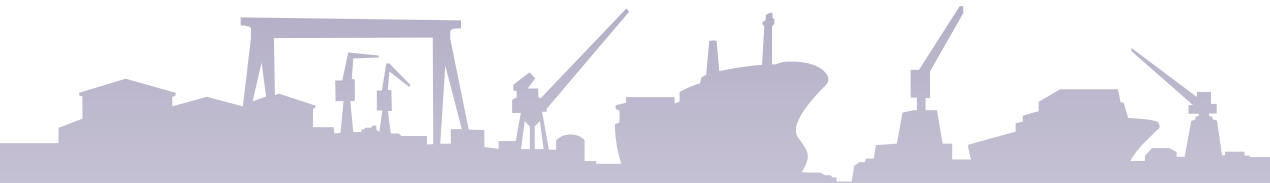# Tribon
M3

**Supports the complete
shipbuilding process.
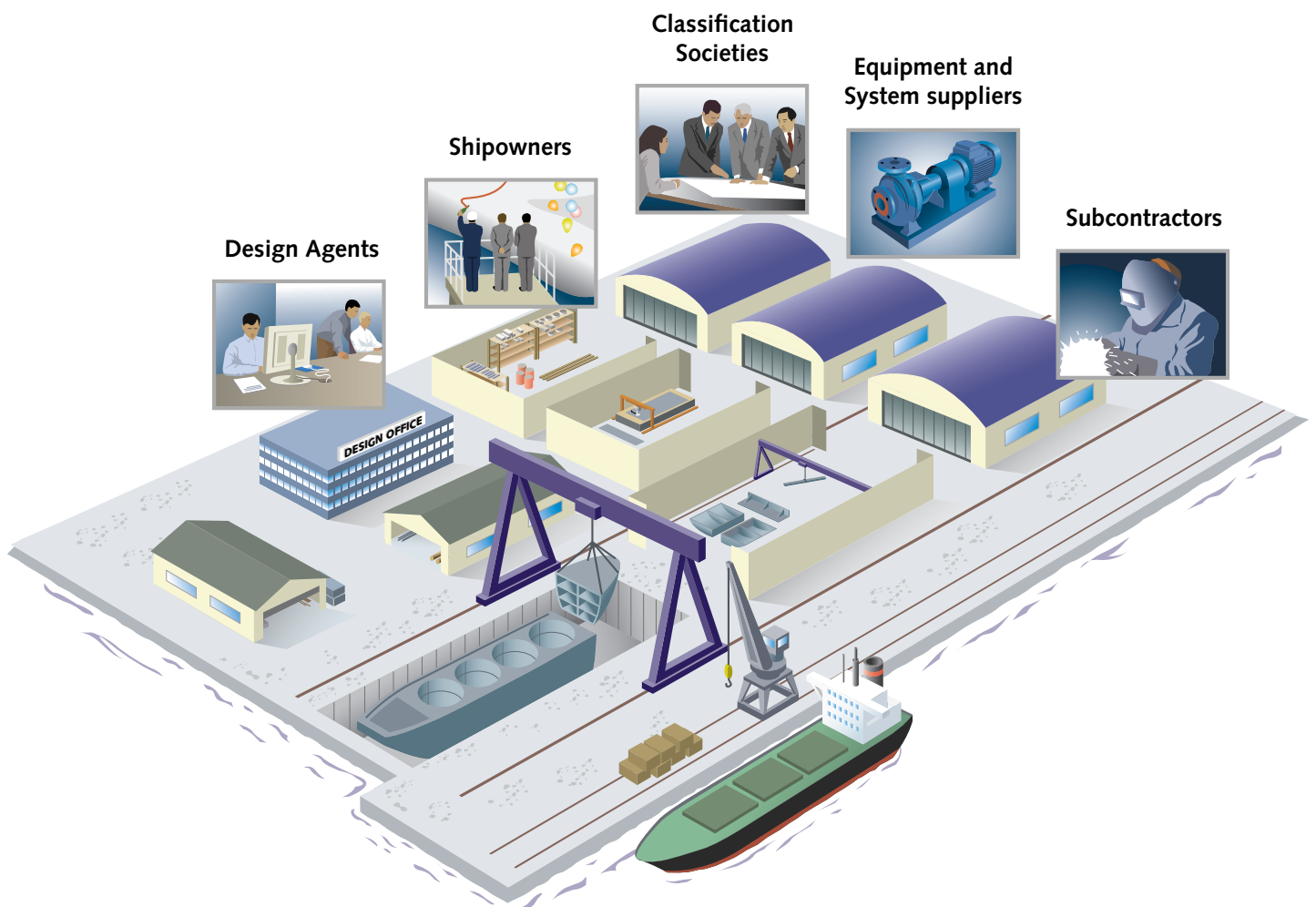From concept to delivery.**

TRIBON
solutions

Tribon M3 handles all aspects of information between everyone involved in the shipbuilding process

As you know, shipbuilding is an extremely complex business. The time between order and delivery is very short, which means that a huge amount of tasks must be performed in parallel. To perform these tasks it is essential to have good tools for co-ordinating and managing the complex flow of information between everyone involved. And to create those tools you need to know the industry.

Focused on shipbuilding
For more than 40 years, Tribon Solutions has been focused on the shipbuilding industry. Our number one objective has been to provide the world's shipbuilders with unique software solutions to increase their efficiency. We have continuously found new ways to improve quality, generate cost savings and shorten delivery times.

Classification
Societies

Equipment and
System suppliers

Shipowners

Subcontractors

Design Agents

DESIGN OFFICE

The world market leader

Tribon Solutions is the market leader in software solutions for the shipbuilding industry. Over 260 shipbuilders and design agents in 39 countries rely on Tribon applications from start to finish. Tribon users carry out the design and production of approximately one third of the world wide output of large vessels every year.

So every day one or more large "Tribon ship" is launched.

Developed in co-operation

Tribon M3 has been developed in close co-operation with the market leading shipbuilders around the world. The demands and needs from these shipbuilders have formed the foundation for the entire development. Specific solutions have been created and tested to meet specific needs. Tribon M3 is an incredibly efficient system, helping you to save both time and money.

Well proven unique technology

There are more improvements in Tribon M3 than in any other previous release from Tribon Solutions. Our well proven Tribon technology allows the storage and development of the entire design in one complete database that is available to all people involved – the Tribon PIM (Tribon Product Information Model).

Tribon.com offers the designers immediate access to design information, pictures, technical specifications, certificates and 3D models of each product from equipment and systems suppliers. This can significantly reduce the large number of hours spent on searching for accurate information, as well as facilitating the integration of that information into the design.

Images:
1. Queen Mary 2. Photo Alstom Marine, Bernard Biger.
2. Photo Shanghai Waigaoqiao Shipbuilding.
3. KDX-2 Frigate. Photo Daewoo Shipbuilding & Marine Engineering Co., Ltd. (DSME).
4. Belanak Natuna. Photo Dalian New Shipbuilding Heavy Industry Co., Ltd.

Proven to offer significant savings in the design and production phases

Tribon M3 is based on well proven Tribon technology. Reports from shipyards using the Tribon technology show 30 percent savings in design man-hours and 8 percent savings in production man-hours compared to the previous use of systems based on traditional methods.

Savings throughout the entire process

With Tribon M3 you will save further time and costs in some of the most important phases in the shipbuilding process. In the Contract Design and Basic Design phases you save calendar time by working in parallel internally as well as externally due to highly developed co-ordination possibilities.
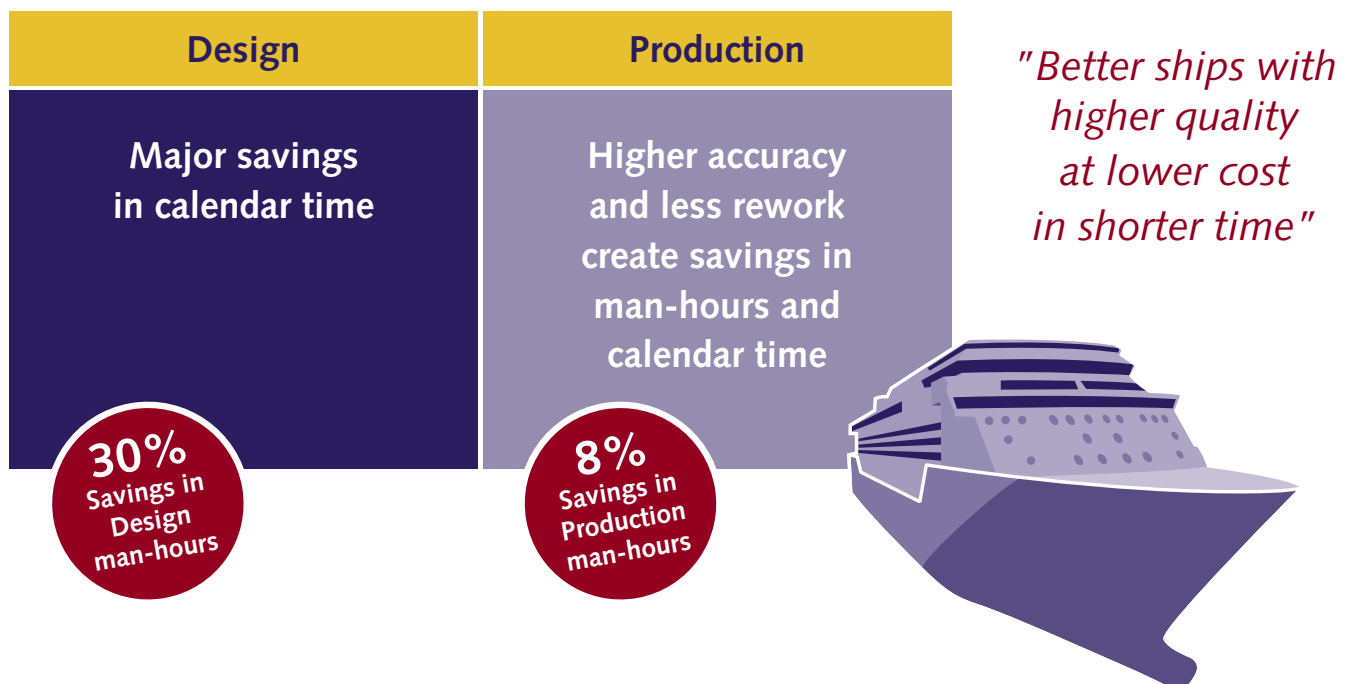
In the Detailed Design phase you reduce man-hours through an efficient process to create production information and documents for the tasks of manufacturing and assembly.

In the Parts Manufacturing and Assembly phases you reduce material costs and save man-hours due to the high quality of the manufacturing information. This leads to better fitting, less rework and full utilization of the workshop machines.

Possible to share information worldwide

Today in the modern, more distributed way of working, a complete infrastructure is used by a shipyard to build a ship. This consists of design agents, steel manufacturing subcontractors, suppliers of individual equipment items and complete systems.

Tribon technology provides a solution where all the parties can be connected using the Internet which means a revolution to the development of the virtual shipyard.

