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Experience No 02



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Linnankatu 52 A, 20100 Turku, Finland, tel. +358 2 412 4500, info@CADMATIC.com Cover picture: Laser-scanned point clouds can be imported into a CADMATIC model to guide modelling. Picture © Glosten. The CADMATIC eXperience Magazine is published twice a year by CADMATIC 0y. CADMATIC believes that all information provided in this publication is correct at the time of printing. CADMATIC is not responsible for any inadvertent errors.

Leveraging mobile, cloud and AR/VR technologies

In this edition of the Marine eXperience magazine, we highlight our customers' experiences of CADMATIC software and present some eye-catching software developments: FollowApp to monitor 3D project progress on mobile phones and eShare for Microsoft HoloLens, an exciting addition to our Information Management product family.

We have had a truly excellent year. We managed to increase revenue by 29%, which boosted our turnover to over €20 million euros. Over a two-year period, we have increased the number of CADMATIC user organizations by 20%. Our software is now used by over 1000 user organizations in 58 countries.

We focus on ease of use and solutions that allow our customers to gain efficiencies in data-driven design and ship information management. Our customers report that our technologies for online and globally distributed design are very competitive. It also ensures high quality when the best and most cost-efficient resources can be used in the same projects.

In this edition, we have an article about Glosten, an American marine consulting firm with 60 years' experience in the design of commercial- and public-sector vessels. They have been able to increase the productivity and reliability of their working processes with CADMATIC's integrated and automated functionality. They have been particularly impressed with how fast and efficiently CADMATIC's Laser Scan Modeller handles scanned data for use in design in their large amount of retrofit projects. This has raised the quality of their retrofit designs to a high and reliable level.

We also have an article about 3J Yachting, an Italian engineering and consulting company that designs eye-catching yachts with CADMATIC. They report that our software helps them to work faster and more accurately than their competitors, especially when working on a series of sister ships that are similar, but never identical.

2018 a breakthrough year for information management solutions

Many customers are showing a growing interest in our eShare information management solution. For example, ENI, one of the biggest oil and gas companies in the world, has started using our solution worldwide to build their digital twin solutions and to manage their digital design, construction and operational data better. Another interesting example is FedShip Group, which builds exciting luxury yachts. They are utilizing eShare for the management and



sharing of design and production information.

Our continued efforts to digitalize and integrate design, engineering and production processes can also be seen in modern applications, including the latest AR/VR technology integrations we have developed.

On page 16, we have an article that follows the application of AR technologies for design review with Microsoft HoloLens. It offers an entirely new and exciting interactive design and engineering experience in augmented reality where digital 3D models reside in the real-world environment.

We also have an article about the CADMATIC FollowApp for mobile project monitoring. The app is currently free of charge, so I urge our customers to download it and to start experiencing the convenience of tracking key CADMATIC design project metrics on their mobile phones.

I wish you all happy reading and welcome your feedback.

Jukka Rantala, CEO CADMATIC



Thinking in 3D Glosten identifies conflicts before they occur

Glosten, located in Seattle, Washington and New Bedford, Massachusetts, USA, has used CADMATIC Marine software for several years. After some detailed demonstrations in 2014, Glosten decided to start using CADMATIC, mainly due to software's ability to quickly build and process models for new projects and its early collision detection. Since then, Glosten has successfully used CADMATIC software on a wide range of design projects. The R/V Atlantis and Glosten team members. Glosten has recently undertaken midlife refits of three global class research vessels of the US Academic Research Fleet.







The Tazlina Alaska Class Ferry Day Boat and 3D models of the vessel created by Glosten.

In 2014, Glosten was just scratching the surface of CADMATIC's capabilities. The team at Glosten could clearly see that CADMATIC provided several advantages over other software products on the market. They recognized that it would allow them to differentiate themselves from their competition.

Ashley D. Vetter has been a production engineer at Glosten for three years. Since the purchase of the CADMATIC Diagram module, she has been the Diagram lead and CADMATIC administrator at the company. She indicates that CADMATIC has many benefits, but highlights two key advantages: "The integration between Diagram and Plant Modeller is an important quality assurance tool for us, so we are certain everything is in the model and is in the correct order based on the diagrams. I have also been very impressed with the Laser Scan Modeller module. We have scanned everything, from bulk carriers in need of ballast water treatment up to a 124-meter ferry slated for a mid-life refit," says Ashley.

Thinking in 3D

With their latest, fully equipped, 85-meter passenger ferry project, CADMATIC has proven to Glosten that it can process and handle very large models quickly. Ashley indicates that she thinks CADMATIC has been designed around 3D and piping systems, in contrast with other software packages. "But, every CAD package feels different." Ashlev notes. One example is the scroll button on the mouse that can be used to 3D-rotate a view. a feature that is not used by other software packages and is a real plus at Glosten.

Regularly utilizing CADMATIC has helped Glosten staff become more comfortable with "thinking in 3D". "We are often asked to place a piece of equipment in a space to ensure it fits in the environment. This 3D thinking helps us find potential conflicts in the design before they occur. This shift of thinking was accelerated by using CADMATIC."

Productivity and reliability

In CADMATIC, many processes are automated and many functions increase both productivity and the reliability of results. Glosten recently worked on a refrigeration refit project for a 112-meter factory fish processor. Only pipe runs that where 75 mm in diameter and larger required routing. With the diagram received, all other runs had to be filtered out. However, Glosten chose to do it differently and created a new process in CADMATIC Diagram with a much simpler diagram that is linked with Plant Modeller. Thereafter, the modeling and reviewing processes where done in Plant Modeller.

"CADMATIC has enhanced Glosten's ability to produce excellent design work."

The Glosten team's favorite feature is updating drawings, spools and annotations based on model changes. It avoids having to do rework on drawings.

Refitting projects

CADMATIC is currently being used for several interesting design projects at Glosten. The midlife refit of three global class research vessels of the US Academic Research Fleet is one of these projects. The US Navy AGOR-23 class vessels have all passed the midpoint of their service lives. The engineering and design for two of the vessels has already been completed. The design for the R/V Atlantis is still underway.

