




Lubricants & greases manufacturing plants

Design, engineering and supply of
lubricants and greases manufacturing
plants

The background image shows a complex industrial facility, likely a manufacturing plant, with numerous pipes, structural beams, and machinery. The entire image is overlaid with a semi-transparent red filter. The text is centered and written in a bold, white, sans-serif font.

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With over 50 years of blending experience, in both new and revamped plants all over the world, Cellier, as an Activity of ABB France, fully understands the complexity of running a lubes or greases manufacturing plant and in particular how to achieve quality and on-spec products within optimized cycle time, while lowering operating costs and meeting sustainability goals.

Worldwide references

Through our capability to meet the real needs of the lubricants industry and our unique position as specialist in the supply of turnkey production units, Cellier Activity enjoys a leading position in this

AMOC	Egypt
AGIP	Italy
BLENDCOR	RSA
BP CASTROL	Australia, Belgium, China, India, Iran, Singapore, RSA
CHEVRON	Belgium, China, Pakistan, Singapore, Sri Lanka, USA
COPEC	Chile
ENGEN	RSA
ENOC	UAE
EXXON MOBIL	China, Egypt, France, Hong Kong, Japan, Singapore, Tunisia, UK
FUCHS	France, KSA
GALP	Portugal
GULF OIL	India
HASCOL	Pakistan
IDEMITSU	Japan
INDIAN OIL	India
INFINEUM	Italy, Singapore
LUBRIFIN	Romania
LUKOIL	Romania
LUBRIZOL	France, India, UK, USA
LYBIA OIL	Morocco, Tunisia
NAFTEC	Algeria
NIPPON OIL	Japan
ORLEN	Poland
ORYX	Togo
PERTAMINA	Indonesia
PETROBRAS	Brazil
PETROCHINA	China
PETROMIN	KSA
PETRON	Philippines
PETRONAS	Argentina, China, India
PETROSAM	Algeria
PETROSER	Algeria
PSO	Pakistan
Q8 OILS	Belgium
RAK OIL	UAE
REPSOL	Spain
SHELL	Austria, Belgium, Canada, China, Egypt, France, Hong Kong, Indonesia, Japan, Philippines, Russia, Singapore, Trinidad, USA
SINOPEC	China, Singapore
TOTAL	Algeria, Belgium, China, France, India, Kenya, Russia, KSA, Singapore, Spain, UAE, Vietnam
UNIOIL	Philippines

International technology provider

Design, engineering and supply of highly automated plants worldwide

— 01 Overview of blending facilities with Drum Decanting System, Simultaneous Metering Blander, Automatic Batch Blender and In-Line Blender
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02 Design methodology

Our services include:

- Conceptual design
- Existing plant audit
- Basic engineering
- Detail engineering
- Equipment design and supply
- Installation and start-up by ABB's own expert team
- Training and technical assistance
- Software telemaintenance services

Design

Cellier Activity has developed specific software for the design of new plants or modernisation of existing ones. The design is optimised to give the shortest Return On Investment (ROI) time and to guarantee the plant performance.

Key equipment

State-of-the-art equipment has been developed and standardised by Cellier Activity to meet the specific requirements of the lubricants and greases markets:

- Automatic Batch Blender
- Drum Decanting System
- In-Line Blending system
- Simultaneous Metering Blending system

- High-yield grease reactor and peripherals
- Pigged pipe line components
- Pigged manifold

All the equipment can be skid mounted. In addition to the key equipment noted above, our capability includes the design and delivery of raw material and finished product storage, transfer and distribution systems as well as filling and packaging lines.

