EDL Anlagenbau Gesellschaft mbH

Lube Oil Blending

PÖRNER GRUPPE

Table of Contents

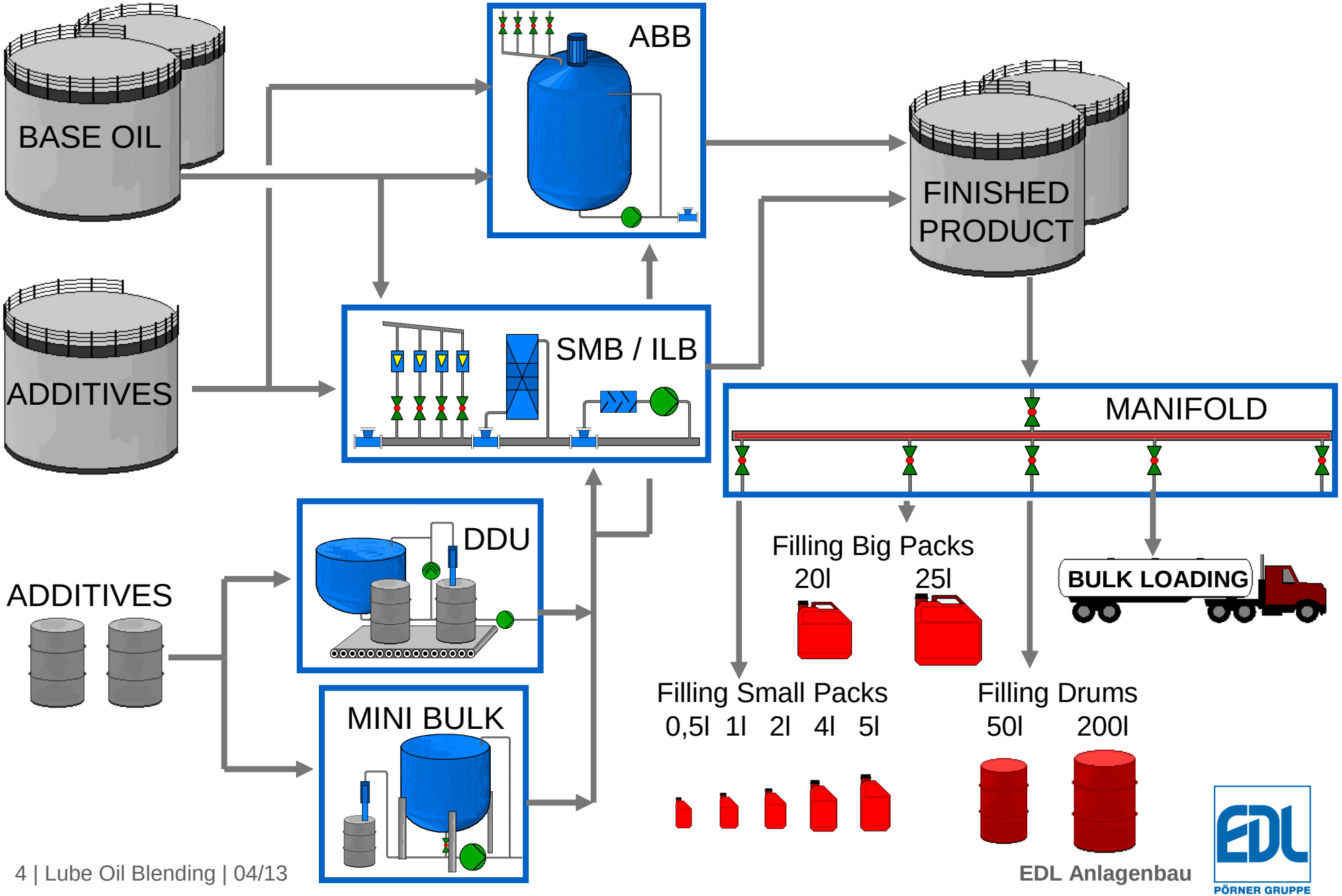
EDL's Capabilities

- **Special expertise and technology for complete lube oil blending plants**
  - **Studies**
  - **Basic engineering**
  - **Detail engineering**
  - **Procurement**
  - **Construction supervision**