The projects entail a lot – repowering, replacement, refurbishment of shipboard equipment and replacement of technically obsolete shipboard machinery etc. The project started with Glosten 3D scanning the vessel with an infrared laser scanner. Thereafter, the laser scans where imported into CADMATIC eBrowser and Plant Modeller using the Laser Scan Modeller. The CADMATIC eBrowser was used to visualize the location of the current systems. The scans loaded into the Plant Modeller where used to create new system diagrams and recreated the structure and equipment/piping remaining in the vessel in the Diagram module. Finally, Plant Modeller was used to do routing in the space available, making use of the supporting link between Diagram and Plant Modeler to guide modelling.

Keen on Laser Scan Modeller

Since Glosten has seen a big increase in refit work, they are very keen on the Laser Scan Modeller. It is used frequently and they have gained good experience in its use.

"We are very impressed with the way CADMATIC handles scans and we think that it is an extremely useful tool. Importing scans into CADMATIC is fast, efficient and we do not lose quality. We all think that the scans look great as well.

Glosten

Headquarters: Seattle, Washington, USA

Branch Office: New Bedford, Massachusetts

Employees: 93, including naval architects, marine-, electrical- and ocean engineers and production designers.

CADMATIC: Since 2014

Activities: Full service marine consulting firm with 60 years' experience in the design of commercial- and public-sector vessels.

Capabilities: Vessel design and acquisition, construction support, program management, model testing, noise and vibration analysis and green ship technologies.





The design of a ballast system manifold and ballast water treatment system. The laserscanned point clouds are imported into the models to guide modelling.



Ashley D. Vetter is the Diagram lead and CADMATIC administrator at Glosten.

Jumping into bubble views to get a clearer view of the surroundings is a nice addition too. The ability to route pipes based on the point clouds helps to remove some of the guesswork when determining the sizes of existing pipes," Ashley explains.

The future looks bright

Glosten often works with clients and subcontractors that use other modeling software. With CADMATIC, they are able to import and export other models, which eases the process. eBrowser models are often distributed to other parties. For Glosten, it is an effective tool to communicate with people that are not familiar with modeling, such as some project managers and clients. In the future, Glosten will also look into eShare, a tool that is helpful for users, shipyards and owners. It offers, for example, hyperlinks between drawings and the 3D model and the ability to track equipment installation.





Introducing Verónica Alonso de los Ríos: Senior Sales Manager, Spain

Who is Verónica Alonso de los Ríos?

I think I have two facets to my personality: the first is more analytical, the other more artistic.

I studied at the Polytechnic University of Madrid and have a master's degree in naval architecture and marine oceanic engineering. Since I was a child, I liked the sea, ships and sailing. My father is also a naval architect. I enjoyed watching him working in a hightech company related to shipbuilding. He traveled a lot around the world, which inspired me greatly in my childhood. Also, my mother, warm-blooded about the sea, influenced me too. I am passionate about painting, which gives me another perspective in life.

I have always worked in the world of software technology and shipbuilding. I started my career in 2001 at Navantia shipyard in Cartagena. After that, I worked in different companies all related to software in the marine industry, such as simulation (FEM tools) and design (CAD systems).

I am an outgoing person. I like to take on challenges and learn new things. I have always worked in business and marketing, and I really like to be in sales, even though I am an engineer. I have a beautiful family, with three children that are 8, 9 and 10 years old. This is the most important part of my life and all our family members work as a team.

When and how did you end up at CADMATIC?

In 2018, I was looking for new opportunities. While searching for different possibilities in the shipbuilding industry, I considered CADMATIC and heard that the company was doing very well. I had a contact in CADMATIC. Henk Kramer, whom I had met at shipbuilding events in the US and Canada. I contacted him and he encouraged me to join the company. He introduced me to CADMATIC and I really appreciated his help. After the job interview, I was accepted and we decided to open an office in Madrid. I am very happy that I ioined CADMATIC.

How do you think CADMATIC's office in Spain will help its business development?

I think it is good to have an office here and someone who speaks the local language and understands the market. Jan Broos has been working on this market for several years and he has done an impressive job. Having an office here makes it easier for clients, and Jan and I can work together and develop the market even more. Madrid is also well connected to other countries where I work and need to travel.

As a senior sales manager, what are your most important tasks?

For the marine business in Spain and France, I am responsible for

communicating with potential customers, shipyards and design offices and understanding what is going on in the market. I visit shipyards and design offices and promote CADMATIC in these countries with Jan. I also collaborate with Henk Kramer, who is responsible for sales in the US, Canada and UK, and with Juan Prieto, who is responsible for Norway, Denmark and South America. I appreciate having the opportunity to work with CADMATIC colleagues in a collaborative atmosphere.

I am also currently collaborating in the development of CADMATIC's data-driven shipbuilding concept and functions. This will offer huge opportunities for our customers to improve quality in shipbuilding by minimizing manual data handling during the whole process. CADMATIC software offers highly automated data handling from initial design to detail design, procurement and production. Additionally, we are able to integrate that efficiently with other data management tools, such as PDM and ERP; typically material management, document management, and change management functionalities. I am involved in some marketing activities too, such as new brochures, which is great since it allows me to develop my creative and artistic side.

Which part of your work do you like most?

I really like using my academic background in my work and being in contact with people. This is why I enjoy working in business development and in the marine industry. I enjoy travelling and working with a high-tech company and with a great team. It is good for me to improve continuously. I am where I want to be.

What do you think are the biggest challenges and opportunities in your region of responsibility?

Getting new customers is clearly my most important task. I personally would like to promote growth in the naval shipbuilding industry. This could be my most relevant challenge. There are, of course, opportunities for this.

I think collaboration with other countries is also relevant for me. We have to work hard, naturally, and the results have started to show; for example, we already have some good references in Spain.

Any special focus area in 2019?

My target is to help the shipbuilding industry to increase their efficiency. I want to focus on selected shipyards to improve their processes and efficiency with the help of CADMATIC.

Which company value influences you most?

Continuous improvement is the most relevant value for me. Succeeding together is also important. All my colleagues are customer-oriented, which brings good results. I really want to emphasize that CADMATIC is an open, international and equal company for me as a woman. I see differences between CADMATIC and other companies in this regard.