Process Control

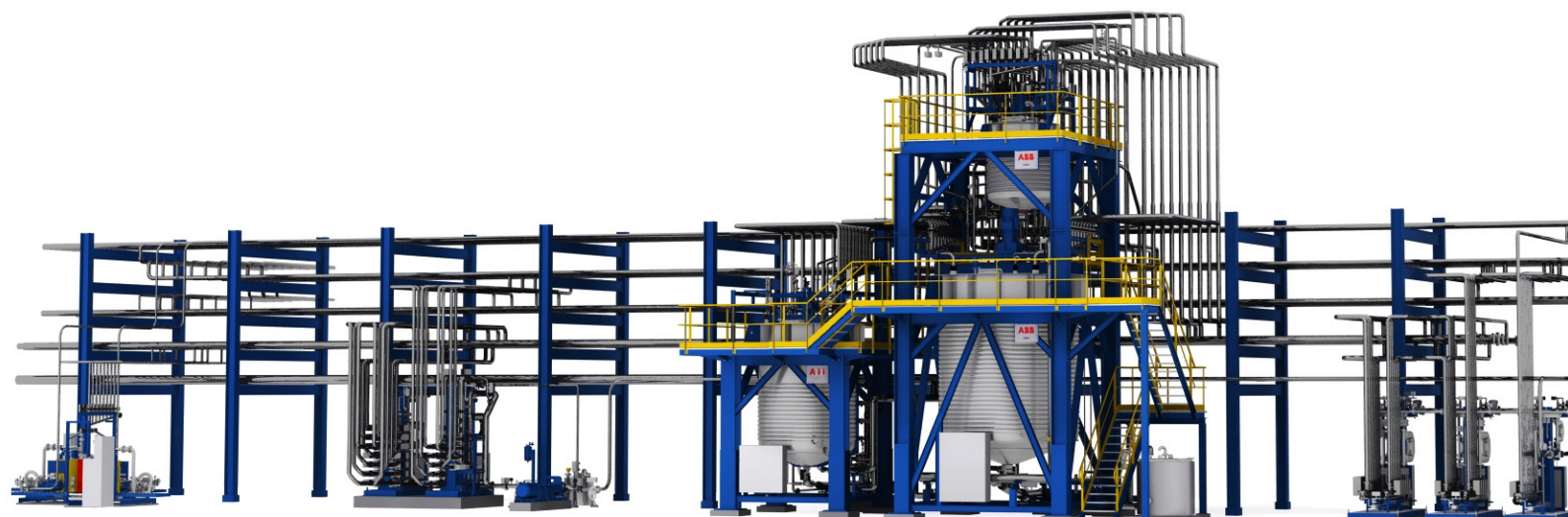
Cellier Activity has developed Lubcel™, a specific process control software for lubricants manufacturing plants helping you to achieve the compliance with quality procedures and a total traceability of operations.

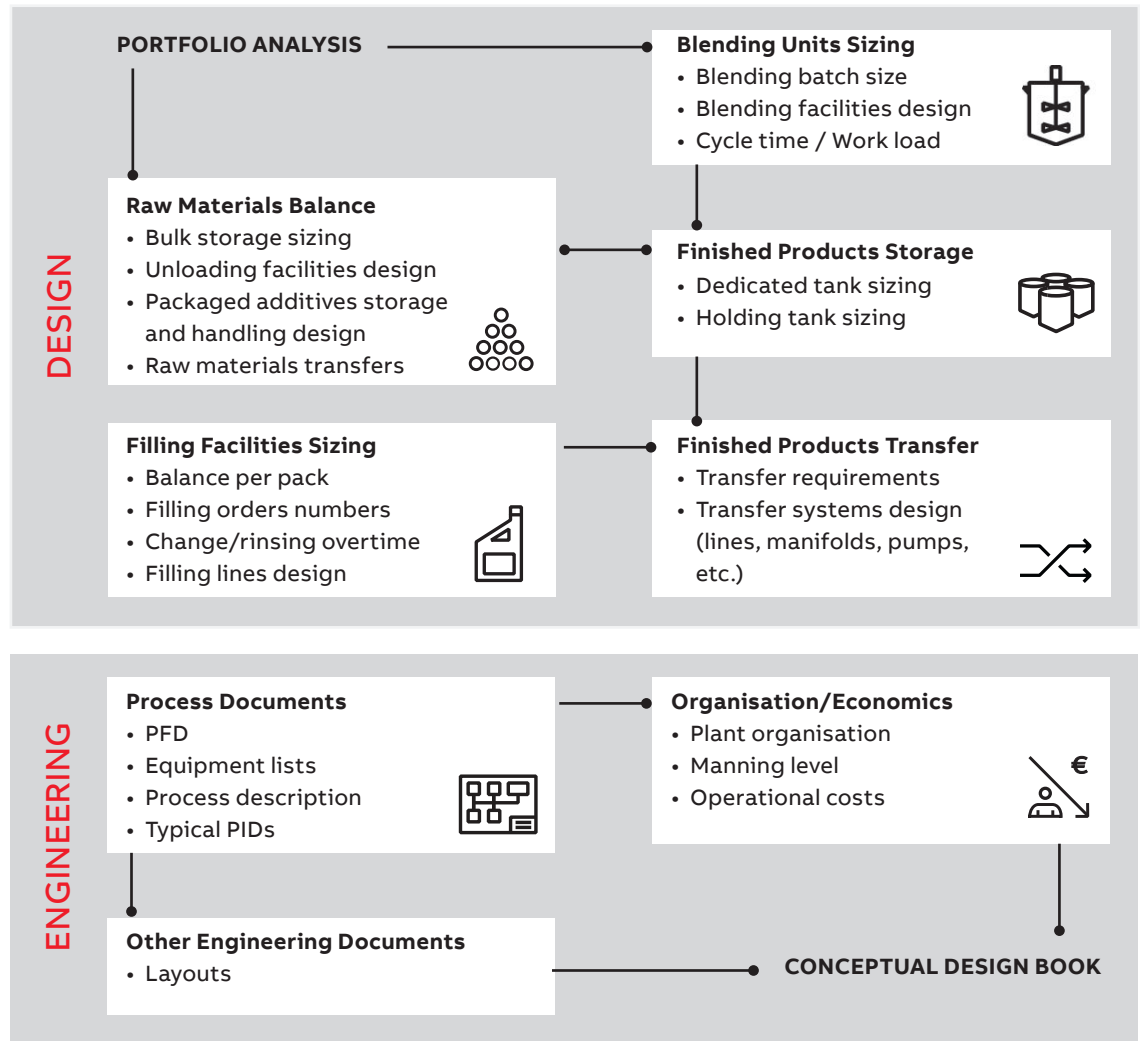
Organisation

Our solutions are supported by:

- a project management focused organization,
- process specialists,
- efficient engineering and design departments,
- innovative products and technologies,
- worldwide sales and service resources,
- the ABB global structure and expertise.