Design	Production
Major savings in calendar time	Higher accuracy and less rework create savings in man-hours and calendar time

30% Savings in Design man-hours

8% Savings in Production man-hours

"Better ships with higher quality at lower cost in shorter time"

New and additional savings with Tribon M3

Tribon M3 has a very close connection with the Internet based service Tribon.com. This makes it possible to create even further savings of a ship's total cost, including overhead, design, production and material.
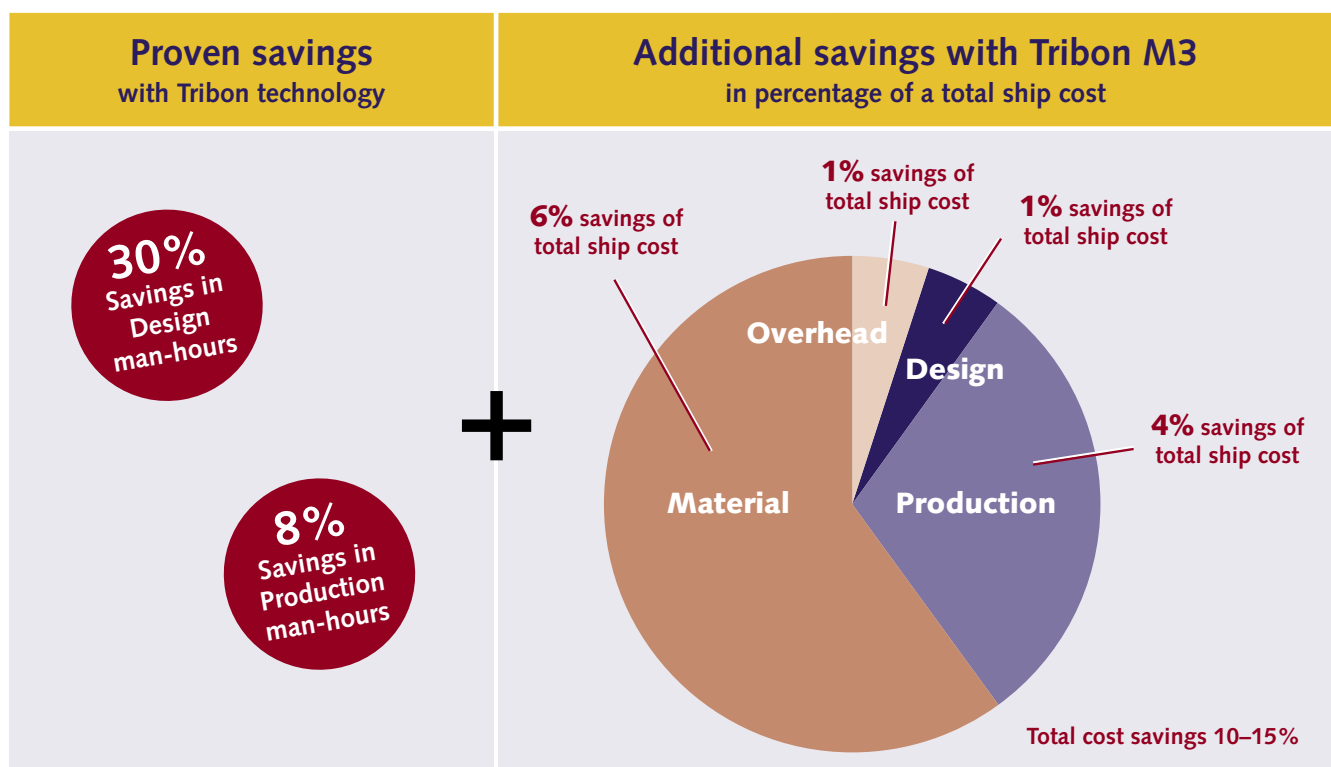
Less time spent on searching

Building an average ship involves searching of components from thousands of different suppliers. Often the information needed regarding the components are either hard to find, inaccurate or insufficient, which means that a major portion of design man-hours is spent on searching. Naturally, searching also holds up the design process until relevant information is received. Tribon M3 solves these problems.

Equipment selection in design

Tribon.com incorporates a Global Database filled with information about shipbuilding components and equipment. The Global Database works as your local database giving you instant access to accurate supplier information in a standardized shipbuilding format which can be integrated directly into your design. In this way you reduce the time spent on searching for accurate information considerably.

Tribon.com helps you make savings through a more efficient selection of equipment by making it easier to evaluate alternatives in terms of performance and quality when designing and purchasing.

Proven savings
with Tribon technology

Additional savings with Tribon M3
in percentage of a total ship cost

30% Savings in Design man-hours

8% Savings in Production man-hours

+

6% savings of total ship cost — Material

1% savings of total ship cost — Overhead

1% savings of total ship cost — Design

4% savings of total ship cost — Production

Total cost savings 10–15%

From the leading shipyards of the world, every day more than one large "Tribon ship" is launched

EUROPE

Bulgaria
Rousse Shipyard Ltd.
Varna Shipyard

Croatia
3. Maj Shipyard
Brodosplit Shipyard
Kraljevica Shipyard
Viktor Lenac Shipyard

Denmark
Odense Steel Shipyard Ltd.

Finland
Aker Finnyards Oy
Kværner Masa-Yards Inc., Helsinki
Kværner Masa-Yards Inc., Turku

France
Alstom Marine, Chantiers de l'Atlantique

Germany
Aker MTW Werft GmbH
Aker Warnow Werft GmbH
Blohm + Voss GmbH
Howaldtswerke-Deutsche Werft AG
Lindenau GmbH Schiffswerft und
Maschinenfabrik
Nordseewerke GmbH
Volkswerft Stralsund GmbH

Greece
Elefsis Shipyards
Hellenic Shipyards Co

Italy
Cantiere Navale di Pesaro

The Netherlands
Damen Shipyards Hoogezand
Keppel Verolme B.V.

Norway
Fosen Mek. Verksteder A/S

Poland
Gdynia Shipyard
Stocznia Szczecinska Nowa Sp. z o.o.

Romania
Aker Braila S.A.
Constantza Shipyard
Daewoo-Mangalia Shipyard S.A.
Damen Shipyards Galati S.A.
Severnav S.A. Shipyard
Tulcea Shipyard

Sweden
Kockums AB
Kockums AB Karlskrona

Turkey
Çelik Tekne shipyard
Gemak Shipbuilding Industry and Trading S.A.
RMK Marine
Sedef shipyard Inc
Tuzla Shipbuilding Industry Co., Ltd.
Yildiz Shipyard

Ukraine
Damen Shipyards Okean
Kherson Shipyard

United Kingdom
Appledore.
BAe Systems
VT Shipbuilding

MIDDLE EAST

Egypt
Port Said Shipyard

Iran
Iran Marine Industrial
Iran Shipbuilding & Offshore Industries
Complex Co. (ISOICO)

AUSTRALIA

Australia
Tenix Defence Systems Pty Ltd.

ASIA

China
Bohai Shipbuilding Heavy Industry Co., Ltd.
Dalian New Shipbuilding Heavy Industry Co., Ltd.
Dalian Shipyard Co., Ltd.
Fujian Mawei Shipbuilding Co., Ltd.
Guangzhou Shipyard International Co., Ltd.
Hudong-Zhonghua Shipbuilding (Group) Co., Ltd.
Jiangnan Shipyard (Group) Co., Ltd.
Jiangyang Shipbuilding Group Co., Ltd.
Jiangsu Yangzijiang Shipyard Co., Ltd.
Nantong COSCO KHI Engineering Co., Ltd. (NACKS)
New Century Shipbuilding Co., Ltd.
Shanghai Edward Shipbuilding Co., Ltd.
Shanghai Shipyard
Shanghai Waigaoqiao Shipbuilding Co., Ltd.
Tianjin Xingang Shipyard
Xiamen Shipbuilding Industry Co., Ltd.

India
Cochin Shipyard Ltd.
Garden Reach Shipbuilders & Engineers Ltd.
Goa Shipyard Limited
Hindustan Shipyard Ltd.
Indian Navy, Naval Headquarters
Mazagon Dock Limited

Indonesia
PT Dok & Perkapalan Kodja Bahari
PT PAL INDONESIA
PT Pan-United Shipyard
PT. Dok Dan Perkapalan Surabaya

Japan
Fukuoka Shipbuilding Co., Ltd.
Higaki Shipbuilding Co., Ltd.
IHI Marine United Inc.
Kawasaki Shipbuilding Corporation, Kobe Shipyard
Kawasaki Shipbuilding Corporation, Sakaide Shipyard
Mitsui Engineering & Shipbuilding Co., Ltd., Chiba Works
Mitsui Engineering & Shipbuilding Co., Ltd., Tamano Works
Naikai Zosen Corporation
Namura Shipbuilding Co., Ltd.
Onomichi Dockyard Co., Ltd.
Oshima Shipbuilding Co., Ltd.
Sasebo Heavy Industries Co., Ltd.
Shin Kurushima Dockyards Co., Ltd.
Universal Shipbuilding Corporation, Ariake Shipyard
Universal shipbuilding Corporation, Keihin Shipyard
Universal Shipbuilding Corporation, Maizuru Shipyard
Universal Shipbuilding Corporation, Tsu Shipyard

Republic of Korea
Daewoo Shipbuilding & Marine Engineering Co., Ltd. (DSME)
Hanjin Heavy Industries Co Ltd.
Hyundai Heavy Industries Co., Ltd., Special & Naval shipbuilding division
Hyundai Mipo Dockyards Co., Ltd.
Hyundai Samho Heavy Industries Co., Ltd.
Shina Shipbuilding Co., Ltd.
STX Shipbuilding Co., Ltd.

Malaysia
Malaysia Shipyard and Engineering Sdn. Bhd.

Myanmar
Myanmar Navy

Russia
Admiralty Shipyards
JSC Astrakhan Shipwright
Rybinsk Shipbuilding Plant
Vympel Shipyard.
Yantar Commercial Shipyard

Singapore
ASL Shipyard Pte., Ltd.
Jurong Shipyard Ltd.
Keppel FELS Ltd.
Keppel Singmarine Pte Ltd
Pan-United Shipyard Pte Ltd
PPL Shipyard Pte Ltd
Sembawang Shipyard Pte. Ltd.
Singapore Technologies Engineering Ltd.

Taiwan
China Shipbuilding Corporation, Kaohsiung Shipyard
China Shipbuilding Corporation, Keelung Shipyard
Jong Shyn Shipbuilding Co., Ltd.
Shing Sheng Fa Boat Building Co.

Vietnam
Vinashin Corporation

NORTH AMERICA

Canada
Davie Maritime Inc.
Halifax Shipyard Ltd.

United States
Atlantic Marine Inc.
Bath Iron Works Corporation
Kvaerner Philadelphia
National Steel and Shipbuilding Company (NASSCO)
Northrop Grumman Newport News

SOUTH AMERICA

Brazil
FELS Setal S.A.

Chile
Astilleros y Servicios Navales S.A. (ASENAV)

Colombia
COTECMAR

Over 120 design agents worldwide provide the shipyards with professional support using Tribon technology

EUROPE

Bulgaria
Keppel FELS Baltech Ltd.

Croatia
Brodoplan d.o.o.
De Naval
Ladon Ltd.
Mardesign d.o.o.
NAVTEC Marine
R-Project

Denmark
Burmeister & Wain Ship Design A/S
Hands & Brains
Jorgen Petersen Ltd. Consulting Naval Architects
Poul Ree Ltd.