- **Delivery of complete blending plant respectively core equipment based on client's requirements**
  - **Engineering**
  - **Construction**
  - **Commissioning**

- **Reliability also after delivery and commissioning**
  - **Operator training**
  - **Maintenance service for hard- and software**
  - **Troubleshooting via telephone and internet**
  - **Troubleshooting at site**

Capabilities – Overview Blending Plant



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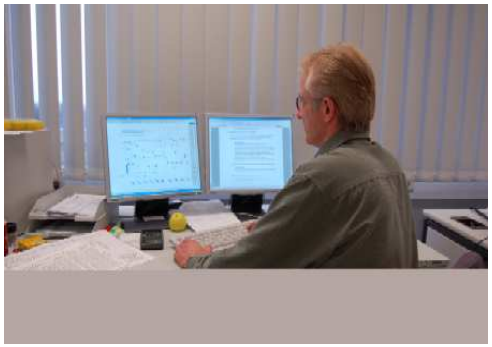
Engineering Tools

For the client's benefit, EDL use different kinds of special technologies and engineering tools:



Process Engineering

- **Process simulation tools**
  - **IPS – Invensys Process System**
    - **PRO-II** — **Stationary simulation**
    - **DYNSIM** — **Dynamic simulation**
    - **Visual Flow** — **Flare network calculation**
    - **INPLANT** — **Pressure loss calculation**
    - **ELECTROLYTE** — **Electrolytes calculation**
    - **BATCH** — **Batch distillations**
    - **PIPEPHASE** — **Simulation of long-distance lines and sources**
    - **HEXTRAN** — **PINCH calculations, heat exchanger design**
    - **ARPM/ROMEO** — **Data adjustment, plant optimization**
    - **USER modules** — **Pro-II applications**

Engineering Tools

- **Process simulation tools**
  - **ASPEN Tech**
    - **ASPEN Plus** — **Stationary simulation of chemical processes**
    - **HYSYS & CRUDE** — **Stationary simulation of refinery processes**
- **Design tools**
  - **FRNC-5PC** — **Calculation and design of fired heaters**
  - **PIPENET** — **Hydraulic calculation of networks**
  - **HTRI-Suite** — **Heat exchangers, air coolers, fired heaters**
  - **CONVAL** — **Automation and control systems**
  - **Different process software applications**
- **PHA-WORKS** — **HAZOP and Risk Assessment (SIL classification)**
- **Engineering tools**
  - **COMOS PT**

Engineering Tools

Mechanical

- **PROBAD** - Sizing of vessels/pressure equipment acc. to *AD-Merkblatt* (German regulations for such equipment)
- **MICROPROTOL** - Sizing of mechanical equipment acc. to international standards
- **COMOS PT**

Layout

- **PDS/SmartPlant 3D** - 3-D plant layout
- **SmartPlant Review** - Design review
- **NavisWorks** - Design review

Instrumentation/Automation

- **CONVAL** - Calculation of safety valves, orifice plates, control valves etc.
- **ELOP II** - Logic diagrams
- **SILence** - SIL calculation
- **COMOS PT**

Engineering Tools

Electrical

- **Simaris Design** - **Calculation of short circuits**
- **COMOS PT**
- **PDS-3-D Plant design** - **Cable routing**

Piping

- **PDS/SmartPlant 3-D** - **3-D plant design (pipe work, insulation)**
- **SUCAD** - **Pipe supports in 3-D model**
- **CAESAR II** - **Statics of piping systems**
- **PROBAD** - **Calculation of components for pipe class preparation**
- **MVS** - **Purchase and warehouse management – Piping Material System**
- **SmartPlant Review/ NavisWorks** - **Design Review**
- **PIPECAD** - **Preparation of 2-D isometrics**