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Increasingly stringent product-quality requirements are the standard for today's lube oil market. Formulations are forever increasing in number and complexity. In addition to these production constraints, the Lube Oil Blending Plant (LOBP) has to face up to the highly competitive lubricants market.

Competitive cost is of primary importance as is customer service especially for the industrial lubricants market. Ability to guarantee, at short notice, delivery for the exact quantity required by the customer is the daily challenge of every modern LOBP.

In this environment, only an optimised LOBP design can ensure customer satisfaction and supplier profitability. A blending plant typically includes five main areas:

- Raw materials storage
- Blending units
- Finished-product storage (bulk)
- Filling and loading
- Packed finished products warehouse and dispatch

These areas are closely interconnected and as such an optimised design needs to cover the complete plant. Design is based on the actual customer production requirements and constraints which include:

- Production portfolio (product slate, required production, formulas, grade/ pack distribution)
- Batch size distribution (Economic Order Quantity or Customer Order based)
- Product compatibility
- Raw material characteristics and delivery mode
- Products Lead time and peak demand.

The design methodology specifically developed by Cellier Activity for complex batch production plants, and supported by specific design tools, can be applied at the different steps of the project from feasibility study up to turn-key unit design.

This know-how applies also to the manufacture of greases.



Efficient and productivity-oriented blending technologies

Depending on the lubricant grades manufactured: specialty lubricants, fast or slow movers, you will make the most of the flexibility of the Automatic Batch Blender, the agility of the Simultaneous Metering blender or the velocity of the In-Line Blending system, by reducing production costs, increasing process reliability and product quality.

The collaborative approach of our dedicated design specialists will help you choose either a batch or an in-line system, or even an hybrid blending solution.





Lube oil blending core equipment

Meet productivity and efficiency challenges

—
01 Simultaneous
Metering Blender (SMB)
as skidded system

AUTOMATIC BATCH BLENDING (ABB)

The Automatic Batch Blender represents a technologically advanced blending option especially adapted to complex formulations, extended products slate and blend-to-order policies which are part of production requirements of modern lubricants, lubricant additives and fuel additives.

Blending flexibility for specialty products

Main advantages of the ABB system, compared to conventional batch blending, are :

- Enhanced flexibility in batch size, product formulation, raw material handling and process sequences
- High level of blending accuracy and repeatability
- High RFTI (Right First Time) index, no re-blend
- Reduced manpower requirements
- Quick blend turnaround
- Low contamination
- Minimum (virtually zero) slop generation.

IN-LINE BLENDING (ILB)

In-Line Blending (ILB) is especially adapted to large throughput production with a limited number of products and compatibility groups and when immediate product availability is required or intermediate storage is difficult (such as ship loading).

Blending velocity for fast movers

Main advantages of the ILB system are:

- Product immediately available (on spec)
- Large throughput
- High level of blending accuracy and repeatability
- Low manpower requirements.

SIMULTANEOUS METERING BLENDING (SMB)

Simultaneous Metering Blending (SMB) is similar to the ILB but coupled with a sequential control and mode of operation. It combines the advantage of the ILB in terms of production capacity but also the advantage of the sequential control related to flexibility and contamination.

Blending agility for specialty products

Main advantages of the SMB system are:

- High throughput capability
- Low inter-contamination through rinsing being part of the blend
- Reduced number of dosing modules compared to conventional ILB (typically 4 vs. 9) meaning reduced investment
- Simpler control
- Possible batch interruption enabling direct drum decanting or manual additions.

HYBRID BLENDING SOLUTIONS

Lube oil hybrid blending solutions consist of in-line polyvalent dosing and blending modules to produce both small and large batches.