Finland
Akoship Oy
Deltamarin Ltd.
Elomatic Group Ltd.
Europlan Engineering Ltd.
PI-Rauma Ltd.

France
ETA, Etudes Techniques Applications
Secomat Ingenierie Industrielle

Germany
Alfons Winter 3-D-Konstruktions GmbH
archnav.de
Atlantec Enterprise Solutions GmbH
IBS Ingenieurbüro für Schiffbau Theodor Paxinos
Ingenieurbüro Franz Sternkopf GmbH
Ingenieurbüro Holger Achner
Ingenieurbüro Kölpin GmbH
Ingenieurbüro Steffen Franck
KBN Konstruktionsbüro GmbH
KONO Konstruktionsbüro GmbH
MTE Meerestechnik Engineering GmbH
Neptun-Stahlkonstruktions GmbH
Schiffko GmbH
S.M.I.L.E. Technisches Büro
SMK Ingenieurbüro GmbH
SMK Konstruktionsbüro GmbH
Warnow Design GmbH
Wismarer Ingenieurgesellschaft mbH

Greece
Martedec S.A. (EANT)
SETE Technical Services S.A.

Ireland
Department of Marine

Italy
Comed srl
Francesco Andolfi, Naval Architect & Marine Eng.
Informatica Navale
Ingegneria Informatica s.r.l.
NAOS Ship and Boat Design
Naval Designs

Latvia
Skibtecs Ltd.

Lithuania
Alex Naval LCC
UAB Baltic Engineering Centre

The Netherlands
Van Dam Marine Contracting B.V.
Orca Marine Design

Norway
Barber Marine Consultants
HITEC Framnaes AS
LMG Marin A/S
Marintek A/S
Möre Maritime AS
Polarkonsult A.S.
Shipping Research Services A/S
Skipskonsulent A/S
Vik & Sandvik A/S

Poland
Pracownia Projektowa StoCAD
Vik-Sandvik Poland Spolka z.o.o.

Romania
Icepronav S.A.
MTV Ship Design S.R.L.
Romconsult S.A.

Spain
A.T.N. y Proyectos, S.A.
GHESA

Sweden
Timetec
Viking SteelCad AB

Turkey
Andac Denizcilik Ltd
ATG Engineering Bureau
Bilgi Cad/Cam Ltd
ES-CAD
Navtek Naval Technologies Inc.
Serene A.S.
SETA Gemi Muhendislik
Özsay Deniz Ship Industry & Trading Co.

Ukraine
Chernomorets State DB
Chernomorsudoproject J.S.C.
Korall Central Design Bureau
Ship Design and Engineering Ukraine
Torola Ltd.
VVS-Cont. Ltd.

United Kingdom
Armstrong Technology
BMT Defence Services Ltd.
BMT Shipdesign Limited
Harland and Wolff Technical Services
International Marine Transportation Limited
James Fisher (Shipping Services) Limited
Ministry Of Defence
Thales Naval Ltd.
Vogwill Shipdesign Services

ASIA

China
Marine Design & Research Institute of China (MARIC)
Peter Cheng Naval Architect & Marine Consultants Ltd.
Shanghai Merchant Ship Design and Research Institute (SDARI)
Shanghai Xin Ye Marine & Engineering Design Co., Ltd.

India
L&T-e Engineering Solutions
Neilsoft Limited
SST India Pvt Ltd.

Japan
AZ Technical Enterprize Co.,Ltd.
CDI Corporation
Laboratory of Practical Technology
SEA Soken
West Japan Fluid Engineering Laboratory Co., Ltd.
Yakushiji Kogyou

Republic of Korea
BIP Engineering Co., Ltd
DAE Young Engineering Co., Ltd
Daewoo Shipbuilding Engineering Coorporation
FD Solution
Hana Information Technology
HI-PRES Korea Co., Ltd
Infoget Systems Co., Ltd.
Jin Sung Hi-Tech Co., Ltd.
Korea Research Institute of Medium & Small Shipbuilding
Lee Young Industrial Machinery Co., Ltd.
Shinhan Machinery Co., Ltd
SUN BO Industries Co., Ltd
TechServer Corporation
Win Engineering

Russia
Baltsudoservice Ltd.
Central Marine Design Bureau Almaz
Iceberg Design Bureau JSC
MTD Marine Technology Development Ltd.
Nevskoye Design Bureau
PCB Petrobalt Ltd. Design Bureau
Proteus Training Center
Vympel Design Bureau JSC

Singapore
Conan Wu & Associates Pte Ltd
Dragan New -Tech Pte Ltd
Marine CadCam Pte. Ltd

Taiwan
United Ship Design & Development Center

NORTH AMERICA

Canada
Fleetway Inc.
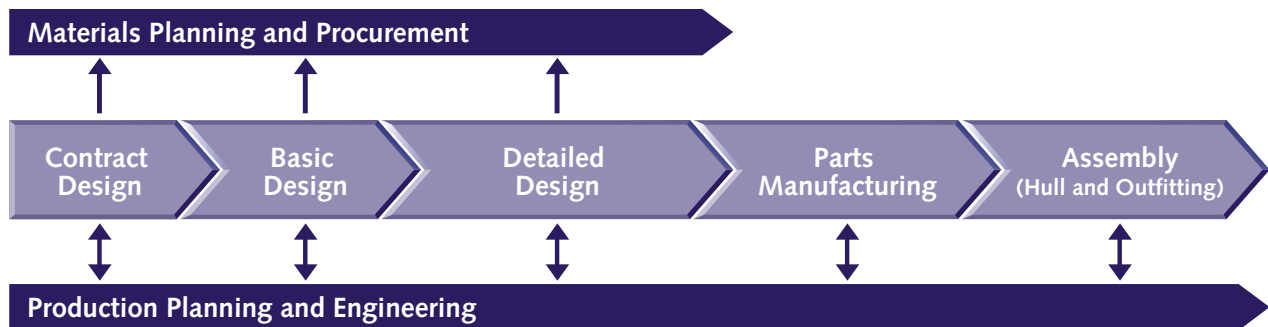SDMI Technologies Inc.

United States
Designers & Planners Inc.
Lockheed Martin Maritime System & Sensors
Military Sealift Command
ProMar Design, Professional Marine Design

SOUTH AMERICA

Brazil
Projemar, S.A.

Tribon M3 supports the complete shipbuilding process from concept to delivery

Materials Planning and Procurement				
Contract Design	Basic Design	Detailed Design	Parts Manufacturing	Assembly (Hull and Outfitting)
Production Planning and Engineering				

Tribon M3 is a design and information system created to fit the specific needs of shipbuilding and offshore industries. Tribon M3 supports the shipbuilding process, where the goal is to efficiently produce and handle all the information needed from concept to delivery.

Instant access to accurate supplier information

When using Tribon.com, shipyards have access to accurate and complete supplier product information, which helps them shorten the time spent on searching for, downloading and integrating component information during the design process.

Design for production

Each Tribon M3 application handles the design from the initial stage through to the exact details needed for production. Information registered at an earlier stage of design can be refined as the project progresses. Where possible, Tribon M3 will check that the design meets design rules and is practical. This helps prevent the kind of mistakes which might otherwise not be discovered until production is underway, saving both valuable time and money. Easy access to design information means that several designers can work in parallel and co-ordinate their tasks.

Production benefits

Tribon M3 gives you many benefits in your production. Minimization of rework is built on close attention to accuracy in all stages of design and production so that things can be done right the first time. Tribon M3 has practical realistic features to promote an accurate way of working. Built into Triobn M3 is an extensive knowledge of the shipbuilding process, including a high standard of production information for all types of parts. This information includes things such as allowance for shrinkage in manufacturing so that all parts fit first time. No additional rework saves above all time and money, but also eliminates frustration and unpleasant internal conflicts.

Just-in-Time

Tribon PIM technology makes product data available to all parties involved so that they can "pull" out the information they need, when they need it. All data relevant to parts manufacturing and assembly is found in the Tribon PIM and can be extracted in the format each individual user requires. Each assembly or installation activity can have its own document containing precisely the information needed to perform that particular activity. The result is that draftsmen or workshop planners can prepare and print work instructions 'just in time'.

Create once, refine, use many times

One of the basic features of the Tribon technology is to create information once and use it many times. Designers create a basic Tribon PIM (Tribon Product Information Model) which is enhanced with details by the engineers. All documentation for materials acquisition and planning is derived from the Tribon PIM. Drawings, reports etc. for manufacturing of plate parts, pipe spools, ventilation ducts, cables, pipe and cable hangers etc. are also taken automatically from the Tribon PIM. In addition, drawings for assembly and welding data to feed assembly welding robots are all extracted from the Tribon PIM.

Re-use of design

Tribon M3 contains new tools for copying parts of existing ship models to a new model – we call it the Tribon Project Copy functionality. This makes it possible to re-use existing design data. These tools automatically rename objects and object references. They also disconnect associative references from the "mother" ship and re-establish them correctly in the receiving project.

These new functions will dramatically improve the possibilities to save design time through an efficient re-use of existing design data. They can also be used to study different alternative ship designs.

Photo Volkswerft Stralsund GmbH

Contract Design – reduce cost by getting it right from the start

Preparing a tender correctly is of vital importance if a contract is to be won by offering the most competitive price. A key element of a successful tender is a well defined initial design and build strategy for the project. In this process Tribon M3 supports you every step of the way.

Contract Design
- Specification
- Equipment selection
- Outfit
- Hull

Less time waiting and searching

Tribon M3 provides a wide range of tools in all disciplines to make the Contract Design in a structured way that allows full details to be extracted for pricing and planning. The instant access to accurate product information from system and equipment suppliers using Tribon.com reduces the time spent on searching and waiting for supplier

information needed to develop the contract design. A number of different alternatives can be evaluated to find the best solution.
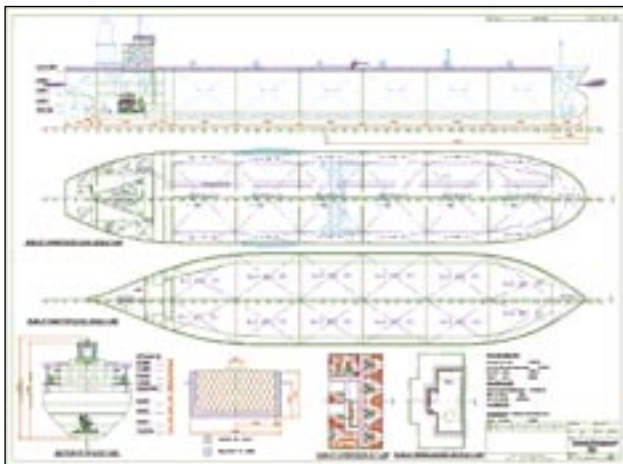
Finally the best design can be effectively presented to the client reflecting the skills of your company.
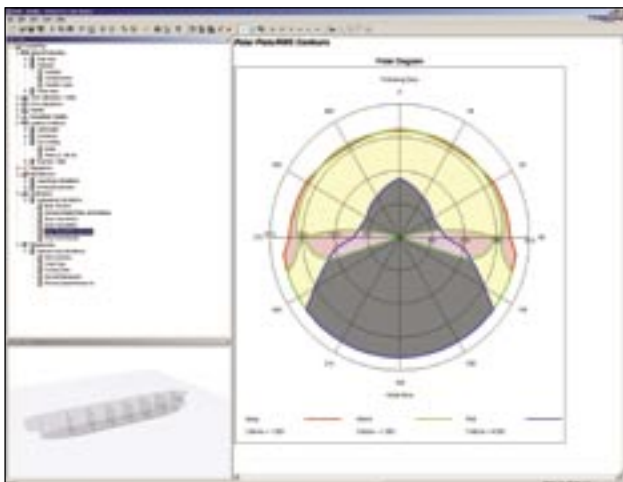
Greater accuracy, better profit

