show that there may be better ways. The best of these ideas will eventually become a small flight concept", says Roberto Chaves.

### 3D trials since 1997

Already in 1997, Roberto Chaves started his deep dive into 3D printing. At the Siggraph trade fair in Los Angeles, one of the world's first commercial 3D printers caught his eye. A must have, Roberto Chaves thought. A few years later, he bought his own and started experimenting. Today, four 3D printers take their turns producing innovative prototypes for vases, jewellery and other small design items in his combined work shop/studio in Stockholm.

Roberto Chaves uses Autodesk Fusion 360 and mixes drawing by hand, computer aided design and digital prototyping.

"The big difference is the simplicity of the 3D design processes of today. I am still amazed that in as little as 30 minutes, I can hold a plastic prototype of a necklace in my hand. Fusion 360 has increased my productivity tremendously", Roberto Chaves claims.

Ring from the Stickii series in Lumitoro's first collection Shapes. *Images: Roberto Chaves.*

### Inspiration everywhere

The Lumitoro collection Shapes – his first, we can expect many more – is the essence of his many different roles and interests. The perfect mix of art, design and technology, with the experienced macro photographer's attention to detail – light and shade, shape and form. An idea may emerge from the most trivial of events. For instance, the Shapes series "Stickii" was inspired by a number of Q-tips that were spilled in a pile on the floor.

In all his work, he is preoccupied with perfection and imperfection.

"If you look at a truly beautiful person, it may almost get a bit dull", he claims.

"We all appreciate symmetry, but there must be that little something in it, that adds interest. A slight imperfection is what creates real beauty."

### Next to perfect

The pieces may be made of silver, bronze, stainless steel, titanium or nylon. Most of them are 3D printed. Production in longer series is carried out using specialized lego manufacturers. Silver pieces, however, are so far produced using a 3D printed wax and then lost-wax casted and hand polished to perfection. Roberto Chaves has tested printers, materials and methods – over and over again.

"I had to really use my persuasive skills in order to get access to machines that could 3D print titanium, technology that would normally only be available for the medical and space industry," Roberto Chaves explains.

### Long hard road

The road to today's hi-pitched jewellery collection has been long and hard, and is still heavily supported by Roberto Chaves two "real jobs" as a photographer and a 3D software developer. But the response once the Shapes collection was on the market, was almost instant.

With a truly international heritage – his mother is Finnish, his father from Spain and he is raised in Sweden – he speaks four languages fluently and is currently learning a fifth, Japanese. Lumitoro is a clever combination of the Finnish word for snow, Lumi, and the Spanish word for bull, Toro.

And the snowbull?

"That is me, of course", Roberto Chaves says, smilingly.

Bracelet from the Stickii series.



Back to content

The necklace Tubii, also from the Shapes collection, is produced in a wide variety of materials.


Above and below: Ring and necklace versions of Stickii.

> "I am still amazed that in as little as 30 minutes, I can hold a plastic prototype of a necklace in my hand. Fusion 360 has increased my productivity tremendously."
>
> – **Roberto Chaves**
> Lumitoro

### About 3D printing

3D printing or Additive manufacturing is a process of making a three-dimensional solid object of virtually any shape from a digital model. 3D printing is achieved using an additive process, where successive layers of material are laid down in different shapes. 3D printing is also considered distinct from traditional machining techniques, which mostly rely on the removal of material by methods such as cutting or drilling (subtractive processes).

*Source: Wikipedia*

### Autodesk Key Software:

Fusion 360 is a tailor made 3D tool for product development aimed at, among other methods, 3D printing. Fusion 360 is the only cloud-based tool that combines industrial and mechanical design, collaboration, and machining in a single package. The workflow is creative; you move between industrial design and mechanical design with one click.

**Watch the movie about Roberto Chaves and Lumitoro!**

*Challenging cost pressure in the oil & gas industry:*

# Custom design makes safety affordable

## When the fire alarm goes off on an offshore oil rig you cannot dial 112. Luckily there is an ocean of water around you. And Eureka Pumps makes sure you can use that water to save both lives and equipment.