Advantages of hybrid solutions :

- Enhanced blending and transfer flexibility
- High quality product (higher dosing accuracy, in-line recipe correction)
- Modular blending (easy layout of expandable skidded modules)
- Reduced CAPEX and OPEX costs

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01 In-Line Blender
system (ILB), heat
traced and insulated

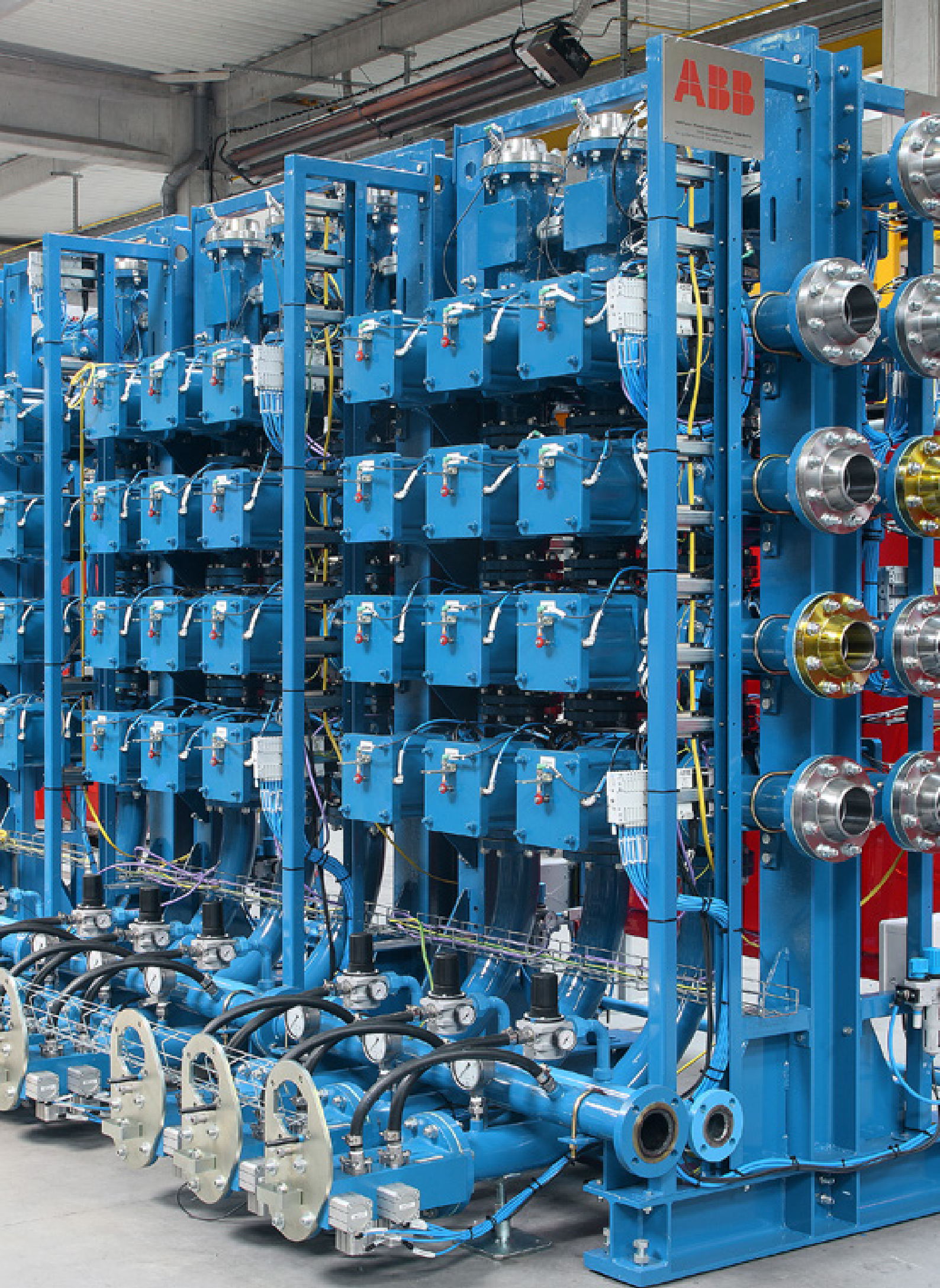
—
02 Blending plant
including Automatic
Batch Blender (ABB) and
In-Line Blender (ILB)

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Increase profitability by multidirectional product transfers

ABB pigging solutions are the best in terms of reliability, easy maintenance and minimised cross-contamination. They are real process tools enhancing transfer efficiency and flexibility as well as reducing product losses.





Integrated peripheral solutions

Streamline operations and reduce operational costs

—
01 Drum Decanting
System

—
02 Automatic piggable
manifold

—
03 VI Improver dissolver

DRUM DECANTING SYSTEM

Cellier Drum Decanting System (DDS) is designed to pump and dose liquid products (even viscous) stored in drums or small containers and to incorporate them in formulation processes (chemical industry, lubricants, etc.).

The DDS performs the following functions:

- empties a drum or mini-container
- doses a quantity of product
- rinses the emptied drum and
- recycles the rinsing product.

VI IMPROVER DISSOLVING UNIT

Viscosity Index Improver (VII) is the key additive in the formulation of multi-grade oils. ABB powerful dissolver helps you to produce it in the most cost effective way, disintegrating and homogenizing polymer in all forms in a single batch operation and in reduced processing time. It is supplied as a complete skidded unit with surrounding equipment and control system.