When an offer becomes an order, the design information can immediately be re-used and refined without being recreated as the project develops and progresses. The better the design is, the less risk there will be in the tender. The result is greater accuracy with the best possible price – and a reduced risk regarding what the profit will be at the end of the day.
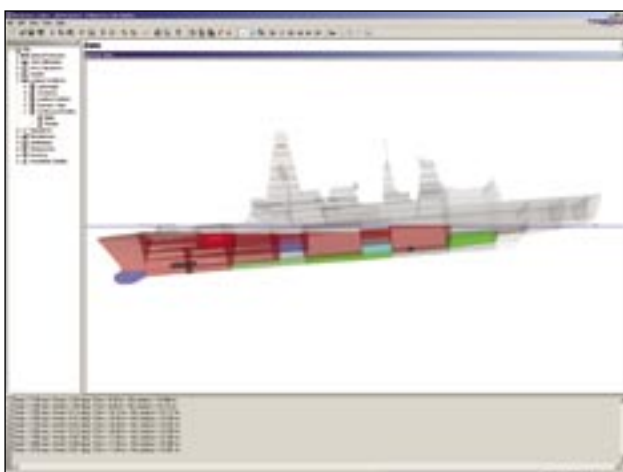

A concept model of a cruise vessel.

General arrangement.

Seakeeping analysis presentation.

Continuous flooding simulation.

Tribon M3 applications for Contract Design

Tribon.com has functions for
- Global database of suppliers and technical product information
- Searching for suppliers and their products
- Downloading of technical information for products including 3D volumes
- Technical enquiries to suppliers for additional product information

Tribon M3 Initial Design has functions for
- Preliminary hullform definition
- Distortion of existing hullforms
- Definition of decks and bulkheads
- Compartmentation
- Resistance and powering calculations
- Manoeuvring, propulsion and seakeeping calculations
- Stability and capacity calculations (including grain and containers)
- Calculation of structural loads (bending moment and shear force)
- Lines plan
- Continuous flooding simulation

Tribon M3 Basic Design has functions for
- Design of longitudinal structural members. (longitudinals, shell plating, girders and decks)
- Calculation of sectional modulus
- Design of transversal structural members. (bulkheads, floors, web frames)
- Placement of main equipments and creation of machinery arrangement drawings
- Automatic drawing generation from the Tribon PIM (body plan, midship section, typical sections and decks)
- Division of steel structure into main building blocks

Tribon M3 Drafting has functions for
- Creation of general arrangement drawings

Tribon M3 Pipe has functions for
- Specification of components for pipe systems
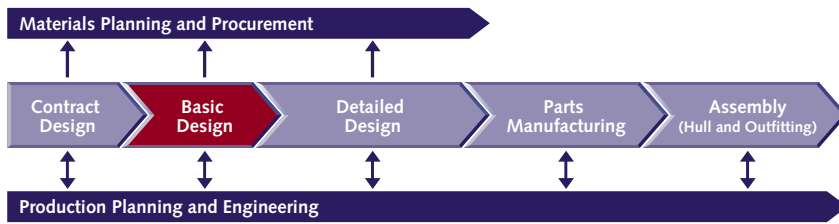- Diagrams for pipe systems

Tribon M3 Cable has functions for
- Diagrams for electrical systems

Tribon M3 Design Manager has functions for
- Estimates of block weights.
- Design review by shipyard management, classification societies and ship owners
- Walk through

Tribon M3 Data Management has functions for
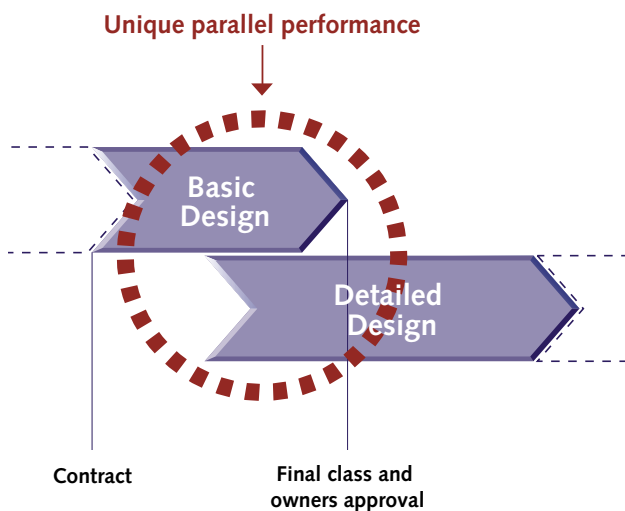- Access control, approval and release of design data

Basic Design – less rework leads to savings

Tribon M3 effectively supports the Basic Design phase during which major equipment selection, general arrangements, systems design, spaces allocation and structural design are given final approval by classification societies and shipowners.

Basic Design
- Equipment selection
- Outfit
- Hull

Supportive solution

By using Tribon.com the equipment selection process can be improved significantly. Different alternatives for equipment from suppliers all over the world can be reviewed and compared. Technical data for each piece of equipment can be downloaded into the design and technical enquiries can be sent to suppliers for more information.

Tribon M3 is useful for a variety of design scenarios, one of them being when subcontractors make the entire or parts of the design. Tribon M3 is used for preliminary definition and arrangement of the ship's structure and compartment. The system is an aid in making important decisions regarding the preliminary definition and arrangement of principal structural members, and it provides the framework for associated design guidance.
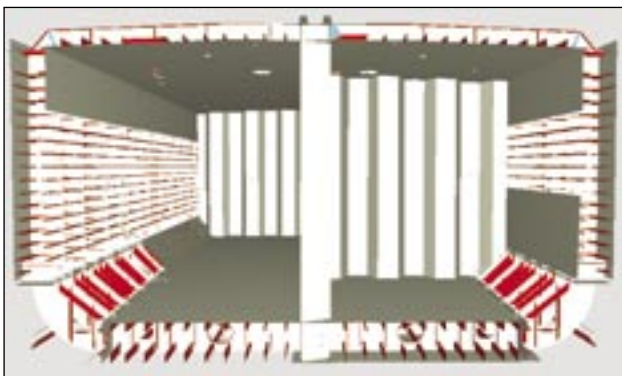
More accurate calculations

Tribon M3 generates classification drawings, steel material estimates, equipment lists, weld lengths and weights and centres of gravity reports. The preliminary structural definition developed in the Basic Design phase can be used for detailed design and preparation of production information. This is possible thanks to an advanced block splitting function that transforms the initial design structure into production blocks. The use of the Tribon PIM in the Basic Design phase leads to more accurate calculations and better estimates of materials and work content.

Unique parallel performance

Basic Design

Detailed Design

Contract

Final class and owners approval

Interfaces to FEM softwares

In Tribon M3 analysis tools are integrated into the Basic Design process. Through the XML based interface formats available with Tribon M3, links are built to software packages from classification societies and for FEM based strength and vibration calculations.

Classification drawing.

Hull cargo part during basic design.

Tribon M3 applications for Basic Design

Tribon.com has functions for
- Global database of suppliers and technical product information
- Searching for suppliers and their products
- Downloading of technical information for products including 3D volumes
- Technical enquiries to suppliers for additional product information

Tribon M3 Initial Design has functions for
- Fairing of the hullform
- Tank plan
- Capacity tables
- Stability book
- Deterministic and probabilistic damage stability
- Launching calculations
- Lines plan
- Offset table

Tribon M3 Basic Design has functions for
- Design of longitudinal structural members. (longitudinals, shell plating, girders and decks)
- Calculation of sectional modulus.
- Design of transversal structural members. (bulkheads, floors and web frames)
- Placement of main equipments and creation of machinery arrangement drawings
- Automatic drawing generation from the Tribon PIM (body plan, midship section, typical sections and decks)
- Division of steel structure into main building blocks.
- Weight and centre of gravity reports
- Steel material estimation
- Export of data to FEM calculations

Tribon M3 Drafting has functions for
- Approval and general arrangement drawings
- Import from / Export to DXF and IGES
- Collision control

Tribon M3 Pipe has functions for
- Specification of components for pipe systems
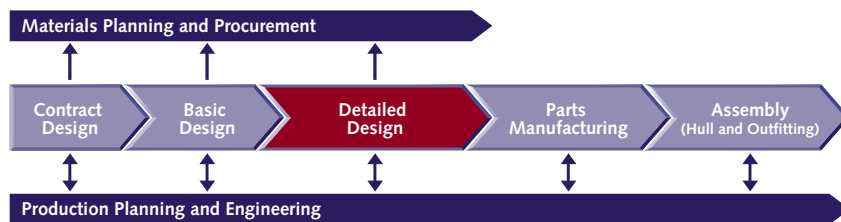- Diagrams for pipe systems

Tribon M3 Cable has functions for
- Diagrams for electrical systems

Tribon M3 Design Manager has functions for
- Estimates of block weights.
- Design review by shipyard management, classification societies and ship owners
- Walk through

Tribon M3 Data Management has functions for
- Access control, approval and release of design data

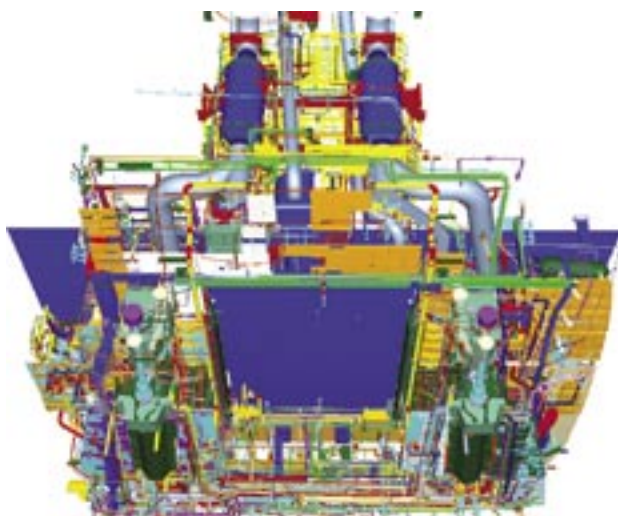| Materials Planning and Procurement				
Contract Design	Basic Design	**Detailed Design**	Parts Manufacturing	Assembly (Hull and Outfitting)
Production Planning and Engineering				

Detailed Design – specific features for every step of the process

In the Detailed Design phase, Tribon M3 provides an efficient system for concurrent design. Therefore many designers can work in parallel creating detailed layout of compartments, defining systems and making the details of the steel structure.