Engineering Tools

Project Scheduling

- **PRIMAVERA P6**
- **MS PROJECT**

Project Administration

- **EDL-owned database solution**

- Time scheduling, activity lists
- Requisition lists (procurement management from inquiry up to order)
- Project budget control
- Vendor documentation
- Vendor database
- Document index
- Correspondence
- To-do list
- Project progress

Engineering Tools

COMOS PT

- **Object-orientated computer-aided engineering system useful for plant design, erection management, plant operation**
- **Interdisciplinary tool for complex engineering on a common database**

- **Process**	**Simulation, process data, generation of PFDs and P&IDs**
- **Automation/Electrical**	**Equipment specifications and datasheets, procurement and assembly documentations, line diagrams, dimensioning calculations**
- **Mechanical**	**Equipment specifications, equipment lists**
- **Piping**	**Piping specifications, piping lists**

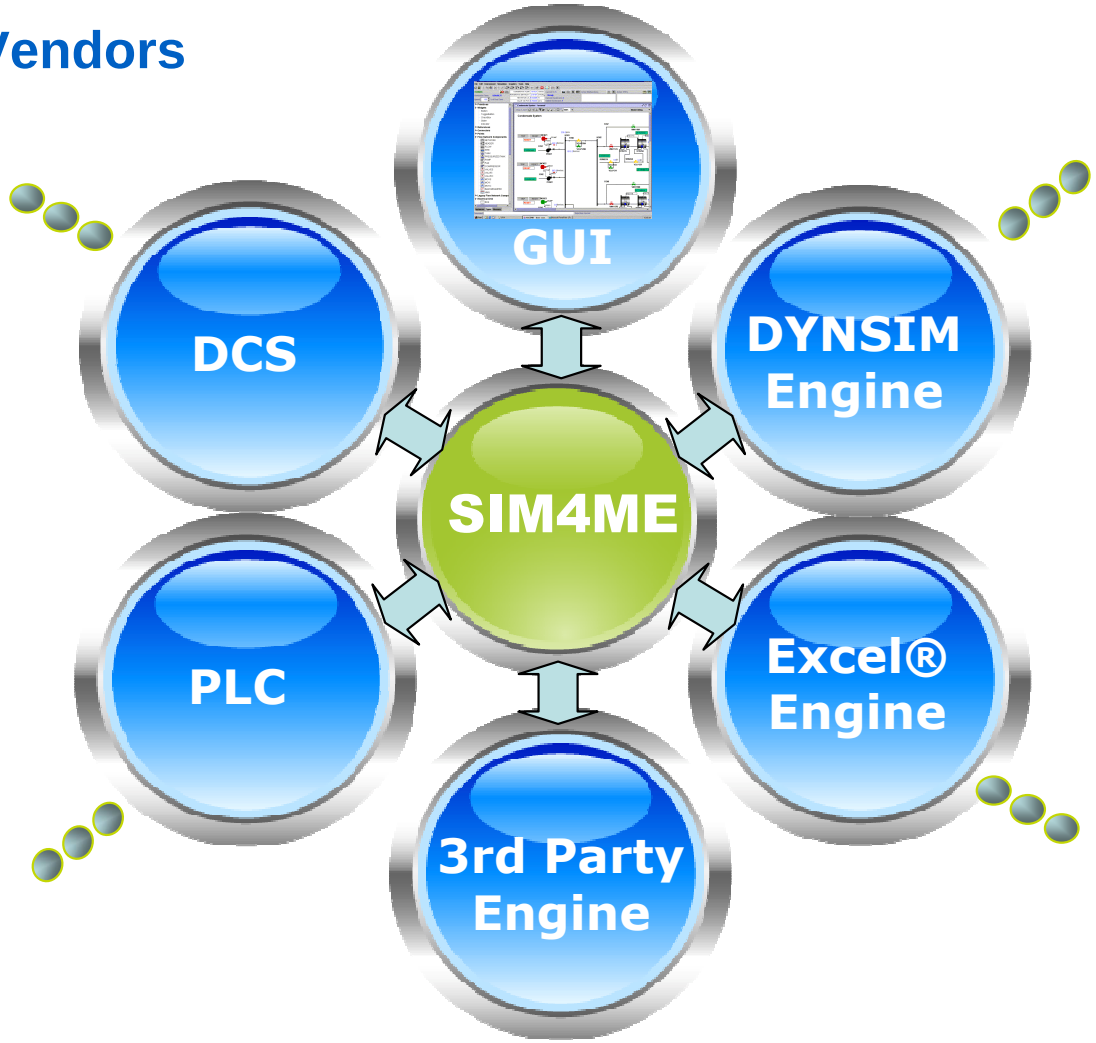
- **Life cycle management from the first process idea up to plant shutdown**
- **COMOS PT acts as database**
- **Interfaces to several software tools**