New Software Features

Information Management

The CADMATIC Information Management Software family includes easyto-use applications to access, find and visualize digital design and engineering data. This article includes, among others, selected new functionalities in our eShare, eGo and eBrowser products.

New navigation possibilities in eBrowser and eShare app

The new navigation mode allows the use of a WASD keys for faster navigation. It works alongside arrows or mouse buttons. Additionally, there are several improvements for more intuitive navigation in 3D, including zooming, the possibility to move in the XY-plane and improved pan navigation.

Tools for model authoring

Several tools add the possibility to manage models in eBrowser and provide combined, reduced or modified models:

- Preserve sub models separately when saving model
- Change visualization material of objects and branches of hierarchy
- Save model including only visible objects and excluding hidden objects
- Save without 3D space objects
- Save model excluding connections to node points
- Save model excluding insulation of objects

WASD keys can now be used in eBrowser and eShare for faster navigation.



Free distance in 3D measuring tool

Small marks at the end of measurement arrows now show where the distance is measured from and an additional mark for pipes indicates that the second value in parentheses is a distance from a pipe

Free Distance in 3D measuring tool

surface. Axis measurements (d, dx, dy, dz) are shown immediately when measurements are made.

Object identifiers for 3D objects in eBrowser and eShare

More information is now available when navigating 3D models in eBrowser and eShare. 3D object identifiers are customizable with 3D labels and position IDs, key attributes or other data. The labels are displayed on top of the 3D model view and are always aligned with the model and move with objects.



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3D object identifiers. 3D labels, position IDs, key attributes or other data can be displayed on top of the 3D model view.



Point clouds can now be added to the eShare server. Users can easily navigate to "bubble views" and view point clouds in the model, add notes and measure distances.

Quick clash checks or complete collision tests can now be done within the eShare app

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The increased color range in eShare makes it easy to convert drawings into active interfaces to the 3D model.

- Any attribute can be displayed on top of the 3D model, such as position IDs, system names, pipelines etc.
- Labels appear during the navigation and zooming in or out.
- The labels are visible also in snapshots taken from the model

Point clouds in eShare

Version 2019T1 allows point clouds to be added to the eShare server. Currently, the supported format is CDP, originating from the CADMATIC Laser Scan Modeller. In eShare, point clouds are automatically converted to panoramic images, which can be transferred from the server to the user quickly when opened.

Once point clouds are added to the eShare server, users can simply navigate to "bubble views" and see point clouds alongside the 3D model. It is possible to measure distances between the cloud and 3D objects, add smart points to store notes or other extra information related to the point cloud.

Use "bubble views" to see photorealistic point clouds with the 3D model

- Navigate from one location to another with point cloud markers
- Add measurements to the views
- Add notes and comments to the point clouds with the smart points feature.

eShare app – tailored for large 3D models

The eShare app is now available for all users and is recommended for use for large project models, especially for projects where some parts come from another software via converted models. The CADMATIC eShare App is a 64-bit Windows application that can be installed on an eShare client computer and connected to the required eShare server. The advantages of using eShare via an application instead of a web browser include support for very large 3D models and improved 3D visualization.

Collision detection in eShare app

A collision detection possibility has been added to the eShare app. It works the same way as in eBrowser and enables quick clash checks or complete collision tests. This provides additional value for collision checks between imported 3D models from different suppliers or converted by eXchangers from different formats.

Using color coding in document link highlights in eShare

More colors are now available to convert drawings into easy-touse and active interfaces to the 3D model. Links in documents can be highlighted with different colors based on the availability of the object in the 3D model. For the most sophisticated cases, links in documents can be highlighted with different colors based on their status.

Take snapshots and notes from the site with markups in eGo

Create markups in eGo to add notes, dimensions, and labels to 3D views of the model and compliment it with a picture taken on site. Taking eGo on inspection trips or to a construction site or production workshop enables the sharing of pictures with engineering or asset management by syncing data between eGo and eShare.

Documentation in HTML5 format and online

Version 2018T3 includes help documentation in HTML5 format. It works the same as before and is context sensitive. The user can press F1 in any context and get documentation related to the topic at hand. It opens in the default browser installed on the user's computer. The new format provides users with more flexibility and a modern look. Optimized search results with optional filtering let users search only for topics from Diagram or script documentation for example. Additionally, users can benefit from online translation services, such as Google Translator to get a basic translation of any part of the documentation.

Additionally, documentation for all products has been placed online at docs.cadmatic.com.



As a rule, the online documentation is kept up to date with the latest available customer release and updated with the newest features.

CADMATIC FollowApp for mobile project monitoring

CADMATIC's recently launched FollowApp mobile application resulted from the development drive to maximize the utilization of mobile and cloud applications with CADMATIC solutions.

The application, which is currently available free of charge, allows users to monitor key CADMATIC design project metrics conveniently from their mobile devices. It reduces the uncertainty around project schedule and cost estimations in new projects. The data can be compared to other similar data from previous projects, which provides the user with a good understanding of the status of the project.

The app is available from both Google Play and Apple Store.

The project metrics that can be monitored with FollowApp include, for example, project 3D model progress by the total length, mass and number of pipes and pipe fittings, pipelines, pieces of equipment, cables, cable trays and ducts. The progress of P&ID can also be monitored during process design as well as document production. The metrics are automatically uploaded to the app at scheduled times from CADMATIC design applications.

Storage in cloud service

The metrics are stored in a cloud service provided by CADMATIC. Actual design data is not published and access to the service is restricted to only authenticated users controlled by system administrators.

CADMATIC FollowApp in brief:

- Takes your business decisions to a new level – accurate and up-to-date project progress with an app for your mobile
- In-app reports provide visibility to key project metrics regardless of your physical location.
- Easy to compare project progress with targeted levels
- The metrics are stored in a cloud service provided by CADMATIC.
- Automatic, scheduled publishing.
- Demo data allows trying the app without having CADMATIC projects or licenses.
- Using the app is currently free of charge.



The app enables users to monitor project progress with the flexibility to adjust the periods and metrics covered. The app is available from both Google Play and Apple Store.