Efficient information handling
Design time is often lost whilst waiting for supplier information. During the Detailed Design phase, designers can find detailed supplier information on Tribon.com – for major equipments as well as fittings and minor components that need to be selected in this phase of design.
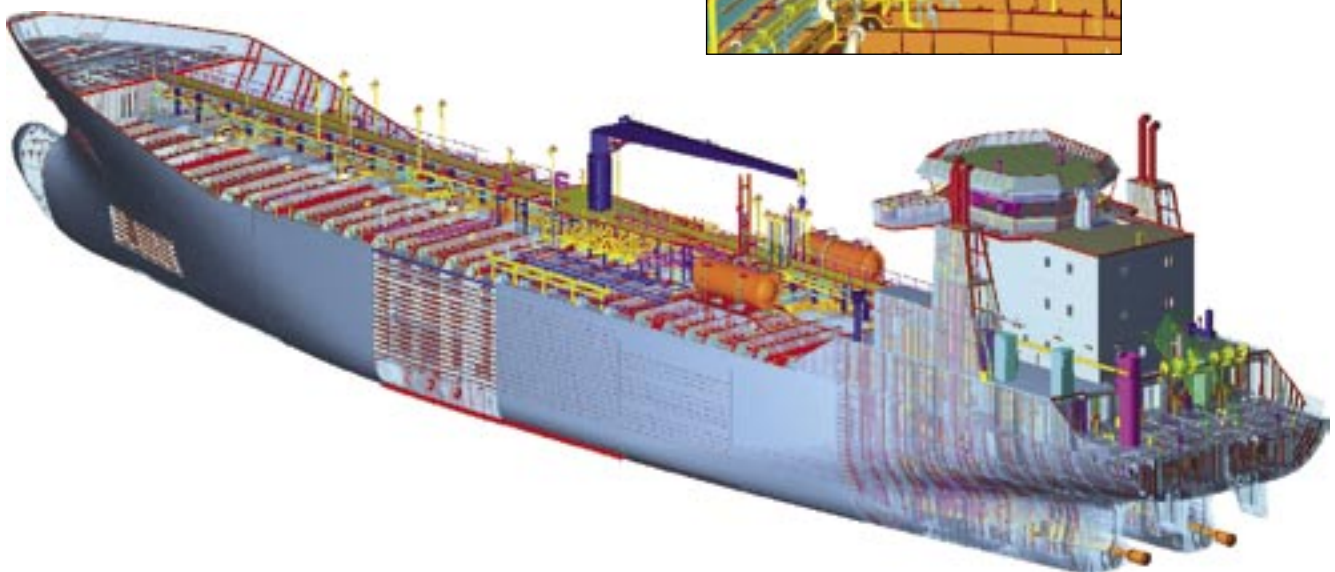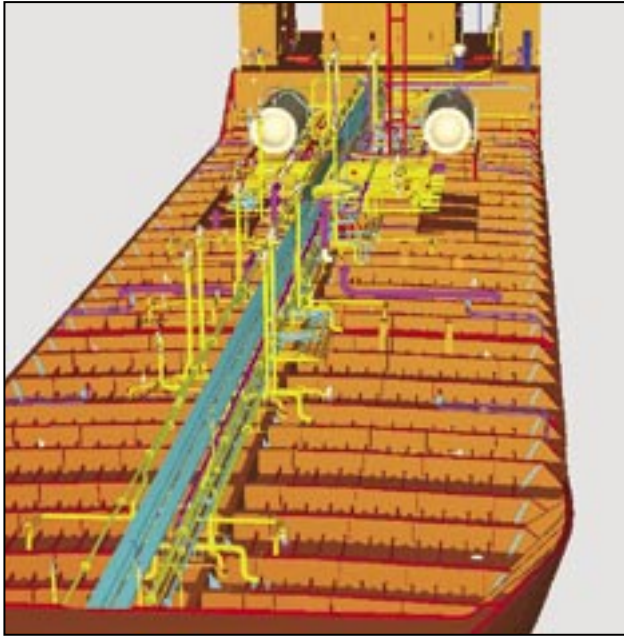
Detailed Design
- Equipment selection
- Outfit
- Hull
- Production information

Supports the complete flow of information
Each application handles the complete flow of information from the use of customized parametric standards for modelling to automatic piece parts generation, advanced support for generation of drawings for Parts Manufacturing and Assembly, and also accurate parts manufacturing production information for the various machines found in a shipyard. Because Tribon M3 manages the complete flow of information, rework in design is minimized and changes can be quickly handled. A change to Tribon PIM can also easily update all associated drawings and production information.
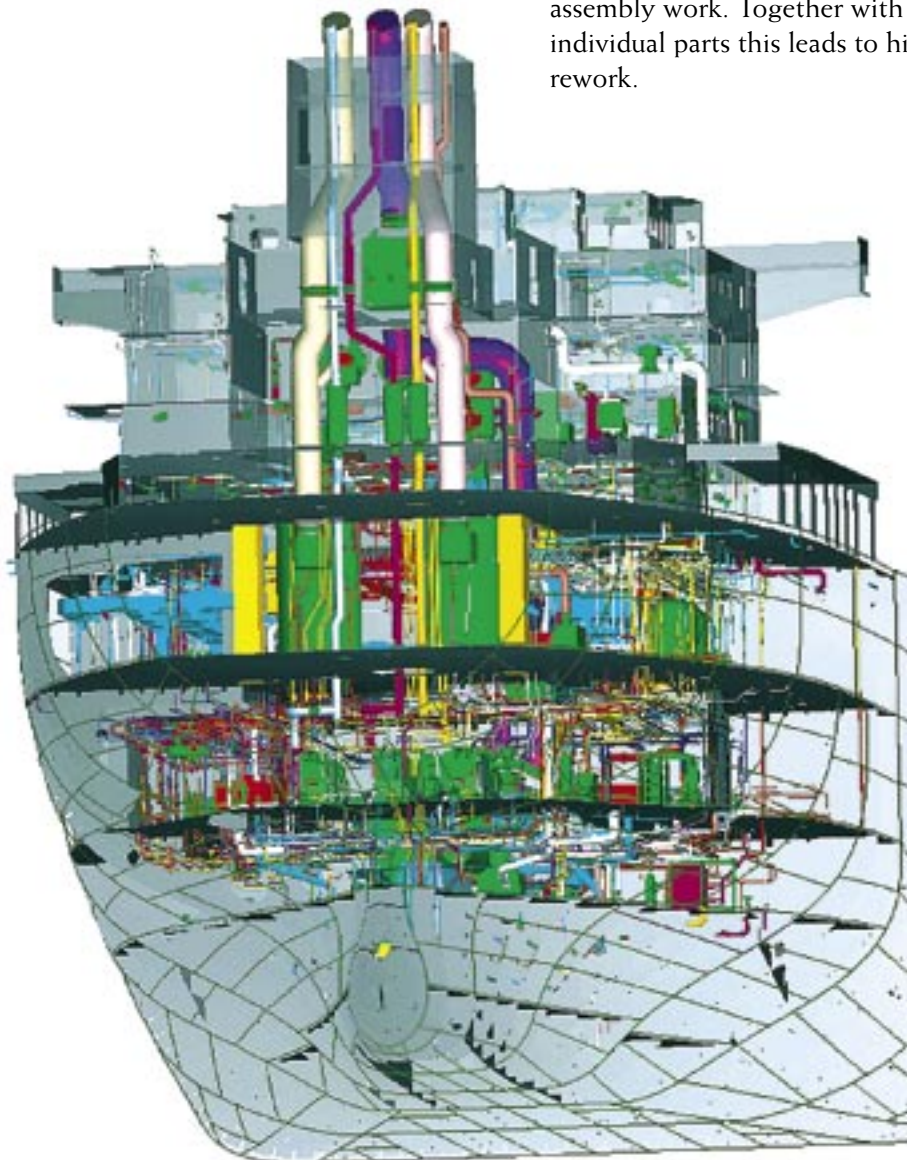

Courtesy of Damen Shipyards Galati S.A.

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Courtesy of Damen Shipyards Galati S.A.
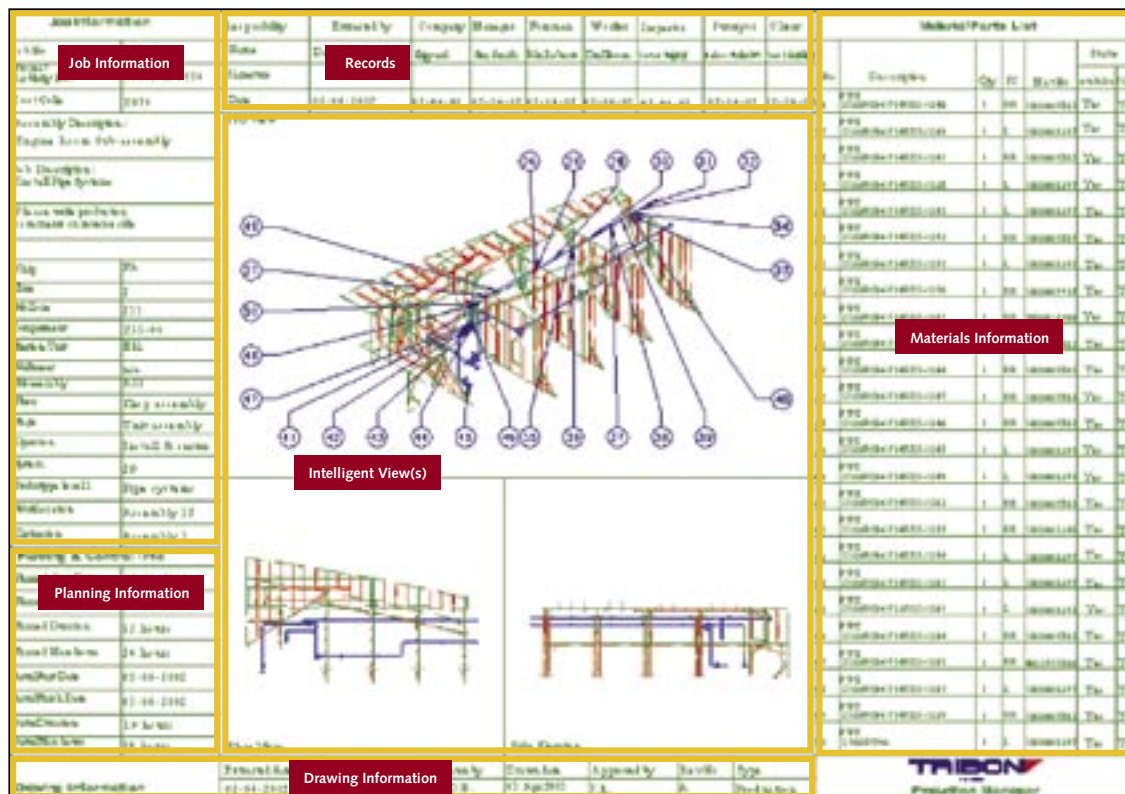
Higher quality and less rework

Tribon M3 comprises a powerful feature to model in a drawing. All kinds of drawing views of model objects derived from Tribon PIM are linked to the actual model. This enables changes in the model to be carried out via the drawing, which in turn ensures complete consistency between Tribon PIM and all related drawings.

Another important feature is Collision Control – the function of carrying out a spatial check of arrangements in compartments and on decks. In Tribon M3 the detailed arrangements can be checked at any time for colliding objects. This will minimize the number of clashing parts during assembly work. Together with high accuracy of the individual parts this leads to higher quality and less rework.

Courtesy of STX Shipbuilding Co., Ltd.

Assembly drawing and instruction document showing installation of pipes in a subassembly.