Engineering Tools

Technology: System Integration

OTS for all Type of DCS and PLC Vendors

- DCS
  - Foxboro I/A Series FSIM (Virtual Simulation)
  - ABB/Bailey BALSIM (Emulation)
  - ABB/Bailey BALTRAN (Partial Simulation)
  - ABB Industrial IT (Virtual Sim Controllers)
  - Emerson OVATION (Virtual Simulation)
  - Emerson DeltaV (Virtual Simulation)
  - Honeywell/TDCSim (Emulation)
  - Yokogawa (Virtual Simulation)
  - Siemens (Virtual Simulation) (under develop.)
- PLC/ESD
  - Triconex TRISIM (Virtual Simulation)
  - Allen-Bradley PLC-5 (Emulation)
  - GE Mark IV/V/VI (Emulation/Virtual Sim)
  - Modicon PLC-984 (Emulation)
  - Woodward Governor (Virtual Simulation)
  - CCC (Virtual Simulation)
- Generic
  - OPC Interface



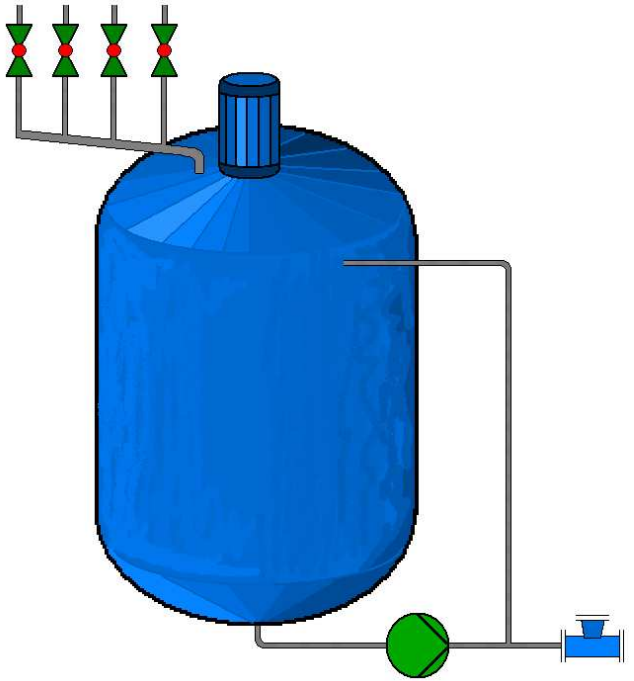
Blending Equipment

Construction and Delivery of Core Equipment for the Blending Process:

- **ABB… Automatic Batch Blender**
- **ILB….. Inline Blender**
- **SMB… Simultaneous Metering Blender**
- **DMB… Dissolving Mixing Blender**
- **DDU… Drum Decanting Unit**
- **DO …. Drum Oven**
- **Mini Bulk**
- **Manifolds**
- **Piggable lines**
- **Automation**

Blending Equipment

ABB …. Automatic Batch Blender



- ABB is suitable for batches
- Easy to adjust acc. to requested quality
- ABB consists of:
  - Blending kettle
  - Agitator
  - Finished product pump
  - Measurement system for process
- Dosing inlets are dedicated to base oils or additives
- Blending kettle can be heated by steam, hot oil or electrically
- High accuracy by dosing and weight measurements
- Ingredients are mechanically mixed into a homogeneous solution
- All rinsing base oils are part of the formula, there is no slop generation