Eureka Pumps is a market leading supplier to Norwegian offshore companies, also operating on international markets, with products based on their own technology.

"We deliver a wide range of pumping and generator systems, focusing on offshore applications. Most of our systems are crucial for the customer. An oil rig cannot operate without knowing that the pumps for fire water are working", says Preben Støbakk, engineering manager at Eureka.

*Images: Eureka Pumps.*

### Worst case scenario

It is a huge responsibility. Eureka's Firewater Packages are the kind of systems that you hope will never be truly needed, but the offshore working environment is tough. In case of emergency, the pumps must function. They are therefore designed to operate in two modes – test mode and emergency mode.

On the platform, the crew often run the equipment in test mode on a weekly basis. All alarms and protective shut down signals are activated during tests in order to detect any kind of trouble – such as low oil levels or a high coolant temperature.

"In emergency mode though, nothing shall stop the pump from delivering. Shut down signals to protect the equipment are overruled. The unit is also designed as a complete standalone system. With its own power supply and diesel supply it will continue, even if other systems on the platform fail", says Preben Støbakk.

### Never the same

On a general level, the units are very much the same. But oil rigs are usually unique in size and layout and a firewater pump needs a lot of equipment to function as requested.

Therefore, standardization is difficult or near impossible. The firewater packages may need diesel engines, generators, start systems, exhaust systems and control systems which must be able to interface towards the platform. Custom design is crucial to meet this demand – no solution becomes exactly like another.

"Our niche is to constantly design multidisciplinary packages that meets the customer's requirements every time", says Preben Støbakk.

### Seamless integration

A while back Eureka Pumps decided it was time to exchange its ERP-system. And the request for the new CAD-system was that it should both enhance development efficiency, and allow for integration with the ERP-system. Opportunity knocked – Autodesk's Product Design Suite was a perfect fit for both aspects and AGS, Autodesk's partner in Norway and Eureka's integration specialist, assisted with the implementation.

Birgit Pettersen, vice president at AGS, honors the decision from Eureka Pumps: "To exchange both ERP- and CAD-system on this scale, simultaneously, is a very bold move. The benefits will no doubt be considerable and are already evident", she says.

Preben Støbakk fully agrees: "We changed the entire foundation of our design process which is a very big step, but we decided that it was the way to go. Seamless integration between the engineering disciplines and our ERP system is a huge benefit and our divisions simultaneously became more integrated", he explains.

### Winning formula

Offshore is a challenging industry. Many other industries, for instance the car industry, has a long design period before the equipment is put into production. Every detail of the design is in place before the supply chain for the manufacturing phase is formed.

For Eureka, this is not possible. The specific customer requirements must be met in a very short time and engineering, design and procurement are often more or less parallel processes.

"With a seamless integration between the design tool and the ERP system, the specifications are always correct and we avoid manual handovers. This reduces the risk for expensive mistakes and increases the quality", says Preben Støbakk.

Eureka's new CAD- and ERP-system is off to a winning start. "These new possibilities along with our long history of accumulated knowledge, will help the oil and gas industry to transform safety obligations into winning business advantages", says Preben Støbakk.

Safety first when custom designing for the rough sea.



Back to content

With excellent standards Eureka translates advanced pumping systems into value for customers.

Preben Støbakk.

"Eureka Pumps' courage to implement a new system on this scale shows the potential and impact that Autodesk's software can provide. For Eureka, it means that their high-quality design can now move freely throughout the development process, helping their customers provide safer working environments."

**– Birgit Pettersen**
AGS Norway

Advanced maintenance and service generates profitability.

An electromotor ready to see the world. Eureka Pumps has offices in Oslo, St.Johns, Houston, Busan, Kuala Lumpur and Perth.

### Eureka Pumps

Eureka Pumps serves the international oil and gas industry, supplying a wide range of pumps and generator sets to new-built facilities while also handling advanced maintenance and service. They also provide upgrades, modifications, equipment testing, installation and commissioning. Eureka Pumps is a division in the Align-group, a supplier of technical safety and total firefighting solutions for the global oil and gas market. Align contributes to customer safety and profitability through delivery, maintenance and modifications of safety- and production critical solutions.