PIGGING SYSTEMS

Used for many years in certain industries, pipe pigging technology can be used where a large variety of products are transferred.



Pigged lines with diverter and distribution valves

Advantages:

- Optimisation of installation costs by reducing the number of lines
- Operating and cleaning costs reduced by a significant decrease of rinsing quantities

- Line flexibility increased, simultaneous multi-connections, reduction of cleaning time between two batches
- Quick, automatic and safe pipe cleaning system
- Completely closed system
- No more dead zones, complete line cleaning
- No waste generation.

PIGGING MANIFOLD

Interconnecting the large number of source tanks with different possible destinations (filling, loading, etc.) has always been a major problem of Lube Oil Blending Plants.

The unsafe and unpractical old “snake-pit” can now be replaced by a closed and compact piggable manifold ensuring safe interconnection without cross-contamination or product loss.

Advantages:

- Automatic operation
- Compactness and optimized space requirement
- Flexibility: multidirectional connections, bidirectional pigging, dedicated/pigged lines, different diameters)
- Fast cycle time
- Equipment availability and cleanliness, easy maintenance.





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Greases manufacturing plants

Expertise and in-house technologies to optimize your process

— 01 Modular batch grease manufacturing unit

— 02 Batch grease manufacturing unit (overall view)

ABB designs greases manufacturing units meeting your specific needs. These units integrate saponification reactors offering excellent performance in terms of mixing, thermal transfer, easy cleaning and maintenance. They also include satellite solutions conferring flexibility and modularity to your plant: in-line dosing (flowmeters, loss-in-weight), transfers of finished products using pigged lines and production monitoring systems.

Application

All types of grease - simple, complex or mixed - lithium, lithium/calcium, aluminium, etc. with or without additives.

Batch manufacturing process

The batch greases manufacturing process includes the following phases:

- metering and addition of reactants (fatty acids, base oils, water, alkali),

- saponification run in a reactor/kettle operating at atmospheric pressure or as a pressurized kettle to convert the fatty acid to soap and disperse the soap throughout the mixture,
- dehydration to remove the reaction water,
- homogenisation or milling to break agglomerated particles,
- adjust the grease consistency and produce a smooth and stable product,
- cooling
- in-line deaeration to remove air entrapped prior to filling.





To add special properties to the grease, other ingredients may be introduced, such as oxidation inhibitors, anti-corrosion and anti-wear agents.

This addition step is completed in a finishing kettle where the deaeration of the product may be completed.

In-line manufacturing process

In the in-line greases manufacturing process, the saponification, dehydration and finishing phases are completed continuously. The in-line process offers:

- flexibility,
- reduced cycle time,
- improved process control.

Heating/cooling

The key to the process control, productivity and quality lies in the mastering of thermal exchange systems. An accurate heating/cooling system for the heating of oil and chemical components and the cooling of the finished product enables:

- reduced heating/cooling times,
- fine product temperature regulation with +/- 1°C accuracy,
- elimination of thermal shocks,
- reduced operational costs.

Process control

The Greacel™ software developed for grease process control is perfectly adapted to the requirements of greases manufacturers. It is based on:

- ABB expertise in the control of continuous and batch processes,

- choice of reliable and accurate measurement, control and regulation instruments,
- customization of the control system according to the process needs.

Greacel™ provides common control tools for both greases and lubricants manufacturing processes.

Benefits

- High dispersion and thermal yields
- Easy cleaning
- Reduced investments costs
- Minimised operational costs
- Flexible and multipurpose units for the production of current greases.
- Excellent process repeatability and quality control.

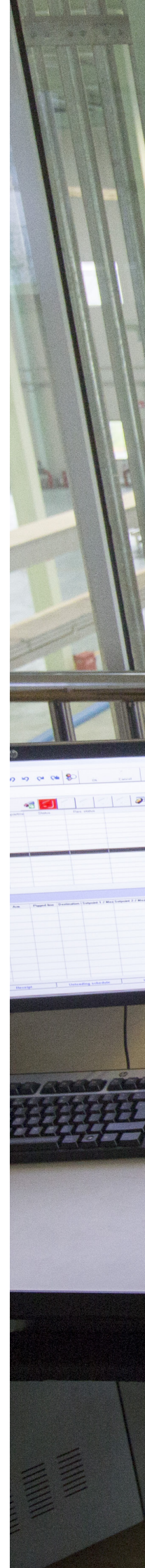
Cellier Activity delivers complete units from the storage and delivery systems of raw materials to the filling and packaging systems, including utilities production.

The units can be delivered as skids, fully assembled and ready for operation, including valves, fittings, control instruments, utilities and thermal insulation, for ease of installation and to meet customer layout constraints.

Integrated blending, automation and process control solutions

The increasing number of additives implemented and of products blended compell lube oil manufacturers to find ways to manage increased complexity. This can be done by investing in state-of-the-art technologies in order to handle smaller batch sizes and shorter runs, maintain lower stock levels, achieve right-first-time blends and manage a wider stock keeping unit range.