"We are very excited about what FollowApp offers our clients. Project Managers are becoming increasingly mobile and they need information at their fingertips regardless of their location. The FollowApp provides our software users with this kind of information wherever they are and allows them to react quickly, if necessary," says Geert Tepper, Vice President - Marine segment at CADMATIC.



Monitoring the progress of the number of elbows in a design project with FollowApp.



Monitoring the length of pipes and P&IDs in a design project with FollowApp.



Augmented reality with eShare for HoloLens

Behind the scenes of AR technology application in design review

CADMATIC customers have shown an interest in virtual and augmented reality technologies for some time. Typically, the interest has not been very specific. It has been fueled by the development of new technologies and hardware, and a desire to try something new. A few years ago, CADMATIC did not consider the technology feasible yet, but has kept abreast of developments in the field. This article follows the development of AR technology and its application in CADMATIC, culminating in the launch of eShare for HoloLens.

The launching of the first version of Microsoft HoloLens in early 2016 proved to be the point where augmented reality technology seemed mature enough to convince CADMATIC developers to try it themselves. At the time, purchasing MS HoloLens was no easy task.

"Ordering the first headset in any of the countries where we have offices proved to be impossible, or at least extremely complicated. Eventually, we managed to order it from Ireland directly from Microsoft. We wanted to see how it would fit our information management products and how it could possibly expand the design tools and techniques," says Mikko YIlikäinen, Product Owner, Information Management Applications.

Early experimentation

The CADMATIC product creation team started experimenting with HoloLens as soon as the package arrived at the office, but the actual development had taken its first steps already before that: They had a prototype version that allowed users to see a 3D model in AR.

"Almost everybody in the office wanted to try HoloLens during the first couple of days. The technology was still very much state-of-theart, despite the availability of several similar cheaper devices. It was funny to see people walking in the corridor wearing a headset and not responding immediately to others," Mikko describes the first days after the arrival of HoloLens.

Finding the right focus areas

In the beginning, the development team had a long list of ideas how CAD models could be utilized with the headset. They held many discussions with clients about the technology and development possibilities were considered before the scope was limited to a manageable size.

It became clear that the first priority was uploading 3D models to HoloLens and the need for basic review functions. These included getting object attributes, measuring distances and aligning digital models with real objects, i.e. taking 3D models to AR and keeping information already available on top of the 3D geometry. The most suitable platform for this proved to be an eShare server, where all the project data is connected centrally.

"We wanted to present the new developments at the bi-annual Users' Meeting in September 2018. Firstly, to share our excitement with our customers, and secondly to discuss possible use cases. This posed some time constraints to get it ready and published to the Windows Store. Prior to the event, we had several use cases in mind that are typical for reviewing 3D models of new and revamp design projects. We already have significant expertise in our company to create and use 3D data for various purposes. All we needed to do was to

extend our imagination with the possibility to see the 3D model in its real size and in a real environment, not on a screen," Mikko YIlikäinen describes the development leading up to the UM 2018.

"Almost everybody in the office wanted to try Holo-Lens during the first couple of days."

The team noticed that HoloLens immediately changes the perception of 3D and space. For example, one part of a test model with a platform with some piping may seem like a small piece in a design application and eBrowser, but once loaded in HoloLens it was far too big for the spacious office corridor.

The whole idea of modeling, originally based on the "eye to hand to brain" concept, changes with HoloLens.

"When you see the actual scale of the design in a live environment it boosts your imagination. It lets you experience changes the project is about to bring," says Mikko.

Launching CADMATIC HoloLens

The team presented the new HoloLens application in workshops at the UM 2018. The immediate feedback was very positive.

"It was great to see how excited people were. The feedback we collected provided us with even more inspiration to continue. The possible use cases raised during the discussion varied from possibilities



Mikko Yllikäinen shows a customer at the 2018 Users' Meeting how 3D object data can be viewed.



Mikko Yllikäinen, Product Owner, Information Management Applications

to use the product for design reviews, show designs to stakeholders, involve people in remote locations, building process controls and simulations, replacing small scale laser scanner use, all the way up to abandoning the use of paper drawings, as well as installation and production instructions," says Mikko.

"When you see the actual scale of the design in a live environment it boosts your imagination."

Even the most experienced designers like to see projects in the building stage, to get a real feel of what is being designed. It allows the designer to experience the actual environment and to notice mismatches, impossible designs or ergonomic issues. All of this is now possible without costly and often impossible trips to construction sites. A new project can be reviewed and presented in the most realistic way to stakeholders even before it is approved or constructed.

AR technologies are currently not the core focus of CADMATIC's development plans. The development adheres to agile principles, however, and the development team always keeps looking for new ways to provide benefits to customers.

"We focus on solutions to design projects and enable building and production in the most cost-efficient way. Extending the limits of traditional design solutions with information management platforms where all project-related data can be connected, allows our customers to save time. It ensures the availability of data that is structured in a natural way with the 3D model as the hub. It also helps customers to eliminate costly design mistakes," Mikko Yllikäinen explains the development focus.

The future – challenging design limits

AR solutions open the door to challenging traditional design limits and truly awaken the imagination. New technologies are coming onto the market more quickly and conveniently than before. Trying these new technologies and selecting those viable for implementation are part of everyday business at CADMATIC.

"As an innovative company we try to remain at the cutting edge with new hardware, new coding libraries and smart and enthusiastic people – it's all part of the CADMATIC culture. We embrace young talents as the company rapidly grows and experiments with the latest technologies to see what best fits our goal of serving our customers and remaining the most innovative CAD provider out there," Mikko concludes.

Download the eShare for HoloLens App:



https://www.microsoft.com/en-za/p/eSharefor-hololens/9n03rklhh67h?ocid=badge&rtc= 1#activetab=pivot:overviewtab

eShare for HoloLens - Key facts

eShare for HoloLens is an app that allows the user to interface Microsoft HoloLens with CADMATIC eShare. It offers an entirely new interactive design and engineering experience in Augmented Reality where digital 3D models reside in the real-world environment.