### Autodesk Key Software:

Product Design Suite is a comprehensive solution delivering 3D product design, simulation, collaboration, and visualization tools to complete Eureka Pumps throughout their engineering process. The Digital Prototyping capabilities of the suite help design better products, reduce development costs, and get their products faster to market. Autodesk Product Design Suite also works seamlessly with Eureka's new ERP-system AX and for documentation the ProArc solution.

# Eco-friendly Valopaa lights up Finland

## Cheaper, longer-lasting, brighter and more flexible. The advantages of the new outdoor LED lighting solutions are considerable. With the aid of cutting edge software from Autodesk, Finnish Cleantech specialist Valopaa is rapidly and sustainably illuminating Finland.

We all know the feeling. You are walking home late at night and in an underpass, the lights start to spark and flicker, as in a horror film. Sudden chills run down your spine and you pick up your pace ever so slightly…

The uneasy feeling it well motivated. Safety is one of the most important aspects of street lighting. It has been proven time and again that crime rate diminishes considerably when cities, parking lots, industrial areas and town squares are lit up sufficiently.

Today, flickering and fading city lights will soon become a thing of the past. The new LED bulbs rarely burn out or fail. In fact, they can last a lifetime.

### Best before 2033

LEDs, or light-emitting diodes, are semiconductor components that emit light when an electric current passes through them. They produce the same level of light as traditional incandescent bulbs but use just a fraction of the energy. With a considerably smaller carbon footprint, they are the technology of the future.

Just like the diode technology itself, Oulu-based LED producer Valopaa is evolving rapidly. In the last two years, the company has doubled its turnover. Ari Mattila, head of Valopaa's product development team, is optimistic about the future:

"Today, LED lights can compete fully with traditional lighting. An increasing number of customers understand the huge potential the technology provides in energy efficiency and maintenance. In addition, the lifespan is impressive. LEDs can last up to 20 years. Install one today and it will serve you until 2033, if not longer."

### From the drawing board to the streets

Valopaa's many products and offerings are all designed around a standard light source that can be used in a wide range of applications. At times, the design process may also originate from the specific requirements of the environment where the solution will be used. The full product development cycle lasts between two and six months, depending on complexity. For the last few years, Valopaa has experienced the advantages of Autodesk's Digital Prototyping software. Matti Kerätär, head of sales at Autodesk reseller MekSystems, suggested that Valopaa join Autodesk's Cleantech Partner Program, which supports trailblazing Cleantech companies with affordable product development software. Today, the company uses Autodesk's Product Design Suite, Vault Professional and Simulation CFD.

"Valopaa's design engineers were very competent and quick to pick up speed in using the software", Matti Kerätär explains. "We set up a two-day training workshop and very soon they were up and running, producing their own designs."

### Reuse of components

The software has already yielded a number of benefits. In addition to providing a competitive advantage, they guide and support the design process. Ari Mattila exemplifies:

"Thanks to Vault Professional, we have managed to significantly improve our product development management and our reuse rates for parts and components. Vault's documentation processes really improve quality and efficiency", he states. All products are designed using Autodesk's comprehensive range of software within the Product Design Suite, which has also made a big difference.

"Our sales and marketing teams often need to have something tangible to show the customer. Thanks to the Design Suite tools, we can quickly model and visualise several options", says Ari Mattila.

The Suite also includes tools that provide the design team with important feedback, such as how much a sheet of metal can be bent, and aid the engineers in checking their designs. With Simulation CFD, heat simulations can be made which reduce the number of physical prototypes.

"The benefits are massive. We are able to model and design far quicker and with fewer errors. These new tools improve both efficiency and quality", Ari Mattila states.