Combined with a high level of automation, it significantly improves operation performance and safety, with high product quality, a better management of receipt, storage, blending, loading and filling operations, all of which being reflected in improved KPIs and energy efficiency.





Lubcel™ : powerful, plant-wide and scalable process control system

As key technology enabling integration, Lubcel™ control system manages all lube oil blending activities, allowing the flexibility necessary for the optimal employment of resources, the conduct of simultaneous operations, the reduction of slops and the elimination of rebleshooting. It promotes total quality control and the compliance with quality procedures, the traceability of operations (manual and automatic), the elimination of human error and the data tracking. This includes the filing of consumption and production reports, the logging of events, and the recording of key performance indicators (KPIs) and quality data for later laboratory analysis.

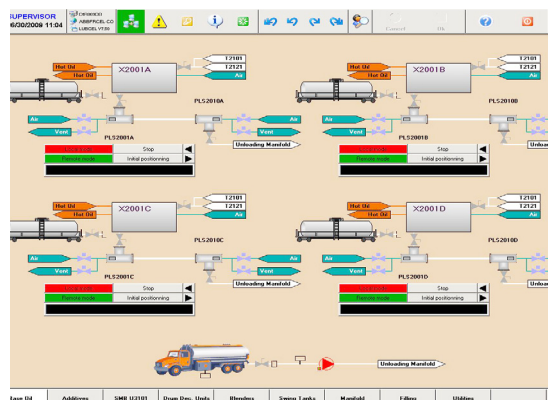
Together with the ERP system, it creates the efficiency improvements that make just in time operations possible. It does this by downloading the receipt, delivery and manufacturing (blending and filling) orders from the ERP. It also uploads reports concerning materials movements and the work in progress inventory.

Lubcel™ control system

Lubcel™ is a powerful control system for batch production monitoring and management which perfectly fits the requirements of lube oils or grease manufacturers. Lubcel™ ensures the entire management of raw materials, product formulation, sub-recipes and recipes, resources,

inventories, production batches and cleaning sequences. Parameter setting enables Lubcel™ to optimize the production.

Lubcel™ can be extended to encompass the control and supervision of all the operations within the plant, from raw material receipt and storage to product dispatch (blending, intermediate storage, transfers, filling and warehouse). It is a plant-wide control system integrating sub-systems such as mimics, workshop capabilities, warehouse management, advanced schedule features. It has no limits in communicating with other systems such as lab or business systems (ERP).



Lubcel™ synoptic screen

Enhanced productivity

- Produce on-spec with more process flexibility
- Real-time monitoring and tuning
- Management of KPIs



Optimised equipment availability and resources

- Management of equipment and tank status
- Safe startups and shutdowns
- Management of assets with CMMS



Recipe management and complete traceability

- Safe product changes
- Repeatability of recipes
- Record of lab results
- Prevent from cross-contaminations