- Load models from the eShare server and use them offline
- Align 3D model with existing environment
- Load and visualize object data from eShare or any connected system
- Measure distances between

digital items, digital and real items, or just real items

- Shared experience for collaboration in multi-user environment
- The app is free of charge for users of CADMATIC eShare version 2018T3 and higher

3J Yachting Yacht design with CADMATIC

3J Yachting has a long history of CADMATIC use. The Italian engineering and consulting company from Follonica acquired CADMATIC Hull in 2010, after carefully evaluating different software packages. From 2013 onwards, 3J Yachting also started using CADMATIC Outfitting. 3J Yachting chose CADMATIC due to the fully customizable parametric solutions for both 3D modeling and production documents.

A 44-meter alloy yacht designed by 3J Yachting for San Lorenzo Shipyard.

3J Yachting's core business is nesting and piping production documentation for the Italian yacht building industry. The company also offers basic and detailed design and consultancy during all steps of construction for shipyards and subcontractors worldwide.

3J Yachting currently has eight expert Hull users, three new Hull users, as well as five expert Outfitting users. A Hull Administrator and an Outfitting Administrator have also received training.

"It is quite easy to start modeling and drawing models with CADMATIC. A basic user can learn Hull and Outfitting in no more than two weeks. The administration training was important because you need experienced CADMATIC administrators to get the most out of the software," says Sergio Allegria, owner at 3J Yachting.

Benefitting from light models

Before adopting CADMATIC software, 3J Yachting used nesting and piping tools from other CAD software providers. They encountered difficulties to manage 3D models and make the necessary production drawings in projects with ships and yachts in excess of than 10 meters. The resultant files were too large, which in turn required extremely powerful workstations.

"With CADMATIC this is not a problem for us anymore. The CADMATIC models are light and the software can be used on a regular workstation. We can easily make production drawings for big yachts, which is very important for us," says Sergio.

3J Yachting reports superior production drawing results with CADMATIC. *"I can confirm that CADMATIC really helps us to be faster and more accurate than other companies, especially for the*



The 3J Yachting team have been impressed with how easily shell plates can be developed in CADMATIC.

shipyard / classification society we work with. The extensive customization options in system administration are also very advantageous. This assists us to provide custom components, listings and drawings as requested by our customers," says Sergio.

Shell plate development

The new version of CADMATIC Shell Plate Development in use at 3J Yachting has made defining shell plates much easier. It calculates shell plates extremely accurately and also calculates templates for bending, including marking lines. It generates elongation lists, 2D sketches and the geometry of each shell plate ready for nesting.

According to Sergio, the shape of a modern yacht cannot be defined only with plane plates, since it is too elaborate. In this respect, he indicates that CADMATIC has a big advantage: "We can now see the actual shape and thickness of the shells in the hull viewer. The shells can also be exported to our customers as solids in other formats".

Multiple yachts in one project

One of 3J Yachting's most recent projects was a 44-meter alloy yacht for San Lorenzo Shipyard. The diagrams were designed and the technical layout was defined first, after which the structural blocks were completed and the last drawings for piping were finished, all with CADMATIC software.

"When we design a series like the 44 meter alloy yacht, several yachts are similar, but never identical. CADMATIC offers an excellent solution for this, because the settings, norms and specifications of the parent model can be copied easily to a new project. The new model is, nevertheless, independent from the parent model and can be set up in any way," Sergio explains.

"CADMATIC helps us to work faster and more accurately than other companies."

As the yacht was a prototype, some modifications needed to be made on the Hull side in a very short period. 3J Yachting used the powerful parametric possibilities of CADMATIC effectively in order to meet the tight schedule.

"In a short amount of time we can make changes in CADMATC

Hull, whilst in Outfitting we can easily work on two different projects in parallel. We did this for the first and second yacht of the 44 meter series, by just copying 3D routing and drawing layouts using .mdl and .cx files."

The second yacht of the series and the planned third one will also be done in CADMATIC. Other current projects include a 75-meter steel/alloy yacht for NCA shipyard, where 3J Yachting is doing scantling and nesting, but no outfitting, as well as the hull blocks for a 107meter yacht for Benetti.

Improved software and support

3J Yachting are satisfied with CADMATIC support including new and improved functionalities and bug fixes that are brought out every tertiary.

"For us it is really important that we do not have to wait for a long time for software updates. The improved functionality for faster collision control and the new functionality for inspection views are some examples of additions we appreciate very much. The support has always been 3D model images of the 44-meter alloy yacht for San Lorenzo Shipyard.



efficient and fast in answering our questions".

eShare under consideration

3J Yachting generally uses the CADMATIC eBrowser for communication with clients in all project phases. This applies to design, meetings at the shipyard, and onboard visits. Recently, they have also tested CADMATIC eShare.

"We were very impressed with eShare's capabilities. The model and document publishing is very useful, but what really stands out for me is the loading and linking of other documents not prepared for eShare integration, or those from different sources. These tools are very powerful and helpful, especially for managing the



relationships with our clients and for cooperating with shipyards". 3J Yachting is currently considering adopting eShare for internal management.



The evolution of modularisation and partitioning in shipbuilding

Text: Ray Essén

The introduction of prefabrication, modularisation and partitioning in shipbuilding goes hand in hand with the evolution of ship size and technology in general. Some big shipyards, with their clusters of specialist companies, have in cooperation with shipowners and other stakeholders gradually learnt to build ever bigger and more complex cruise ships. Among a number of other important factors making this evolution possible, prefabrication and modularization have played an important role.

AIDAnova

A large prefabricated Floating Engine Room Unit produced at Neptun Werft in Germany

The design and engineering process and engineering itself have undergone dramatic changes over recent decades. Engineering offices have adapted to the evolution of modularisation and, in many instances, have been facilitators in this change process.

Despite being somewhat different in nature, prefabrication, modularisation and partitioning are driven by the same factors. The three main drivers behind the modularisation evolution are the need to decrease construction hours, the need to shorten delivery times while maintaining high quality, and the growing size of ships.

In the rest of this article, I discuss the increased role of prefabrication, modularization and partitioning in the context of these drivers and the impact of engineering and its role in these developments.

The development has been evolutionary: processes adopted at certain stages have remained and have been refined in subsequent stages.