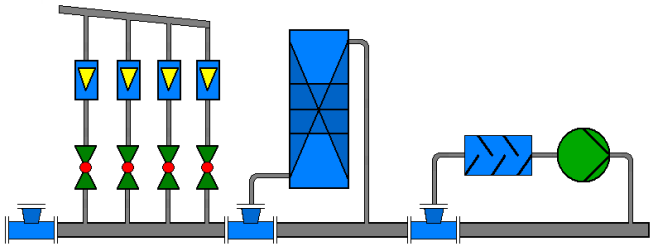
Blending Equipment

ILB …. Inline Blender

- ILB is suitable for high throughput to produce large quantities
  - Fast and continuous mixing
  - Real-time measurement
- ILB is composed of several dosing modules
  - Each dosing module consists of:
    mass flow meter, flow control valve, automatic check valve and air injection point for module purging
  - Dosing modules are dedicated to base oils or additives
- Modular concept:
  - ILB can be fitted with heat exchanger, booster pump and static or dynamic mixer
- Minimum contamination
- Blends can be sent directly to packing or shipping

Blending Equipment

SMB …. Simultaneous Metering Blender



- SMB combines the advantages of ILB and ABB
  - High production throughput of an ILB
  - Mixing in a fast and continuous process
  - Operating flexibility of an ABB
    to change compositions quickly, if necessary
- SMB is composed of several dosing modules
  - Each dosing module consists of:
    mass flow meter, flow control valve, automatic check valve
    and air injection point for module purging
  - Dosing modules are dedicated to base oils or additives
- Modular concept:
  - SMB can be fitted with in-line heat exchanger, booster pump and static or dynamic mixer
- Minimum contamination
- Finished product tanks with blending equipment

Blending Equipment

DMB …. Dissolving Mixing Blender

- **Reduction of mixing temperature**
- **Direct filling; no waiting time for cooling down**
- **Homogenization stable for a long time**
- **CO_2 reduction during production**