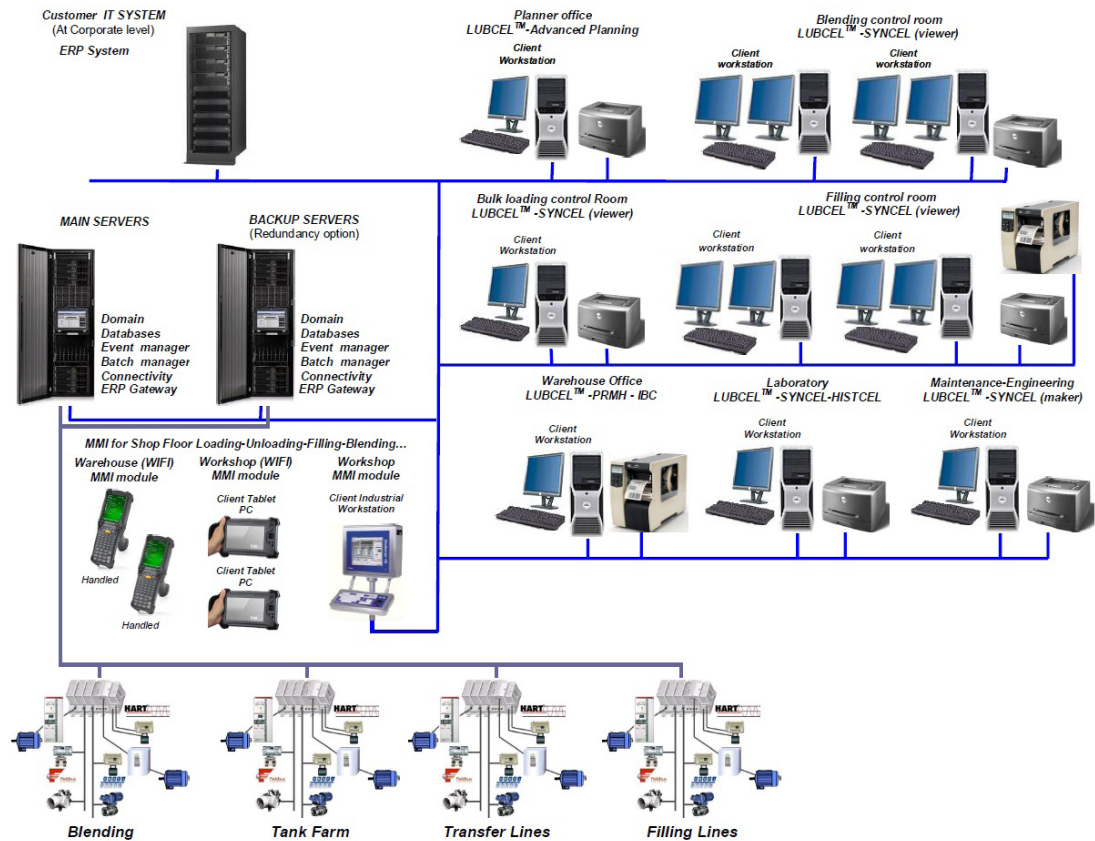


High connectivity control system

- Integrated and scalable architecture
- Interfaceability with ERP, lab, warehouse, ... systems
- Reports and analytics



lubcel™ typical
system architecture



Lubcel™ is able to be integrated with the majority of PLCs or controllers. With Lubcel™ you will achieve the total process control and plant scheduling software integration of your production system.

Syncel graphics module

Syncel graphics module is a SCADA system sharing common database with the Lubcel™ solution. It includes a complete integrated synoptic screen maker.

Workshop capabilities

Lubcel™ enables the management of manual operations through deported industrial PC, WIFI tablets PC.

Warehouse module

Lubcel™ enables the management of packed additives, IBC containers including bar coding scanner and printer solutions.

Advanced short-term scheduling module

Lubcel™ indicates the daily load for each blending or filling resource (ABB, SMB, ILB...) or workshop (reception, blending, filling). This short-term scheduling module is a powerful tool for smoothing the load.

Analytical tools

Lubcel™ provides powerful analytical tools to identify and analyse the production phases which need productivity improvements.

These tools enable to:

- follow-up of production, dosing and waiting times,
- optimise human resources,
- optimise process and maintenance operations,
- increase productivity and quality.

CMMS integration

With its CMMS (Computerized Maintenance Management System), Lubcel™ enables efficient maintenance activities, by:

- managing maintenance operations,
- integrating technical documentations,
- consequently improving plant availability and reducing downtime risks and costs.

Performance Improvement

We know how to provide world class services anywhere, anytime when you need assistance to improve the reliability, availability, maintainability, productivity and safety of your equipment and production processes.

Our service portfolio includes engineering and consulting, maintenance, advanced services and IT tools, extensions, upgrades and retrofits, training as well as service agreements.

Thanks to dedicated specialists, you get fast issue resolution and local support at the right time.





Your performance is our concern

Modernisation of existing plants

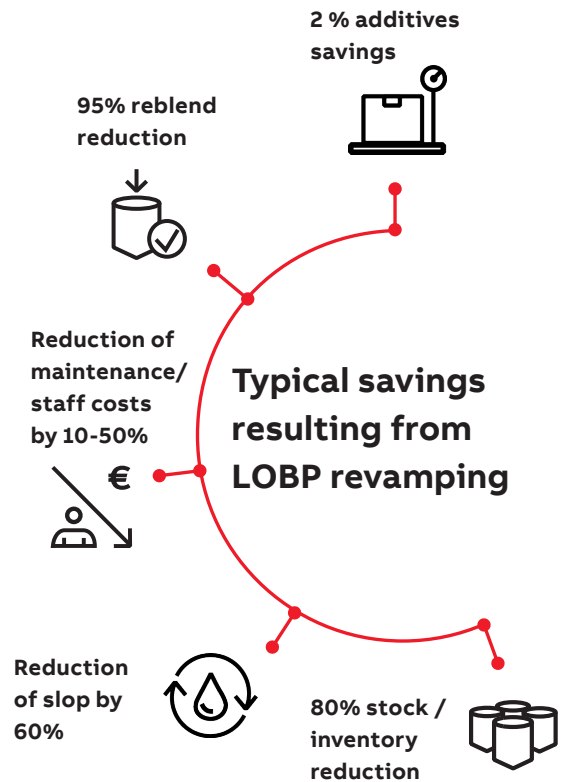
— 01 3-D model review conducted with the customer to ensure that the plant comply with project requirements