DRIVER

STAGE 1: Hour saving – Prefabrication

Perhaps the most significant benefits of prefabrication technology are gained from moving a major part of the work from the ship into workshops, thereby reducing the number of inefficient hours spent on board vessels during construction.

In the early days, prefabrication was limited to various types of equipment and outfitting elements, such as machinery, deck equipment, furniture, hatches and doors. Most of these elements were manufactured in workshops inside the yard.

The use of prefabrication accelerated as the need for efficiency grew. Hull assembly based on building blocks became commonplace while prefabricated pipes and later, pipe packages and system-based modules, were introduced for machinery.

To answer the need for prefabrication in the 70s, Elomatic started to develop CADMATIC software. Based on plastic 3D models and with the help of the software, manufacturing documentation needed for pipe prefabrication was semi-automatically produced in a fraction of the time required for manual drafting.

The benefits of prefabricating are obvious – increased productivity and quality due to better working conditions in the workshop and faster turnaround with more flexibility due to parallel production, shorter installation times and the possibility to subcontract. The evolution of prefabrication, modularisation and partitioning



A feeder booster unit by Auramarine



Installation of a drop-in elevator trunk module



A prefabricated modular cabin



Stage 2: Delivery time and quality – Modularisation

The amount and complexity of prefabricated modules gradually increased as the demand for shorter delivery times and quality grew. Working hours were saved as an increasing share of outfitting was prefabricated and installed at the most favourable stage of the shipbuilding process.

Modularisation became commonplace and a variety of different modules were preassembled before installation on board. Pipes were bunched together to form pipe packages, complex ceiling domes for public spaces were prefabricated as modules, and functional machinery units were developed, assembled and pre-tested. Penetrations were also combined as group penetrations, interior entities such as waiter stations were built in workshops, and window frame panels were standardized and prefabricated.

In refurbishment projects, the use of prefabricated modules has been maximized to enable extremely short turnaround times for on-board work.

In response to increasing demand in the shipbuilding industry, standardised functional modules became commercially available on the market. Specialised suppliers fine-tuned and standardised the processes and standardised the products to fit the growing need.

Auramarine, based in Littoinen in the Southwest of Finland, is one of the pioneer suppliers of functional modules. The company is specialised in fuel supply systems and supplies a comprehensive selection of standardised and tailor-made units.

Today, it would not be possible to build a big cruise ship within the

available timeframe and with the required quality without industrially produced prefabricated cabins. Piikkio Works Oy, a subsidiary of Meyer Turku Oy, is a pioneer supplier of modular cabins for cruise ships. It has delivered more than 130,000 cabins and bathroom units during its 30-year history. The production is based on industrial serial production, both at the company's panel production facility in Vilnius, Lithuania, and at the assembly factory in Piikkiö, Finland. This manufacturing process ensures the highest quality standards throughout.

Rather big subparts of ships, such as fully outfitted AC-rooms, are prefabricated and pre-assembled in yard workshops. Others such as funnel casings and drop-in elevator trunks have been delivered by subcontractors. Prefabrication and modularisation have played an important role in the construction of increasingly large and complex cruise ships.

Modularisation has delivered immense efficiency increases in addition to the savings in calendar time. The shortened delivery times and increased prefabrication have had a considerable impact on the engineering process. To allow time for prefabrication, engineering work has to be finalised earlier and prefabrication requires engineering that is more exact.

Stage 3: Ship size - Partitioning

The need for partitioning has grown alongside the increase in cruise ship size; it has become obvious that the *"elephant must be eaten one bite at a time"*.

The scale factor has an impact on the design, construction and the management of large projects. Extrapolating from previous experience can be used for a small increase in size. A larger increase in size, however, emphasises the scale factor and requires new solutions. The large number of components, people and organisations involved increase the complexity and amount of questions that need to be answered. The growth of complexity is exponential and no longer linear.

This has led the way to the next stage in the evolution of modularisation, namely partitioning. In order to cope with a gigantic task, we must split it into smaller subtasks. These subtasks involve planning, purchasing, engineering, logistics, and construction as well as commissioning. The target is to split the project into parts that have as small an impact on each other as possible. This allows the tasks to be handled in parallel, with a minimum need for interaction between the parts.

In order to achieve this, the ship itself must be designed to facilitate the project split. Partitioning possibilities must be considered when creating the overall layout of the ship and when designing systems. The forming of the building strategy must progress hand in hand with the overall design of the ship.

The basic design phase is crucial in maximizing the degree of modularisation and enabling project partitioning. The design should take into account the possibility of splitting the project into smaller parts with as little interaction as possible, both from a system and from a structural point of view. The parts should be as autonomous as possible to make partial system testing and commissioning possible.

At Elomatic, we have actively taken part in the development of new ideas and processes to cope with the growing demand for new assembly methods. CADMATIC has also developed functionalities to manage the new requirements. Filtered replication can, for example, be used to control what parts of the product model are visible for a particular subcontractor. This makes project partitioning possible as the yard can control access to the product model without jeopardizing the vital IPR assets of the yard.

Meyer group has adopted a strategy to prefabricate massive Floating Engine Room Units (FERU) in a dedicated facility at Meyer's Neptun Werft in Germany. Pre-outfitted FERUs are assembled for its yards in Papenburg, Germany and Turku, Finland. This is an excellent example of partitioning were one specialized site increases efficiency through series benefits and simultaneously shifts working hours away from assembly yards, thereby facilitating shorter delivery times and distributed manufacturing.

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Graduates entering Chinese marine industry with CADMATIC skills

CADMATIC Marine Design Software was implemented at the China Dalian Maritime University in 2009. Starting from 2014, students have used CADMATIC for their computer-aided ship manufacturing courses.

The university also established a CADMATIC Lab in 2018. Students that have graduated from the university have already started working in key companies in the Chinese marine industry such as the China Classification Society, SDARI, Shanghai Jiangnan Shipyard and Guangdong Shipyard.