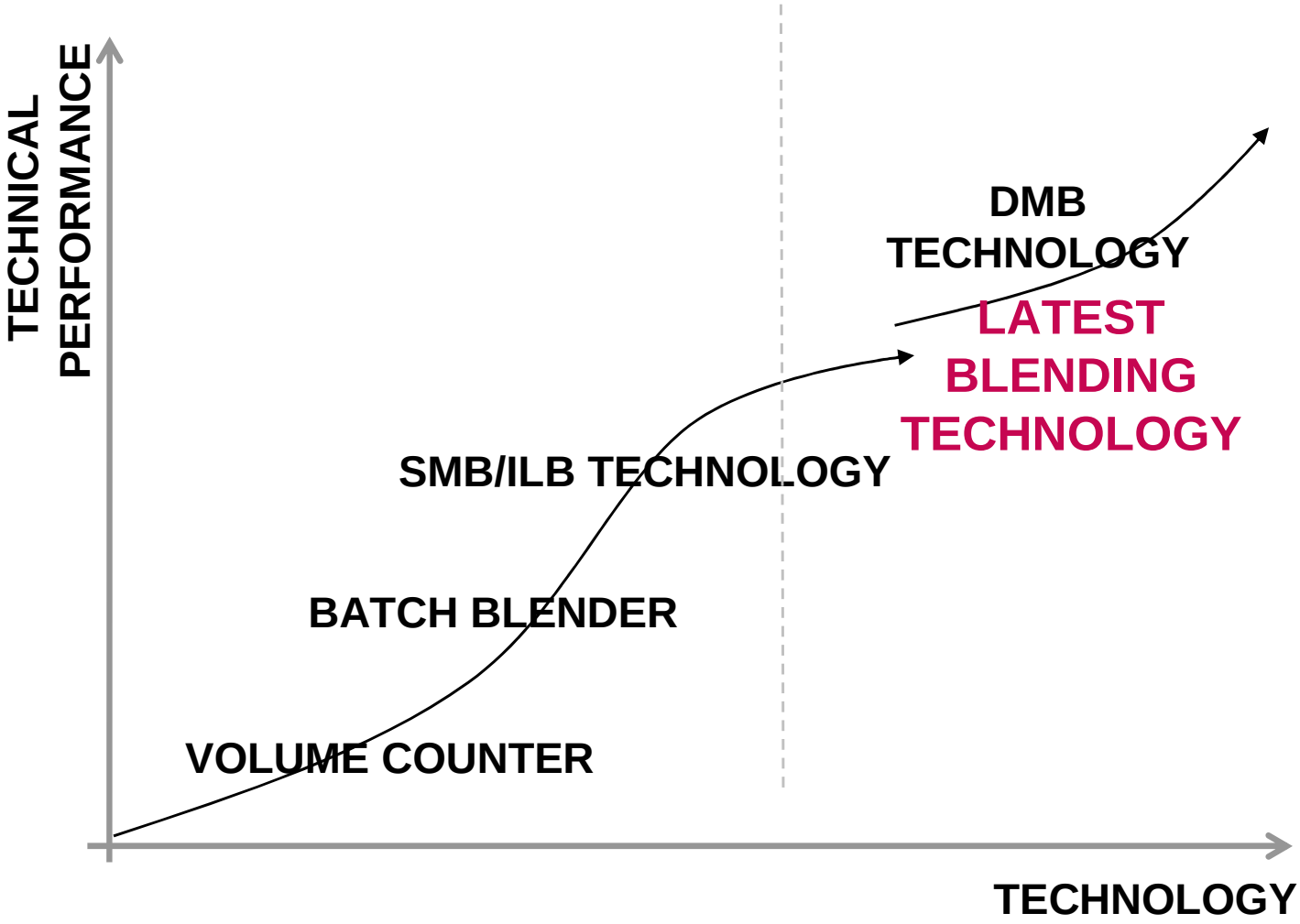
POSSIBLE SAVINGS (e.g. SYNTHETIC BASE OIL)

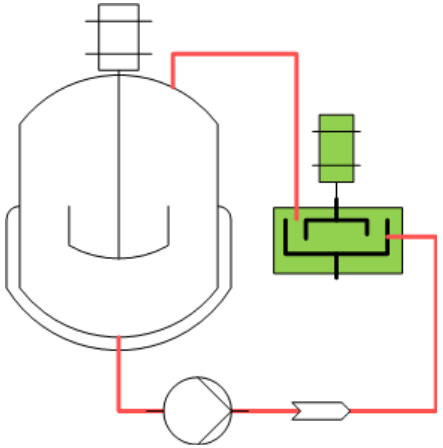
Process time	15 % of conventional time
Energy	50 % of conventional process
Production costs / kg	50 %
Filtration	50 %