Tribon M3 applications for Detailed Design

Tribon.com has functions for
- Global database of suppliers and technical product information
- Searching for suppliers and their products
- Downloading of technical information for products including 3D volumes
- Technical enquiries to suppliers for additional product information

Tribon M3 Initial Design has functions for
- Final hullform fairing

Tribon M3 Hull has functions for
- Detailed planar and curved steel structures
- Manufacturing information for steel parts (excess, bevel and shrinkage)
- Automatic parts numbering
- Penetration holes for outfitting
- Calculation of painting areas
- Plate nesting with burning sketch and NC information
- Profile nesting with sketch and NC information
- Bending template for shell plates
- Jigs for curved panels assembly
- Manufacturing information for straight and bent profiles
- Steel material list

Tribon M3 Pipe has functions for
- Placing of equipments
- Pipe routing
- Pipe sketch
- Pipe material list

Tribon M3 Pipe Support has functions for
- Modelling of pipe support
- Manufacturing sketch

Tribon M3 Ventilation has functions for
- Placing of equipments
- Ventilation routing
- Ventilation sketch
- Ventilation material list

Tribon M3 Cable has functions for
- Placing of equipments
- Cable way
- Cable routing on cable ways
- Cable schedule listing all cables
- Material lists for cables and cable ways

Tribon M3 Structure has functions for
- Outfit steel modelling
- Manufacturing information

Tribon M3 Drafting has functions for
- Detailed drawing
- Collision control

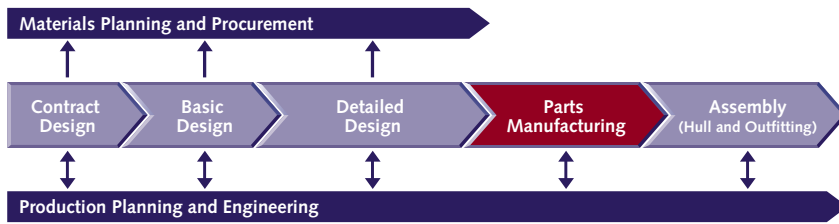**Tribon M3 Factory Automation has functions for**
- Variable beveling (Dotori)
- Marking triangles (Genauigkeit)
- Advanced shrinkage handling
- Panel line control
- Interface for profile cutting robots
- Welding robot data
- Accuracy control measurement points

Tribon M3 Design Manager has functions for
- Design review by shipyard management, classification societies and ship owners
- Bill of material

Tribon M3 Data Management has functions for
- Access control, approval and release of design data

| Contract Design | Basic Design | Detailed Design | **Parts Manufacturing** | Assembly (Hull and Outfitting) |

Production Planning and Engineering

Parts Manufacturing
– profit through accuracy

Tribon M3 gives you many benefits in your production. Accuracy in all stages of design and production means that things can be done right the first time and rework is minimized.

Accurate working methods

Tribon M3 has practical features that promote an accurate way of working. Extensive knowledge of the shipbuilding process built into Tribon M3 means that production information for all types of parts are of a very high standard. They also include features like allowance for shrinkage in manufacturing so that all parts fit first time.

Providing information to production equipment

In Parts Manufacturing, plate parts are cut from raw plates, stiffeners cut from raw bars, cables cut from cable drums, pipe spools fabricated and so on. Different types of production equipment require special information all of which can be extracted directly from Tribon PIM. Tribon M3 can be configured to provide the information needed for flame cutters, profile cutting robots, pipe benders, automatic flange welders, etc. in each shipyard.

Photo Daewoo Shipbuilding & Marine Engineering Co., Ltd. (DSME).

3D view of the Tribon PIM with the parts list window active.

Photo STX Shipbuilding Co., Ltd.

A minimum of rework in production

To keep rework in production down to a minimum, it is essential that the information for Parts Manufacturing "anticipates" the influence of the manufacture and assembly process in such a way that the assembled end product has the correct shape and dimensions according to the design requirements. To achieve this, the piece parts must be automatically adjusted in size from the nominal design size to compensate for issues such as shrinkage, stretch and edge preparation for fitting and welding.

   An essential advantage over other methods is that Tribon M3 automatically takes all these production factors into consideration, requiring little or no extra design hours.

Courtesy of Damen Shipyards Galati S.A.

Tribon M3 applications for Parts Manufacturing

Tribon M3 Hull has functions for
- Manufacturing information for steel parts (excess, bevel and shrinkage)
- Plate nesting with burning sketch and NC information
- Profile nesting with sketch and NC information
- Bending template for shell plates
- Manufacturing information for straight and bent profiles

Tribon M3 Pipe has functions for
- Pipe sketch

Tribon M3 Pipe Support has functions for
- Manufacturing sketch

Tribon M3 Ventilation has functions for
- Ventilation sketch

Tribon M3 Cable has functions for
- Cable schedule listing all cables

Tribon M3 Structure has functions for
- Manufacturing information

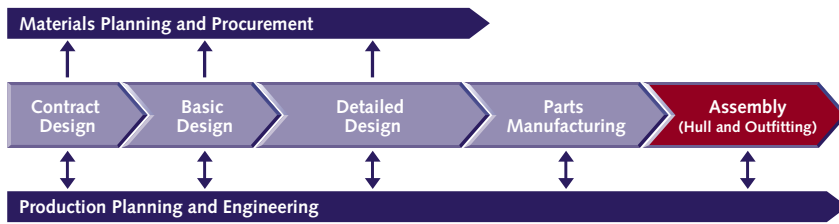**Tribon M3 Factory Automation has functions for**
- Variable beveling (Dotori)
- Marking triangles (Genauigkeit)
- Advanced shrinkage handling
- Interface for profile cutting robots

Tribon M3 Data Management has functions for
- Access control, approval and release of design data

Tribon M3 Developer's Toolkit has functions for
- Integrating Tribon production data with other systems such as materials, planning and procurement systems

Assembly – efficient assembly with high quality information

All the different parts must be assembled into one product through many stages of assembly. The ambition is to manage both the planning and the physical assembly efficiently by carrying out assembly operations at as early assembly stage as possible. The planning of the assembly process requires extensive support to organize the design information to result in production assemblies. Tribon M3 handles all of this in an efficient way.

Tools to define a Build Strategy
When using Tribon M3 you can even define assemblies before the detailed design is complete to define a build strategy, so that design activities can be co-ordinated in line with the production process. Each assembly can be a mix of hull and outfitting items. Tribon M3 supports complete assembly definitions and thereby promotes earlier and more complete pre-outfitting.
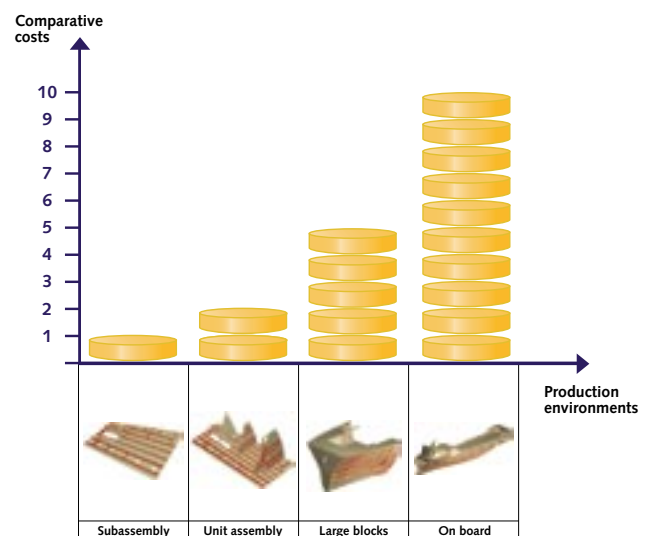
Control of assembly machines
Due to the complexity of creating the required control information, machines in the workshops are often not fully used to their full capacity. Tribon M3 supports the assembly process in the workshop in many different ways. For example, the Genauigkeit option improves the accuracy and efficiency of assembly by making the alignments of parts and subassemblies easier.

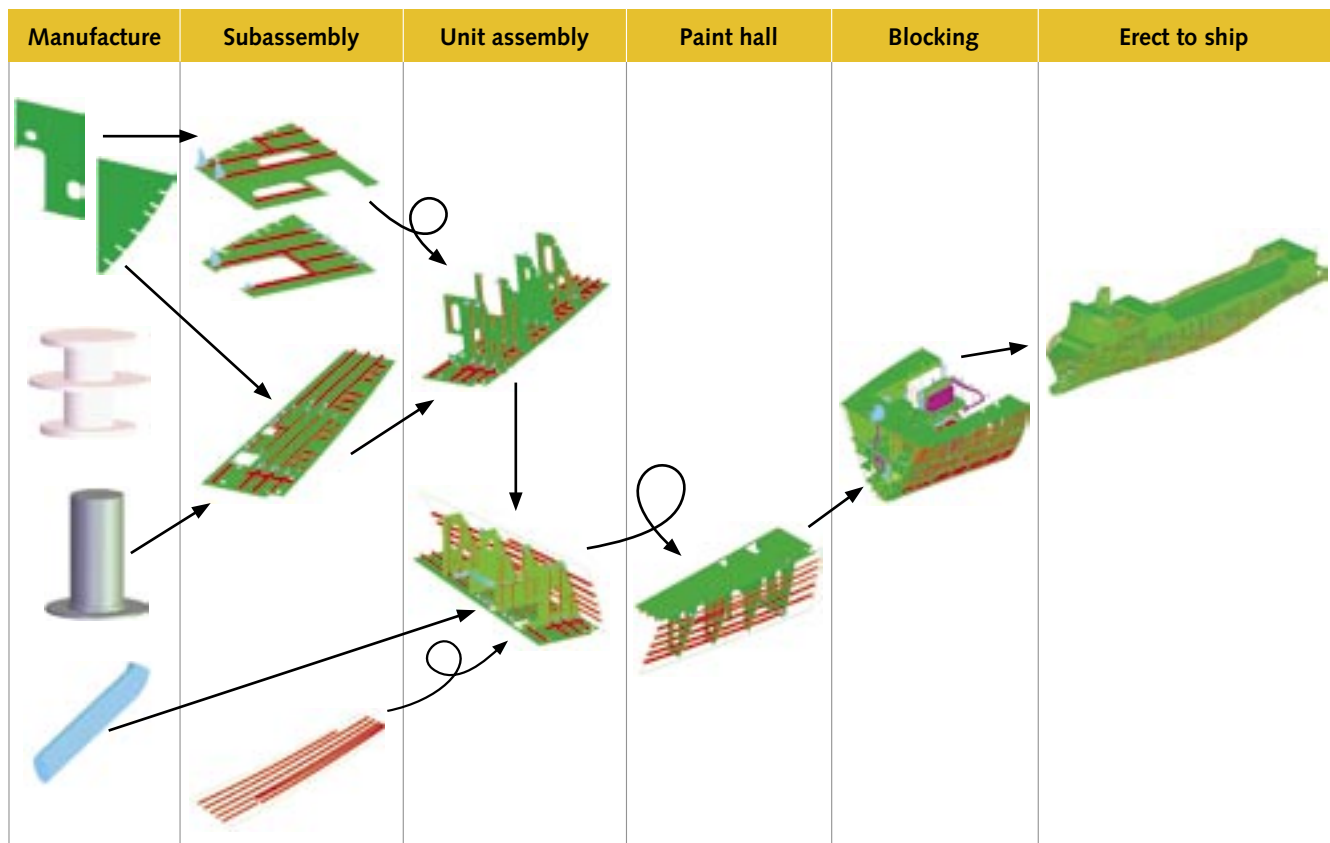Thanks to the complete product information in Tribon PIM, Tribon M3 can easily generate different kinds of numerical information for the control of assembly machines, such as information for automated panel lines and information to be used as a basis to control welding robots.