China Dalian Maritime University (DMU) is a key maritime institution under the Ministry of Transport in the People's Republic of China. The Ministry of Transport, the Ministry of Education, China's State Oceanic Administration, the Peoples' Government of Liaoning Province and the Dalian Municipal Government have agreed to develop the University. DMU is regarded as *"the Cradle of Navigators"* and is a wellknown higher maritime institution in China. DMU enjoys an excellent reputation internationally as a center of maritime education and training. DMU is also recognized by the International Maritime Organization (IMO).

Positive feedback from students and staff

CADMATIC's 3D design concept and the positive influences of 3D modeling on education are the main reasons for the university's cooperation with CADMATIC. Since introducing CADMATIC at the university, students have been very complimentary in their feedback.

"CADMATIC has contributed to and supported education a lot by establishing the CADMATIC Lab."

CADMATIC 3D models help the students to understand 2D drawings, ship structures as well as topological 3D design. The first online CAD Marine Engineering course was started in December 2018 on the famous e-learning platform in Chin, which is the first step to bringing the cooperation online.

"First of all, as the principal of Dalian Maritime University, Faculty of Marine & Offshore Engineering, I highly appreciate the cooperation with CADMATIC. By establishing the CADMATIC Lab and providina CADMATIC educational software. CADMATIC has contributed to and supported the education a lot. Having worked in the marine and offshore industries for a long time, I believe CADMATIC's advanced 3D design concept perfectly meets the current shipbuilding trends. Our students, who will later work in ship design, are benefiting from CADMATIC. I hope we can deepen the cooperation with CADMATIC to nurture students with a worldwide vision and strong professional skills for the marine industries," says Shewen Liu, Principal of Dalian Maritime University.

The principle Mr. Shewen Liu (left) and the vice principle Mr. Huibiao Lu



Students using CADMATIC Marine Software in class.







New Software Features

Diagram – Outfitting – Hull

Diagram

New consistency check settings

Version 2018T3 has new features for consistency checks. All new settings are optional and can be adjusted as needed.

- Consistency check for nominal size compatibility
 - compatibility of nominal sizes of connected objects e.g. between the piperun and valves
 - compatibility of nominal size via mapping of connection nodes
 - compatibility of branches where main pipe is not split,

branch cannot be bigger than main run

- Multiple connections in one node can be avoided with a consistency check. The consistency check identifies multiple connections in diagrams.
- The consistency check notifies the user if a valve cannot be automatically mapped where the component model is selected.
- The direction of a pump/valve can be reversed

Easy reuse of diagram parts

In version 2019T1, any part or a complete diagram can be copied and reused for a new project. The

improved functionality allows the user to export and import diagram parts. When importing to a new location, it is possible to generate new position IDs, change systems and pipelines or edit a single object, such as assigning a different type of valve or actuator.

Diagram FollowUp tool

Design managers can extract data for project status and follow the progress using various metrics. The FollowUp functionality extracts the main characteristics of the diagram, such as the number of routed pipelines or armatures and equipment and allows comparison

Complete diagrams or diagram parts can be easily copied from one project and reused in another.

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with the respective data in the 3D model.

Simplification of everyday tasks

Several features have been included to make everyday tasks simpler:

- AutoRoute pipe runs allow the user to select starting and ending node points to autoroute pipes in Diagram
- Multiple objects can be selected with a box or by picking them individually

• The new right-click menu has a set of commands for editing multiple objects simultaneously

eShare data integrated with Diagram

In version 2019T1, object data can be loaded to Diagram from eShare, even if the object does not exist yet in the 3D model. This enables the use of data for Diagram sourcing from calculations, basic design, or supplier data.

The Diagram FollowUp tool can extract data and monitor project progress across various metrics.





Instance parameters allow users to adjust the values of parameters in the same model. This changes the way a component looks in 3D when inserted.

Labels can be added to views during design to identify all objects.

Outfitting

Instance parameters

Instance parameters provide more flexibility for use of parametrized equipment or standard components. Parameters allow users to create a series of geometrically similar models. Values can be assigned to the parameter at the point of locating it in the 3D model. The user can attach a picture with an explanation about the dimensions or a catalog photo of the component.

With instance parameters, it is possible to use the same model and adjust the values of the parameters, thereby changing this way the component and its service space look in 3D when inserted.

Visualize object data in work views - object identifiers in 3D

Labels are placed on equipment, valves and pipelines and remain in place while the user navigates the model. Labels can be quickly added to views during design to identify every object. Shaded views with labels can be printed as needed for installation or other purposes. All labels are placed automatically and updated according to changes in the model.

Inspection view in Plant Modeller

The new inspection view allows the user to see the same model at the same time in an eBrowser-like view. The view is updated automatically as modeling progresses. The user can choose the most comfortable navigation mode. The view floats and can be placed on a second monitor.

Adding object identifiers in 3D is also possible in the inspection view. It is convenient not only to browse the model, but also to immediately get information about objects in a view. Plant Modeller users can now also see models in eBrowser-like views.





The new visual assistance functionality eases the selection of the right directions during 3D routing and while taking measurements.

Visual assistance in 3D routing and measurements

The 3D direction disk provides users with visual navigation while defining directions. The direction of branches, bends, and elbows are now easy to see and simple to select for standard angles, such as 30, 45, 60, 90 etc. The software assists the user to select from standard angles or to visually check the required direction and input the exact value.

Measuring distances has never been more straightforward – the measured values pop up on top of the 3D model.



New tool for spool generation

The new tool for spool generation enables the generation and automatic annotation of spool drawings for selected compartment areas, as well as the extraction of all production data. The tool offers possibilities for flexible data extraction: user definable views in drawings, presenting pipes as they will be located on the assembly table and data for manufacturing can be presented in the most suitable way to meet the requirements of workshops. Additional checks for production prevent issues related to the manufacturability of pipes with the possibility to add field weld information and extra lengths, if required.