Jyväskylä, "the city of light", has a new signature bridge illuminated by Valopaa. *Image: Jani Salonen.*

The fasade of Kauppahalli in Oulu is lit up in a beautiful and environmentally friendly way. *Image: Valopaa.*

> "LEDs can last up to 20 years. Install one today and it will serve you until 2033, if not longer."
>
> **– Ari Mattila**
> Valopaa

Ari Mattilla heads up Valopaa's development team.

Illuminatied parks and parking lots create safer environments.

### About Valopaa

Valopaa designs light sources, light fittings and optics, with all the assembly and testing carried out in-house. Mechanical and electronic components are sourced mainly from local contractors. The company's solutions are suitable for a wide range of applications, including street lighting, floodlights, and forecourt and park lighting. Nearly all of the solutions are designed for outdoor or industrial use. All of them are energy efficient, robust, and easy to maintain and control. Currently, the majority of Valopaa's customers are Finnish.

### Autodesk Key Software:

**Product Design Suite Ultimate** provides a full range of design software for smart product development.

**Vault Professional** provides solutions for Product Development Management, PDM, and document handling.

**Simulation CFD** speeds up the development process and reduces the number of physical prototypes.

The wall of the Pudasjärvi cemetery has been solemnly illuminated to create a suitably poetic and lyrical note. *Image: Valopaa.*

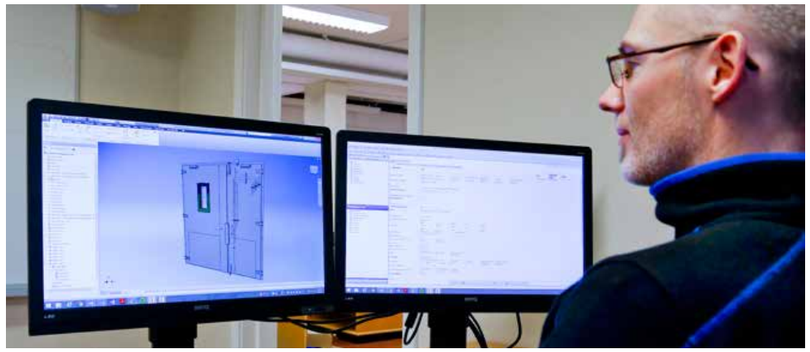
Parking lots and garages are places where lighting is crucial for both vision and safety. *Image: Valopaa.*

Back to content

*Rapp Bomek opened the door to Lean:*

# Doubles the revenue with Inventor ETO

## Toyota, Ford, Caterpillar. The companies that made Lean famous are massive organizations. But what happens if you apply a Lean mindset to a much smaller company? Add some digital prototyping and the results are remarkable.



A specialist in fireproof doors, Rapp Bomek in Bodø, Norway uses Inventor ETO to speed up their product development and apply Lean to their company. Freddy Nygård heads up the engineering team. *Images: Rapp Bomek.*

In the far, far north of Norway, among breathtaking fjords and mountains, with midnight sun in the summer and eternal darkness in the winter. Here, Bodø based Rapp Bomek produce safety doors for the offshore industry – equipment which is prepared for every element that Mother Nature has to come up with.

"Our doors resist heat from fire for up to two hours and blasts up to 3 bar, protecting precious equipment and human lives on offshore platforms all over the world", says engineer Freddy Nygård.

### Right can be wrong

The first Rapp Bomek fire doors were installed in the North Sea fields more than 30 years ago and still perform well in the severely corrosive sea environment. The doors last through fire and flames, but Rapp Bomek were stuck with a small IT-problem – the system sometimes mixed up left from right. A simple problem, with drastic consequences.

"Since all our templates were based on right hinged doors, we had to manually mirror them and do the layout when we cut out a left door with the lasers. This led to high scrapping-costs, and in the worst case, if delivering faulty doors, to losses of up to 5000 Euro", says Freddy Nygård.

The mirroring problem was not all. A "dumb" text configurator often resulted in "two salesmen, two prices". And with each door came a pile of 30–40 documents with – often outdated – instructions and parameters for cutting, production, lasers and so on.

"We were always too busy to update comprehensively, which meant that errors could live on from project to project. Some 35 per cent of our engineering capacity was used for preparation and documentation", says Freddy Nygård.

