



Lubricants & greases manufacturing plants
Optimize and improve your performance

International technology provider

Design, engineering and supply of lubricants and greases manufacturing plants

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 inventory using Just In Time (JIT) principles integrated with the production of many finished products and packing combinations.

Our services include:

- Conceptual design
- 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 lines
- 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 units as well as filling and packaging systems.

Process Control

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

3-D view of a grass-root plant



Process and know-how

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.

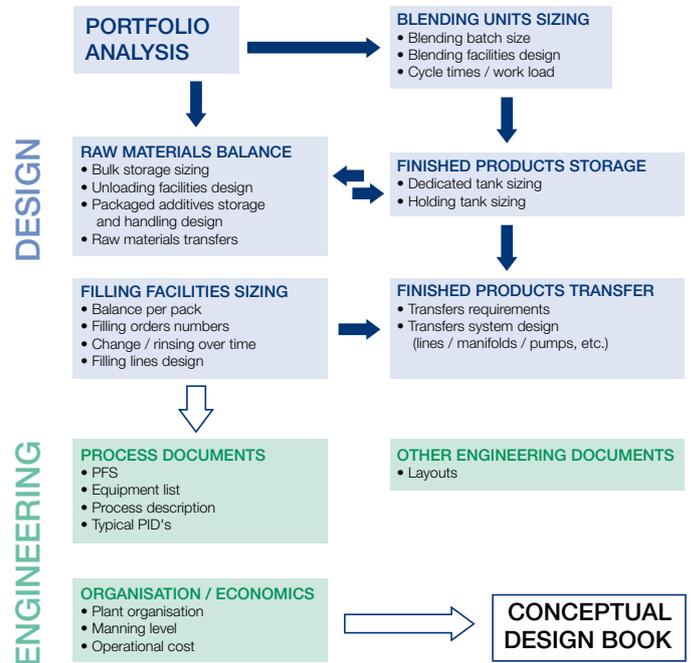
In this environment, only an optimised LOBP design can ensure customer satisfaction and supplier profitability.

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.

Dynamic simulation of production portfolio can be implemented which is of special interest to further optimise areas with great load variations such as truck loading gantries.

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

Lube Oil Blending Plant

Cellier has developed specific processing equipment to meet the lubricant market requirements and quality constraints.

Automatic Batch Blending

The Cellier 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 modern lubricants production requirements.

The principal advantages of Automatic Batch Blending systems as compared to conventional batch blending are :

- High level of blending accuracy and repeatability
- High RFTI (Right First Time Index), no re-blend
- Reduced manpower requirements
- Enhanced blending flexibility
- Quick blend turnaround
- Low contamination
- Minimum (virtually zero) slop generation.

Flexibility in batch size, product formulation, raw material handling and process sequences yield to a powerful blending tool in the fields of lubricants, lubricant additives or fuel additives.

In Line Blending

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).

Advantages:

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

Simultaneous Metering Blending

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.

Advantages:

- 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.

Drum Decanting System

Cellier Drum Decanting System (DDS) is designed to pump 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.



1 Simultaneous Metering Blending systems with pigged lines | 2 In-Line Blending systems | 3 Drum Decanting System | 4 Automatic piggable manifold

Pigging systems

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

Advantages:

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

Greases manufacturing plant

Cellier provides expertise and in-house technologies to optimize your greases manufacturing process.

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 additivation 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,
- high pressures and high velocities of the heating/cooling medium,
- elimination of thermal shocks,
- reduced operational costs.

Process control

The module of the Lubcel™ 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.

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



1 Grease reactors | 2 Dosing hopper with bag emptying | 3 Filling line | 4 Control room with production monitoring

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 skidded units, 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.

Extended process control

Lubcel™: Process control and plant scheduling software

Lubcel™

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 reception and storage to product dispatch (blending, intermediate storage, transfers, filling and warehouse). It is a plant-wide control system integrating sub-systems such as graphics, workshop capabilities, warehouse management, advanced schedule features. It has no limits in communicating with other systems such as lab or business systems (ERP).

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.