- Production checks: Continuity, volume, collisions, specification, delivered length, weld clearance, bending
- Rich data for production: Bending and cutting data, export in Excel format, field welds, extra length of pipes, flange orientation labels



Binding equipment location and compartments

ECONOSTO catalog valves in example project library

A full catalog of Econosto valves has been added to the example project library. All valves and fittings made according to dimensions include attributes and a link to the Econosto webpage. Download the eBrowser file with full license to see the

complete content of the Econosto valves library.

https://www.cadmatic. com/en/products/ release-highlights/ 2018t3/



Binding equipment location and compartments

Equipment objects can be bound the compartment where the object is located. This allows location changes to be detected and visualized, so that objects can be moved to their bound location again

Hull

Export to Mars2000 and scantling analysis

With Export to Mars2000, data can be exported from CADMATIC Hull frame views to XML files, which can then be imported into Mars2000 and used for scantling analysis. The exported XML file contains the description of the inner construction and its distribution in the ship, translated for Mars2000.

Shell application - automatic template generation

The template wizard used to create template sets per shell plate and generate them for production is now more efficient. It is now possible to run this process automatically for all shell plates in a block. The System Management Application contains the default definition followed by the wizard and the new "Automatic Templates Generation" feature.

The feature displays all shell plates in the block and selects all

shell plates that are eligible for processing. The "Code templates" option generates all the production data. The progress bar presents the process progress. Aborting the feature finishes the current template set. The generated template set can be opened and changed as it was generated by the template wizard. Flat shell plates are be excluded from the automatically generated selection list.

Shell frame profiles

The Create Shell Frame command can be used to define the molded side of a shell frame so profiles and plates can be aligned easily.



The molded side of a shell frame can be defined in order to align plates more easily.



The Hull line properties definition assists the user to make a distinction per line or line group.

Hull Lines

Weld symbols are available in all views. The "Hull line symbols" option is available in all view creation and property panels.

The Hull line properties definition assists the user to make a distinction per line or line group. The symbols clearly explain the purpose of the Hull line in the view plane. This helps engineers and production staff to distinguish between block seams, shell plate seams, paint lines or other function lines. In order to create hull lines symbols more easily, the system management allows more extensions when opening hull models from norms.

New possibilities for basic design and use of HilTop module

Conoship International, SARC and CADMATIC joined forces to develop a collaborative ship design system. The 24-month project, which ran from 2016 to 2017, was titled CPDES (Collaborative Platform for the Design and Engineering of Ships).

The development of the first project phase was supported by the Dutch "MKB Innovatiestimulering Regio & Topsectoren" program. CPDES aimed to create a collaborative software infrastructure that accelerates ship design. With a focus on bulkheads, decks, compartments and piping, CPDES aimed to create a V1.0 implementation, which covers intensively used data and actions, as well as a comprehensive manual and other instructional materials.

Time-consuming design data exchanges and managing the consistency of design data are designers' main challenges. Therefore, uniform, modern data exchange interfaces between early design software tools and steel design software tools are very beneficial, which is exactly what CPDES aimed to achieve.

CPDES achieved the following for bulkheads and decks:

- A two-way 3D data exchange between PIAS and CADMATIC Hull
- A 3D data synchronization mechanism between PIAS and CADMATIC Hull
- Communicate design changes with synchronized Logbook entries

 User-friendly settings and features to facilitate communication between the systems

In the early design stage, most small and medium-sized shipyards and design offices have difficulty controlling consistency when exchanging a ship's arrangement and hull data between the 2D General Arrangement (G.A.) plan and stability analysis tools.

The exchange of design data is often done manually and it can take days to implement design changes like repositioning decks or bulkheads in the G.A. plan and analyzing the effects on the various design calculation applications. Performing damage stability calculations very late in the basic design process, for example, often involves a lot of rework and results in increased building costs if the design does not fulfill the requirements.

Read more about PIAS:



https://www.sarc.nl/pias/



Profile cross section marking. Lines can now be marked for profile end connections to parts.



If extra length is added to the relation, the original contour of the plate can be marked.

Hull Clone

Extra functionality has been added to the Hull Clone to retrieve the actual weight of a block or ship. A shape change does not always affect all surface groups. To improve the modification process, a new function allows the user to import only one surface group. These features are very useful in basic design to recalculate the weight after a shape change

Production – profile cross section marking

Assembling a large profile in a project requires extra support for production. Lines can now be marked for profile end connections to parts. The system ignores profiles lower than the minimum body height definition. Angle markings for bodies and flanges are available.

Shell frames as straight dxf files

It is possible to create straight shell frame cutting data from curved shell frames. This is required for clients that have cutting machines instead of robots. The profile endings are marked when extra lengths are required.

Extra length

With a setting in the system management application, the original contour of the plate is marked when extra length is added to the relation.

Extra angle indications

The system allows more variations

in presenting angle markings on a shell plate to support better assembly information. Angle markings can be added at the start and end positions of connected parts and/or on the nearest grid position of the shell plate.

Additions to Shell Plates development and elongation lists

Elongation reports have been improved. It is now possible to add an elongation table to the Excel layout. The elongation values are an average elongation at each template location. The number of elongation values per template can be set.

Other additions to elongation lists and shell templates:

Shell plates development. Elongation tables can now be added to the Excel layout in elongation reports.



Deformation attribute for weld compensation

- Possibility to set elongation factor
- User definable size of text labels
- The definition for curvature types (Flat, Conic, Elliptic, and Hyperbolic) and minimum/maximum radius
- Warning for meshing tolerance
- Rotation of perpendicular shell views
- Definable coding configuration for templates
- Possibility to remove a template set form a block

- Automatic creation of bending lines in DXF format
- Marking lines from adjacent blocks for shell plate cutting data

Deformation attribute for weld compensation

When welding two plates together, shrinkage can lead to deformation. The primary purpose of the new deformation attribute is to enlarge the plate on one side so that the deformation is neutralized after welding. Other additions for production data include bevel and extra length settings and changes in the number of weld labels.

- Other additions:
- Changed default color combination
- New possibilities for hole dimensioning
- Increased limit to 200 for block export

CADMATIC is a leading 3D design and information management software developer and supplier for the marine, process and energy industries.

- CADMATIC's main offices are located in Turku, Finland and Groningen, the Netherlands.
- We have staff in Australia, China, Hungary, India, Italy, Russia, Singapore, Spain and the UAE.
- We have certified resellers and support partners in 15 countries in Europe, Asia and America. Our growing customer base includes over 1000 customer organizations in 58 countries.



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