### A tough challenge

In 2012, new owners raised the bar for Rapp Bomek. The goal was to increase revenue with 50 per cent by 2015, and 100 per cent by 2018.

"With no more staff to do it, we had to come up with a way to produce more within the same work force. We needed a fresh mindset for the entire process", says Freddy Nygård.

Some initial changes down the road, Rapp Bomek was visited by Anders Mellingen, Business Area Manager at Autodesk's reseller Cad-Q. He understood the company's needs and introduced Inventor ETO.

"It was love at first sight. Immediately after the demo we were hooked. All our engineers were thrilled with these new possibilities and just wanted to start right away. We understood that this was good, really good", says Freddy Nygård.

### Big savings

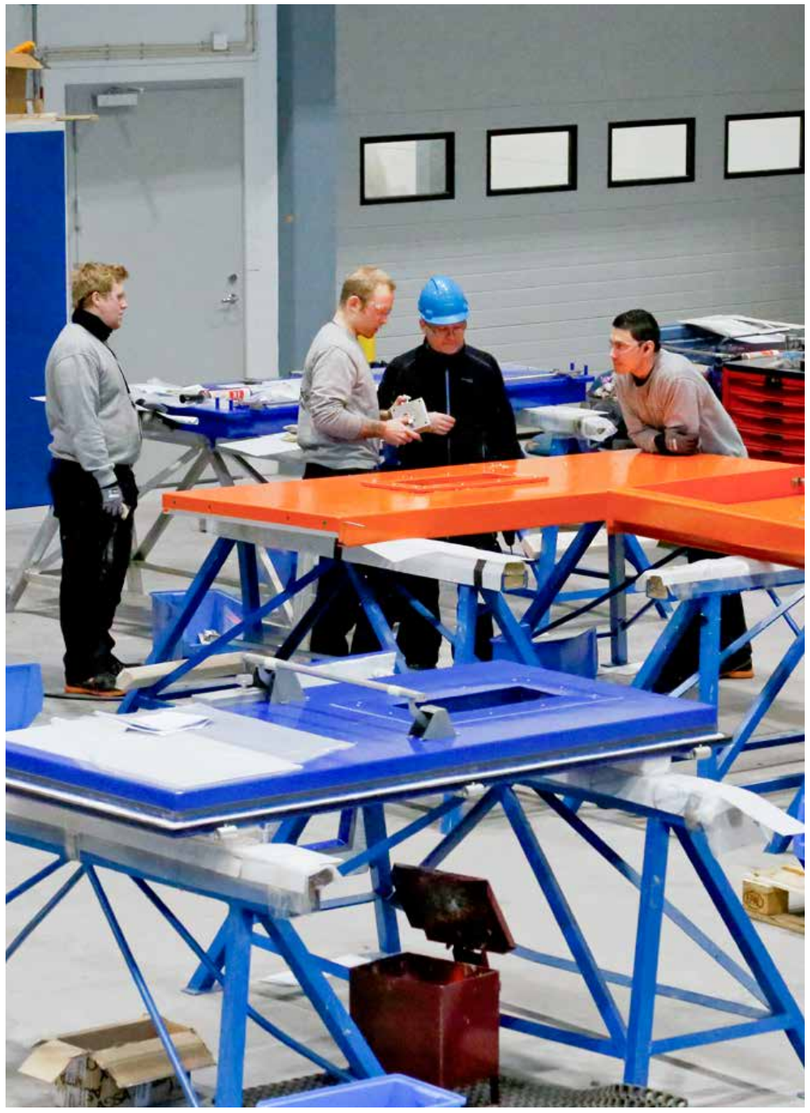
After some fundamental organizational changes and software implementations, dramatic results started to emerge. In September 2014 the first goal was met – 60 doors were produced, compared to 40 before. Simultaneously, Rapp Bomek had saved time for the equivalent of four full time employees!