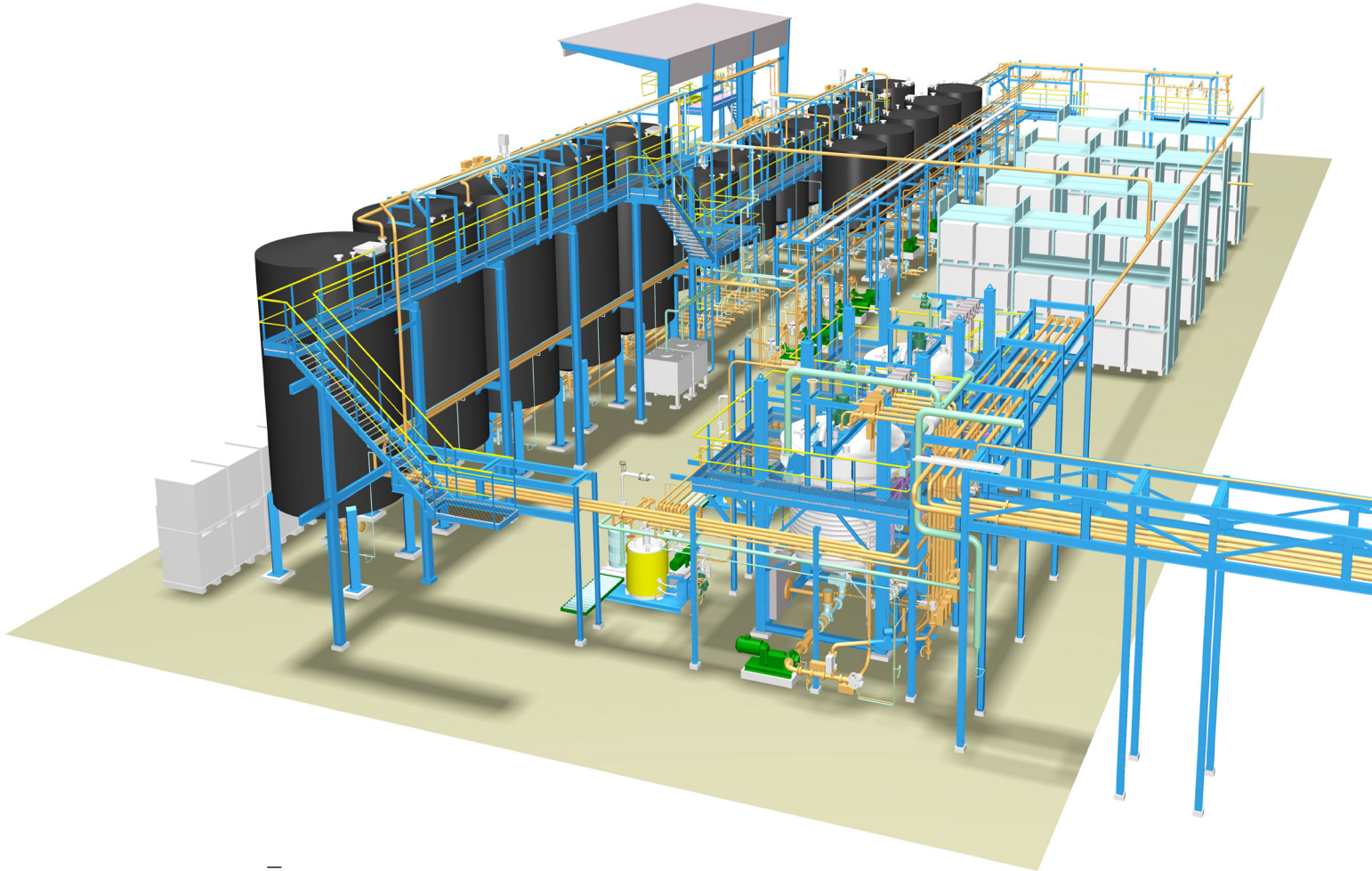
— 02 3-D model of Lube Oil Blending Plant

Why modernise and improve performance ?

- To comply with highest international quality standards.
- To enhance productivity and lower production costs.
- To increase production capacity.
- To enlarge product portfolio.
- To ensure a better customer service.
- To increase control and interface by automation and plant-wide process control system.
- Improvement factors

The technologies developed and implemented by Cellier Activity improve the efficiency of existing plants.





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Modern blending tools

- Variable batch size.
- Dosing accuracy.
- Reduced and repeatable cycle time.

Pigging technology / contamination control during transfers

- Quick product change without slop generation.
- Minimisation of cross-contamination.

High-connectivity control system

- Elimination of human errors.
- Operation traceability.
- Connectivity to corporate network (ERP).

Results and capabilities

Major benefits of a plant upgrade are product and process flexibility. Your plant becomes market responsive allowing:

- high quality products,
- inventory reduction,
- Just-In-Time operations.

Key Performance Indicators (KPIs) improve by the reduction of minimum batch volume and reblend index.

A better productivity is obtained by an optimal resource allocation. It results in time savings by efficient, reliable and automated rinsing and transfer (pigging) procedures as well as in raw material savings (additives and base oils).

Additional benefits are a laboratory workload reduction and a drastic slop reduction (virtually zero at blending stage) and product loss.



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