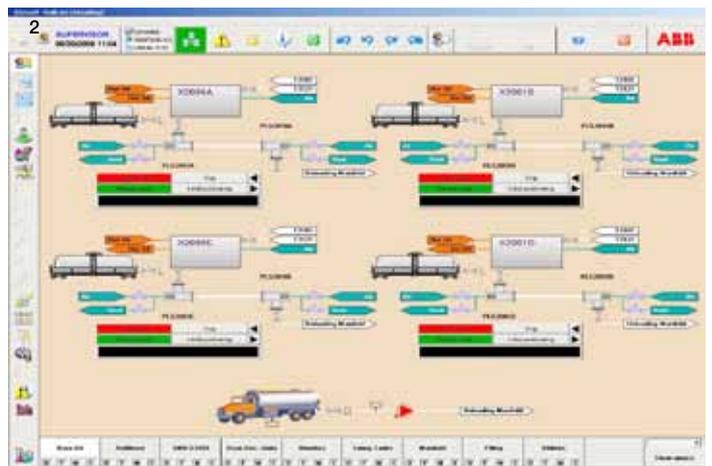
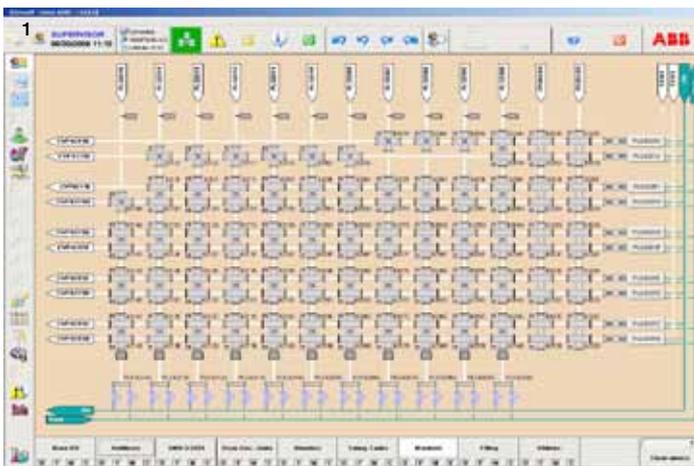
Advanced short-term scheduling module

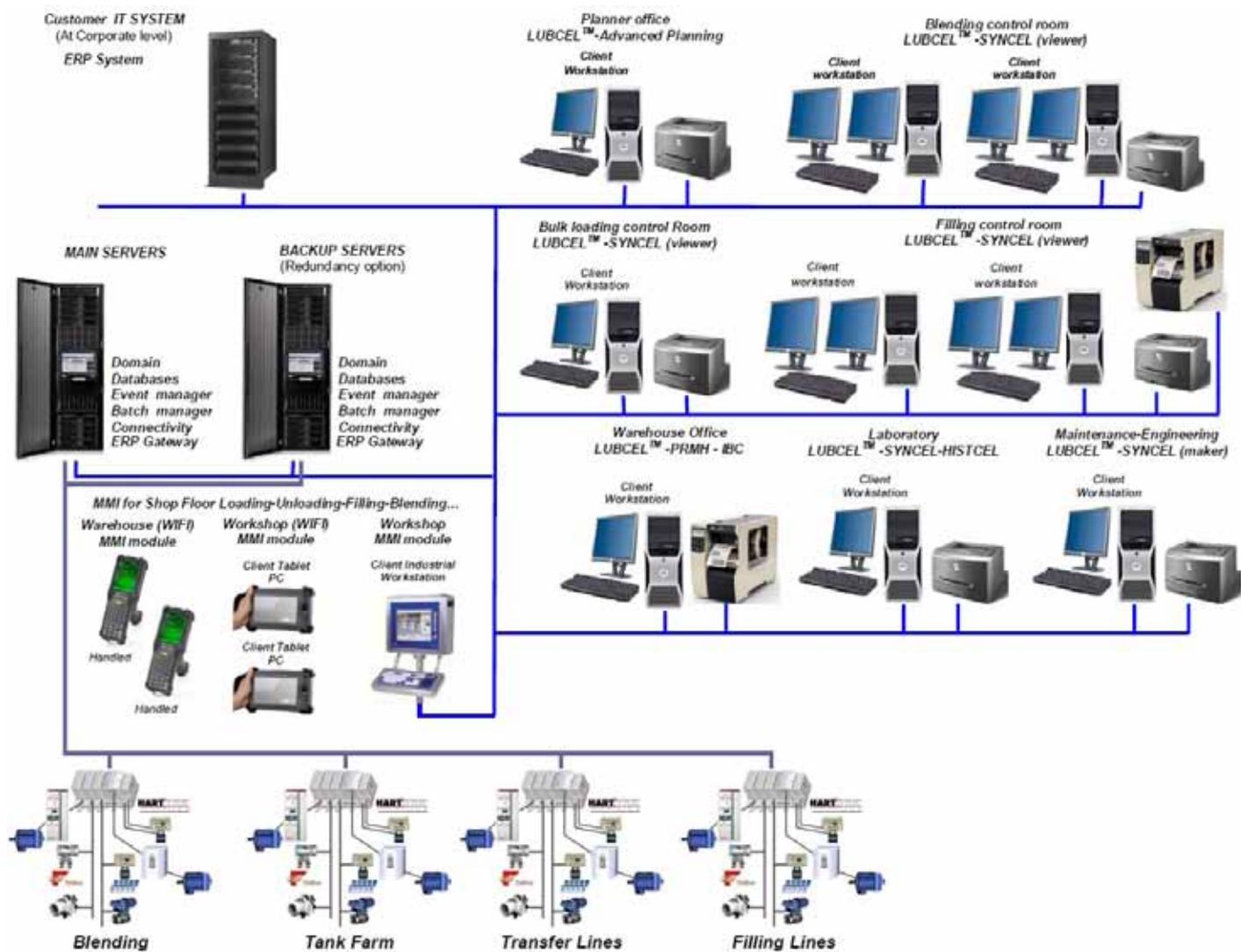
Lubcel™ indicates the daily load for each blending or filling resource (ABB, SMB, ILB...) or workshop (reception, blending, filling). This short-term scheduling module is a powerful tool for smoothing the load.