Efficient weld planning
Tribon M3 supports production engineers with high precision welding information. All aspects of welding, from precise weld geometry to a full set of technical weld parameters are covered.

Comparative costs of installing an item in different stages of assembly.

Manufacture	Subassembly	Unit assembly	Paint hall	Blocking	Erect to ship

Example showing different stages of production assembly.

Photo Daewoo Shipbuilding & Marine Engineering Co., Ltd. (DSME)

Automatic assembly drawings and instruction documents

Tribon M3 offers an efficient way to automatically produce work instruction drawings and documents for each planned work package in the Assembly phase, no matter when and where it is required. The information always reflects the latest version of the design as it is derived directly from Tribon PIM. These new methods dramatically reduce the man-hours needed to create and control work instruction documents. Since these documents are produced as late as possible in the process, they can be relied upon to reflect the latest version of the design.

Photo STX Shipbuilding Co., Ltd.

Photo Kawasaki Shipbuilding Corporation

Important robot interfaces

To support the increasing use of automation equipment in assembly, Tribon M3 can export specific production data for each assembly stage to be used in controlling welding robot systems.

Tribon M3 applications for Assembly (Hull and Outfitting)

Tribon M3 Hull has functions for
- Jigs for curved panels assembly
- Calculation of painting areas

Tribon M3 Assembly Planning has functions for
- Build strategy
- Assembly hierarchy with attributes (assembly stage, working location, design status, etc.)
- Assembly drawings
- Parts list by assemblies
- Calculation of weight and center of gravity

Tribon M3 Weld Planning has functions for
- Automatic weld line generation
- Editing of weld lines

Tribon M3 Factory Automation has functions for
- Panel line control
- Welding robotics data
- Accuracy control measurement points
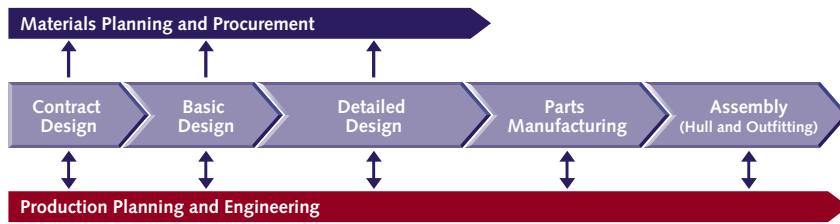
Tribon M3 Production Manager has functions for
- Review of parts and assemblies
- Automatic assembly instruction documents

Tribon M3 Data Management has functions for
- Access control, approval and release of design data

Tribon M3 Developer's Toolkit has functions for
- Integrating Tribon production data with other systems such as materials, planning and procurement systems

Materials Planning and Procurement

Contract Design → Basic Design → Detailed Design → Parts Manufacturing → Assembly (Hull and Outfitting)

Production Planning and Engineering

Production Planning and Engineering – easier management of the work-flow

Tribon M3 provides you with the information needed to support the Production Planning and Engineering tasks in a shipyard. Tribon M3 ensures that the production hierarchy of assemblies and subassemblies is created in parallel with design development. This means that as the design develops, individual parts and equipment are allocated to the relevant stage of assembly in the build strategy.

Structured management of design data

Key planning figures such as weights of blocks and assemblies, surface areas, weld lengths and other statistics can be obtained from Tribon PIM at any time. These figures are used for capacity planning in the different production stations. This structured handling of design data from both a design view and a production view means that Tribon M3 can easily be used together with traditional planning systems, feeding them with information.

Tribon M3 is the primary source for product data and through the various APIs (Application Programming Interfaces) of the Tribon M3, this data can be transferred to planning and resourcing systems. This ensures that a well balanced production plan is created and that production personnel receive the right information for each stage of assembly.

Tribon M3 applications for Production Planning and Engineering

Tribon M3 Assembly Planning has functions for
- Build strategy
- Assembly hierarchy with attributes (assembly stage, working location, design status, etc.)
- Assembly drawings
- Parts list by assemblies
- Calculation of weight and center of gravity

Tribon M3 Weld Planning has functions for
- Automatic weld line generation
- Editing of weld lines

Tribon M3 Factory Automation has functions for
- Interface for profile cutting robots
- Welding robotics data
- Accuracy control measurement points

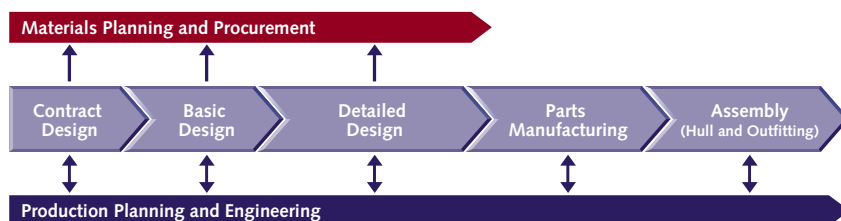**Tribon M3 Production Manager has functions for**
- Review of parts and assemblies
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- Integrating Tribon production data with other systems such as materials, planning and procurement systems

Materials Planning and Procurement				
Contract Design	Basic Design	Detailed Design	Parts Manufacturing	Assembly (Hull and Outfitting)
Production Planning and Engineering				

Materials Planning and Procurement – early information and continuous improvement

Tribon M3 provides information to support the Materials Planning and Procurement tasks in a shipyard. By using Tribon.com during design, the efficiency and cost effectiveness of equipment selection for a design can be improved. The information generated during the equipment selection process can be used as the input to the shipyard's materials procurement system.

Better control, lower costs
As the design develops, Tribon M3 makes material quantity information continually available for the relevant material planning and procurement systems. All parts and equipment in a Tribon design are part of a ship system. By using Tribon M3, they can also be allocated to a production assembly stage. Using this assembly information, the required delivery dates for materials can be derived, so shipyard inventory costs can be controlled by arranging delivery of material for the planned assembly stage.

Tribon M3 applications for Materials Planning and Procurement

Tribon M3 Basic Design has functions for
- Steel material estimation

Tribon.com has functions for
- Global database of suppliers and technical product information
- Searching for suppliers and their products
- Downloading of technical information for products including 3D volumes
- Technical enquiries to suppliers for additional product information

Tribon M3 Hull has functions for
- Early material definition
- Steel material list

Tribon M3 Pipe has functions for
- Early material definition
- Pipe material list

Tribon M3 Cable has functions for
- Early material definition
- Material lists for cables and cable ways

Tribon M3 Ventilation has functions for
- Early material definition
- Ventilation material list

Tribon M3 Data Management has functions for
- Access control, approval and release of design data

Tribon M3 Developer's Toolkit has functions for
- Integrating Tribon production data with other systems such as materials, planning and procurement systems

Tribon PIM – the core information database

Product Information Model (PIM) is a term often used to explain the Tribon technology. Tribon PIM is the core information database for design, planning, engineering and definitions of materials in a Tribon enabled shipyard. All data relevant for the ship is organized and handled here. The philosophy and technology behind the Tribon PIM is well proven, and it is one of the key success factors behind the Tribon software.
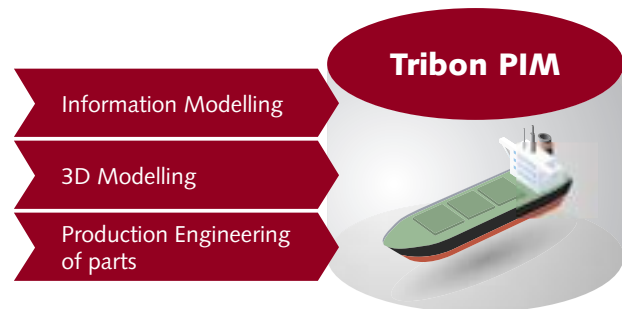
Design coordination

The design and construction of ships involves a high degree of concurrent engineering and manufacturing. The Tribon PIM is a superior tool that enables the needed concurrency.

Traditionally, drawings are used as documentation and communication of the design within different departments. The same drawings serve as external documentation for e.g. the classification societies. Drawings, graphical walk-throughs, parts lists etc. can be obtained from the Tribon PIM at any time. Collision checks can be easily performed and the Tribon PIM can be consulted for any properties or attributes. Designers and planners, administrators of materials, and manufacturing staff all use Tribon PIM as their central database and single source of information.

Lightweight and low costs – high performance

The foundation of Tribon PIM is the way that product data is stored and handled in objects. Tribon M3 has a unique way of organizing and storing these objects which minimizes the requirements for storage space. One immediate effect of this is the high performance in the everyday work and another is the short time it takes to transfer data over communication lines (telephone lines, Internet etc). Ordinary PC workstations and

Tribon supports all phases of design from the earliest information modelling such as an equipment list through detailed 3D layouts to finally creating piece parts for production.

reasonably sized data servers can be used with good performance to support large installations with many simultaneous users. These factors are vital parts of the overall economy of the system.

Product Life Cycle Management

An obvious use of the Tribon PIM is for life cycle support. The use of software for planned maintenance of on board systems and equipment is growing. There is also a development towards systems for hull (steel) maintenance. A lot of the information required for these systems already exists in Tribon PIM since it is close to an as-built image of the ship. UsingTribon PIM for such purposes will not only satisfy the present way of working but will also add new capabilities for walkthroughs without physically going there.

An industry standard

Since over one third of the large vessels produced in the world are currently designed and built with the assistance of Tribon, use of the Tribon PIM for storing and communication of ship product data is a de facto industry standard.

Global Database and the new Component Repository for local storage of supplier information

Tribon.com incorporates a Global Database of supplier and product information that is available to users over the Internet using a standard web browser.

Instant access to accurate supplier information

The Global Database contains a directory of suppliers of marine equipment and systems as well as considerable technical information about their products. Product information is categorized and uploaded to the database in a standardized format. The categorization is made according to a hierarchical structure of functional systems similar to a ship's specification, with a set of standardized attributes assigned to each category.

Component Repository

The information in the Global Database can be searched in a flexible way by shipyard and design agent users. When a product has been found, all the relevant information can be easily downloaded and stored in the Tribon local Component Repository – a database that can hold a selected subset of products from the Global Database relevant to ongoing shipbuilding projects.