"It is a fantastic system that has changed our entire organization to the better, from the first sales pitch to production and logistics. In spite of being a small company, the Lean way of thinking made a remarkable difference. Lean and this powerful software has boosted us more than we could ever hope for", says Freddy Nygård.

Today the digital model of a door originates in the hands of the salesman and lives on during project execution. The pile of paper has met the shredder. Now there are only two master models, one for hinged doors, and one for sliding doors. Cutting files are automatically sent to the lasers, with no chance of any left/right-issues. Today, Rapp Bomek's engineers can focus entirely on producing quality doors to customers around the world, secure in the feeling that each step of the process is in perfect shape.

"With Inventor ETO we can guarantee a whole new precision in delivery. As an engineer it feels great to know that every door we deliver is exactly as ordered, and on time, every time", says Freddy Nygård.

Above and below: With Inventor ETO, the engineering capacity at Rapp Bomek has soared. Today, the same amount of staff has increased both production and revenue by 50 per cent.



> "Lean and Inventor ETO have boosted us more than we could ever hope for."
>
> – **Freddy Nygård**
> Rapp Bomek

The DH Heavy Duty H60 door with top panel is frequently used both offshore and on land.

### Rapp Bomek

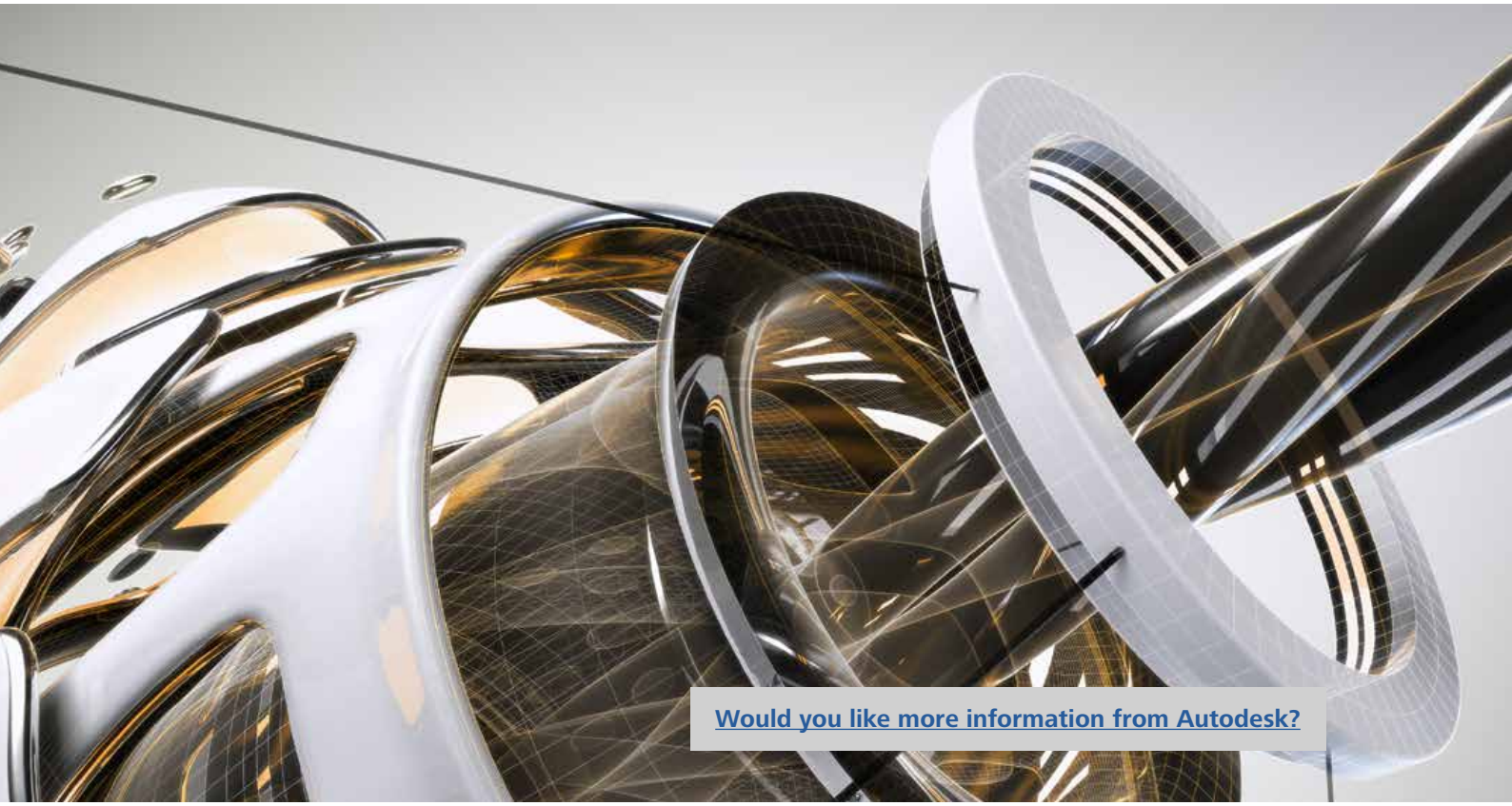
Rapp Bomek has been producing and developing fire doors for offshore and petroleum industry, ship equipment and service since 1983.