Histcel historics module

Lubcel™ enables information from the previous year's production data records to be retrieved for data tracking purpose and to perform analysis or to get some trends. The results of multi-criteria searches can be exported in Excel format files in order to manipulate the records with standard tools.

1 Synoptic screen for the monitoring of a piggable manifold | 2 Synoptic screen for the monitoring of raw materials transfer through pigged lines





Typical Lubcel™ architecture

Modernisation of existing plants

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.

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.

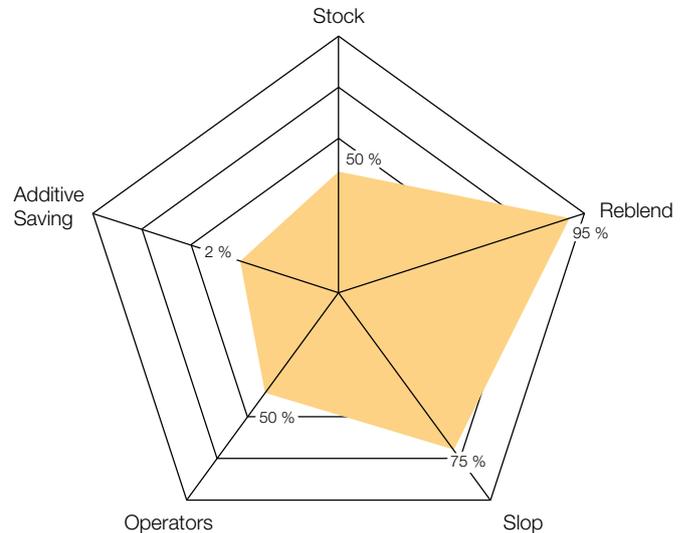
High-connectivity control system

- 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.



Typical savings resulting from an LOBP upgrade

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.

1 Automatic Batch Blenders as skidded units before shipment | 2 Tank farm



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 market.

The major international petroleum companies have chosen Cellier Activity.

AMOC	Egypt
AGIP	Italy
BP Castrol	Australia, Belgium, China, India, Iran, Iran, Singapour, South Africa
CHEVRON	USA
COPEC	Chile
ENGEN	RSA
ENOC	UAE
EXXON MOBIL	China, Egypt, France, Hong Kong, Japan, Singapour, Tunisia, UK
GALP	Portugal
IDEMITSU	Japan
INDIAN OIL	India
INFINEUM	Italy, Singapore
LUBRIFIN	Romania
LUKOIL	Romania
Q8	Belgium
LUBRIZOL	France, India, UK
NAFTEC	Algeria
NIPPON OIL	Japan
PERTAMINA	Indonesia
PSO	Pakistan
RAK OIL	UAE
REPSOL	Spain
SHELL	Belgium, Canada, France, Japan, Philippines, Russia, Singapore, Trinidad
SINOPEC	China
TOTAL	Belgium, China, France, India, Saoudi Arabia, Spain, Vietnam

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