Tribon PIM and Tribon.com

By using functionalities based on the Tribon PIM, unique occurrences of each product can be created with reference to the information stored in the Component Repository. For each item created, the
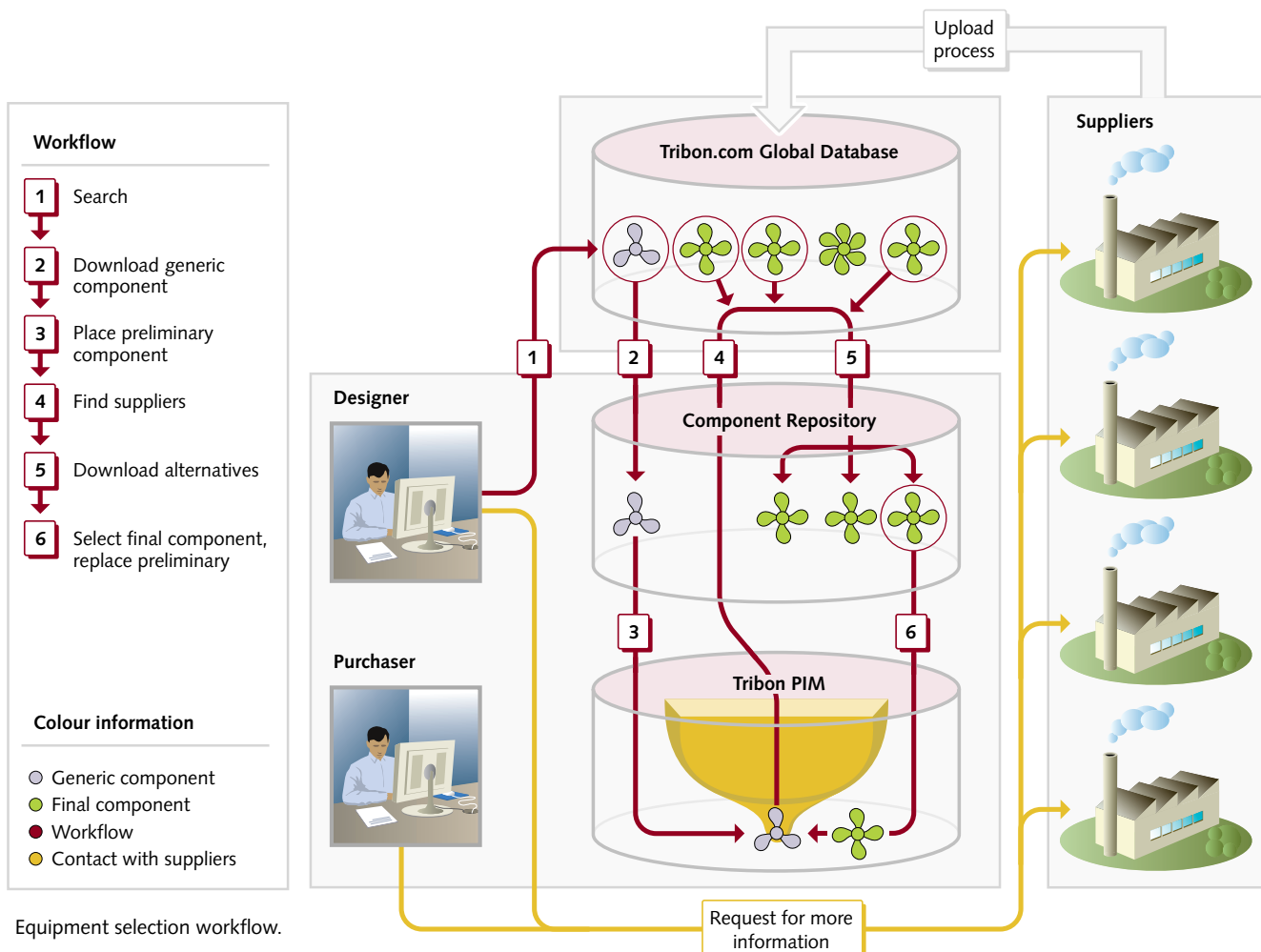

Detailed information about products is available in the Global Database of Tribon.com. The picture above shows an outer dimension drawing, certificates, a 3D (CAD) volume, a product brochure and technical and searchable attributes for a pump from Shin-Shin Machinery in the Republic of Korea.

base product information from the Component Repository is available to all users of the Tribon PIM through viewers and model information functions. Specific information, such as attached documents can be retrieved on request. An example can be to get all installation manuals for a certain area of the ship.

Equipment selection

During the early stages of a shipbuilding project, lots of decisions have to be taken with regard to the selection of equipment items. This process requires a large amount of interaction between ship designers, shipowners and suppliers of systems and equipment items. The availability of complete information about suppliers and products at this stage can provide significant benefits in terms of a better decision support base as well as making it possible to consider more aspects at an early stage of design. To support the equipment selection process, it is now possible to download and manage generic components that can act as the representation of an item in the initial stages. Then products from different suppliers can be downloaded and examined as possible alternatives, finally selecting one to replace the initial generic representation. At this point a substantial set of information regarding the selected product can be directly available for continued design work.

Workflow

1. Search
2. Download generic component
3. Place preliminary component
4. Find suppliers
5. Download alternatives
6. Select final component, replace preliminary

Colour information

- Generic component
- Final component
- Workflow
- Contact with suppliers

Equipment selection workflow.

Design Data Management – the key to better control

Tribon M3 Data Management is a set of functions to control the development, approval and release of design data in a project. The functions are used for projects both within and outside the design departments in the shipyard. It's a solution that paves the way for major time savings in administration of projects.

Security of data and access cntrol

Tribon PIM holds information and documentation about the design and manufacturing of the ship. Tribon M3 Data Management is an embedded and adapted data management functionality fully integrated with Tribon PIM. One of its main features is to control access to the different parts of the Tribon PIM according to the authority rules of the shipyard.
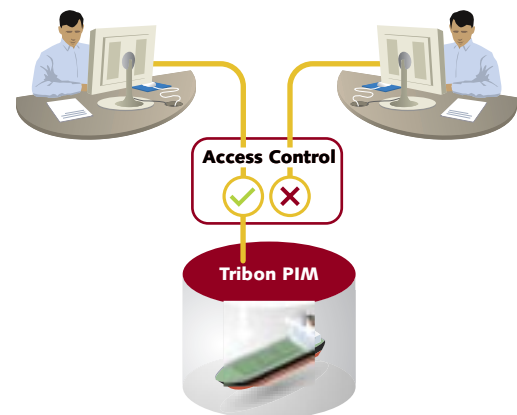
Release of documents

Another important aspect of data management is the mechanisms for an organised release of design and manufacturing documents from one process step to the next one. Tribon M3 Data Management has an advanced and flexible set of functions to set and handle status values for model objects and drawings. In combination with built-in trigger mechanisms the user can control the flow of design and manufacturing information throughout the organization.
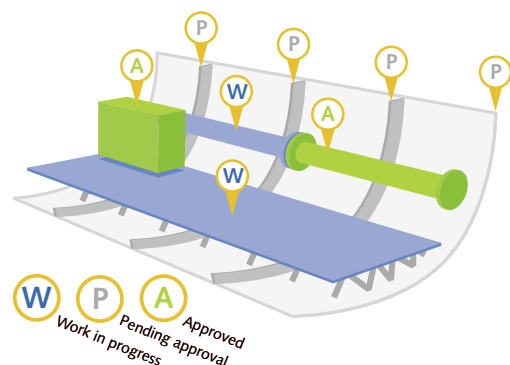
PDM for shipbuilding

The set of features in Tribon M3 Data Management meets the requirements in a "Shipbuilding PDM System" (PDM – Product Data Management). The unique technical solution with data management features built into the basic object model offers efficient tools at low cost for definition and management of the shipbuilding product data and the shipbuilding process.

Oracle database

To support the advanced levels of the Tribon Data Management functions, the Tribon PIM uses Oracle as its database handling tool.

Access control for design data.

An example of status on design data.

Tribon M3 applications for Design Data Management

Tribon M3 Data Management has functions for
- Access control
- Status of model objects
- References from model objects to external documents
- User-defined attributes
- Triggers (points in the system flow where locally developed functions can be added to enhance system functions)

Tribon M3 Developer's Toolkit has functions for
- Data extraction of information from the Tribon PIM
- Vitesse for customer development of extensions to the Tribon system
- Production Data Interface (PDI) to present production information in Oracle database format

Customer developments – customize, extend and integrate efficiently

The Tribon M3 Developer's Toolkit is a powerful collection of tools that helps users customize, extend and integrate the Tribon system to suit their standards, rules and IT-architecture.

Using these tools has a positive impact on the design, production and flow of information. Some benefits of using the toolkit are reduced man-hours in the design office, less rework in production and better access to information throughout the organisation.

Tasks for the Tribon M3 Developer's Toolkit
Some of the typical tasks that can be performed by using the Tribon Developer's Toolkit are:

- Extract data from the Tribon PIM and create interactive, tailor-made and printable reports that can easily be repeated
- Create drawings with a high level of automation to fulfill your standards for e.g. production purposes
- Create and modify model data in an automatic and standardized way
- Create new functions, complete with an interactive user interface, that performs frequent tasks according to the given standards
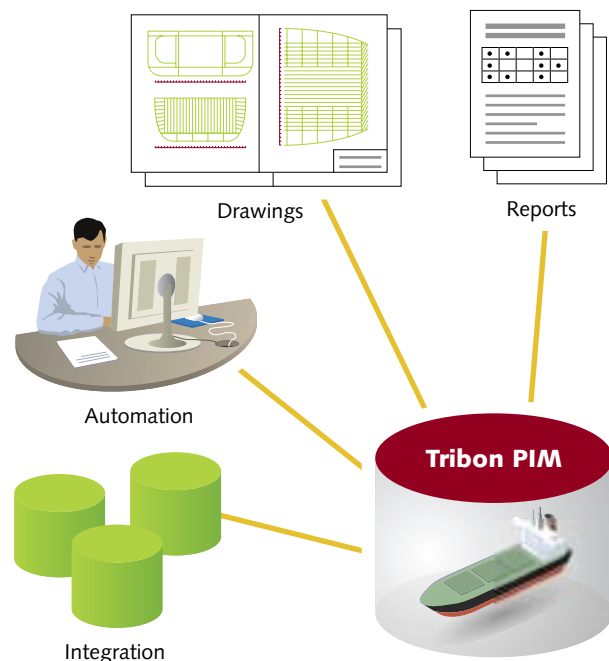- Integrate Tribon M3 with other systems such as planning, materials and procurement systems

Customize and integrate for higher efficiency
The Detailed Design phase has a considerable impact on the construction efficiency and quality of the ship. Much time is spent on searching for information and checking the design. Many of the details are governed by yard practise and classification requirements and sometimes also by the requests of the owner.

For example, a hole in the strength deck larger than a certain size should have edge reinforcement with a minimum cross-sectional area specified by the classification society. The placement of this reinforcement is determined by classification rules, common yard practice and of course the purpose of the opening. A function that takes all requirements into account can be developed with the tools available from the Tribon Developer's Toolkit. Once such a function has been developed, it will help to shorten design time and minimize errors.

Integrating Tribon with other systems helps to minimize the number of requests for information between departments. This in turn, will make planning, control and follow-up easier.

Drawings

Reports

Automation

Tribon PIM

Integration

Tribon M3 applications for Customer developments

Tribon M3 Developer's Toolkit has functions for
- Data extraction of information from the Tribon PIM
- Vitesse for customer development of extensions to the Tribon system
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The same excellent service all around the world

With headquarters in Sweden and offices in China, Germany, India, Japan, the Republic of Korea, Russia, Singapore, the UK and the USA, Tribon Solutions serves the global maritime industry and customers in over 40 countries. Tribon Solutions has achieved practical and proven implementation at many shipyards around the world. We offer you implementation support services to maximize the benefits from your investment in the shortest possible time. When setting strategic directions, we recommend that top management is involved. Together we customize the solution to fit your enterprise and to meet your needs.

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