The company is one of Europe's leading manufacturer of fire-rated heavy, medium and light duty steel doors to offshore and land-based installations.

With its highly international network, Rapp Bomek can serve customers in all parts of the world. Most of the sales work is done from Norway, working through independent agents and partners around the world.

### Autodesk Key Software:

**Inventor ETO** – ETO means Engineer-to-Order. The software helps Rapp Bomek automate point-of-sale order and bidding processes by providing easy-to-use tools for capturing business and engineering rules.




## Welcome to Autodesk Nordics & Baltics!

We always want to ensure that our customers receive the best possible service and attendance. If you want to know more about Autodesk's solutions or have any inquiries about how our solutions can make a difference in your company, please do not hesitate to contact us. In close collaboration with our partners – listed below – we seek to do our best to support you and answer any questions.

**Autodesk Nordic Office:**

Ulrika Nordström, Marketing Manager MFG Nordic & Baltic,
+46 31 726 0129, ulrika.nordstrom@autodesk.com
Mölndalsvägen 24, SE-400 20 Gothenburg, Sweden, +46 31 726 0000, www.autodesk.se

**Partners in Sweden:**

Cadcraft AB, Teknikgatan 2, 504 62 Borås, +46 33 20 50 00, www.cadcraft.se
Cad-Quality AB, Korta gatan 7, 6 tr, 171 54 Solna, +46 08 704 22 00, www.cad-q.se
NTI CADcenter AB, Verkstadsgatan 4, 702 27 Örebro, +46 10 211 69 00, www.nticad.se

**Partners in Denmark:**

Cad-Quality a/s, Robert Jacobsens Vej 70, 1 sal, 2300 København S, +45 70 10 71 10, www.cad-q.dk
NTI CADcenter A/S, Lejrvej 15, 3500 Værløse, +45 70 10 14 00, www.nti.dk

**Partners in Norway:**

AGS AS, Falsens gate 9, 3187 Horten, +47 33 04 01 80, www.ags.no
Cad-Quality AS, Forskningsparken, Gaustadalléen 21, 0349 Oslo, +47 22 02 07 00, www.cad-q.no
NTI CADcenter AS, Malmskriverveien 35, 1337 Sandvika, +47 48 20 33 00, www.nticad.no

**Partners in Finland:**

Cad-Q Finland Oy, Äyritie 8 B, 01510 Vantaa, +358 9 5422 6500, www.cad-q.fi
Comparex Oy, Mannerheimintie 113, 00280 Helsinki, +358 29 170 0070, www.comparex.fi
MekSystems Oy, Mikonkatu 22 E 56, 00100 Helsinki, +358 9 669 878, www.meksystems.fi

**The Baltics:**

For partner contacts in the Baltic states, please contact FutureGroup Finland Oy,
Sahaajankatu 26 A, 00880 Helsinki, +358 9 478 5400, www.futuregroup.fi



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