RETURN OF INVESTMENT < 1 YEAR

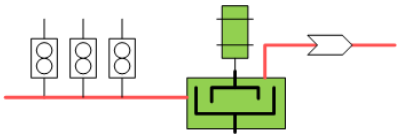
Blending Equipment

Development in Blending Technology





Option A for Dissolver
Integration into a Batch Process



Option B for Dissolver
Integration into a SMB or ILB

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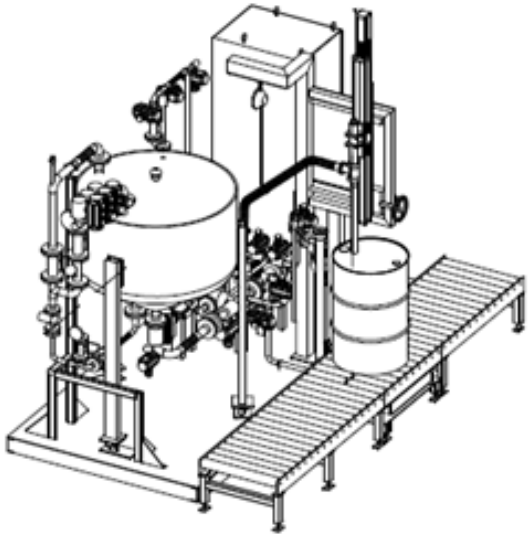
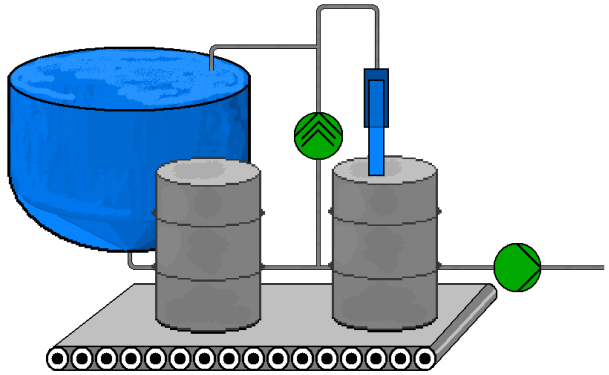
Blending Equipment

DDU …. Drum Decanting Unit

- **Fast automatic decanting within 5 – 7 mins/drum**
- **No impact on dosing accuracy by changes e.g. in density or in viscosity of the additive**
- **Rinsing oil is part of formula (no slop generation)**
- **DDU consists of: suction lance, heated rinsing vessel, decanting pump, rinsing pump, weighing system**

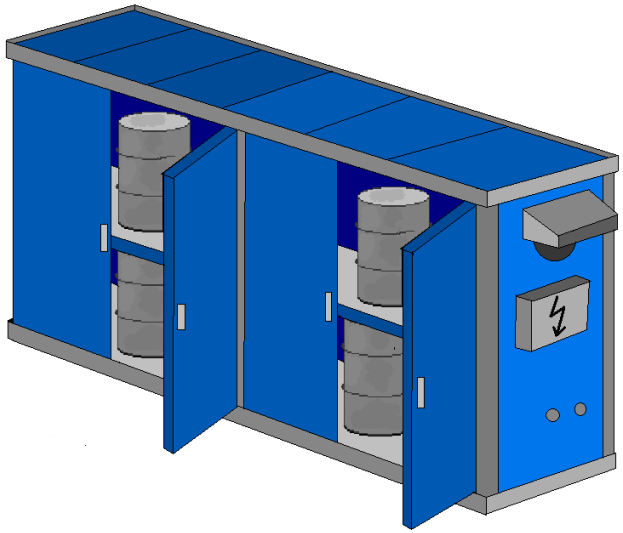




Blending Equipment

DO …. Drum Oven

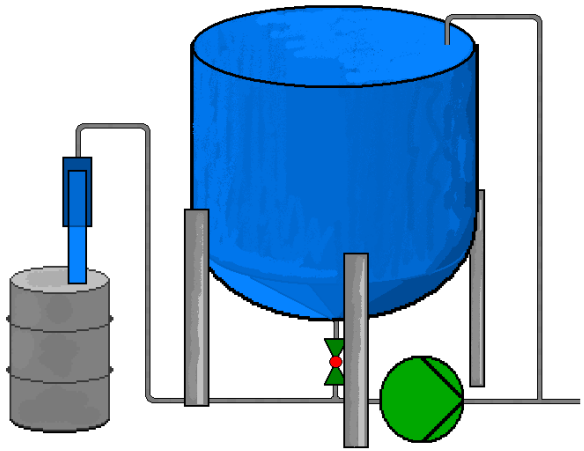
- Preparation of barrels for fast decanting
- Heating up of ingredients
- Decrease of viscosity
- Easy decanting by DDU
- Different sizes based on customer’s requirements
- All-round thermal insulation with non-flammable mineral fibre plates
- Stable steel frame construction for high mechanical loads
- Storage level with removable grids



Blending Equipment

Mini Bulk

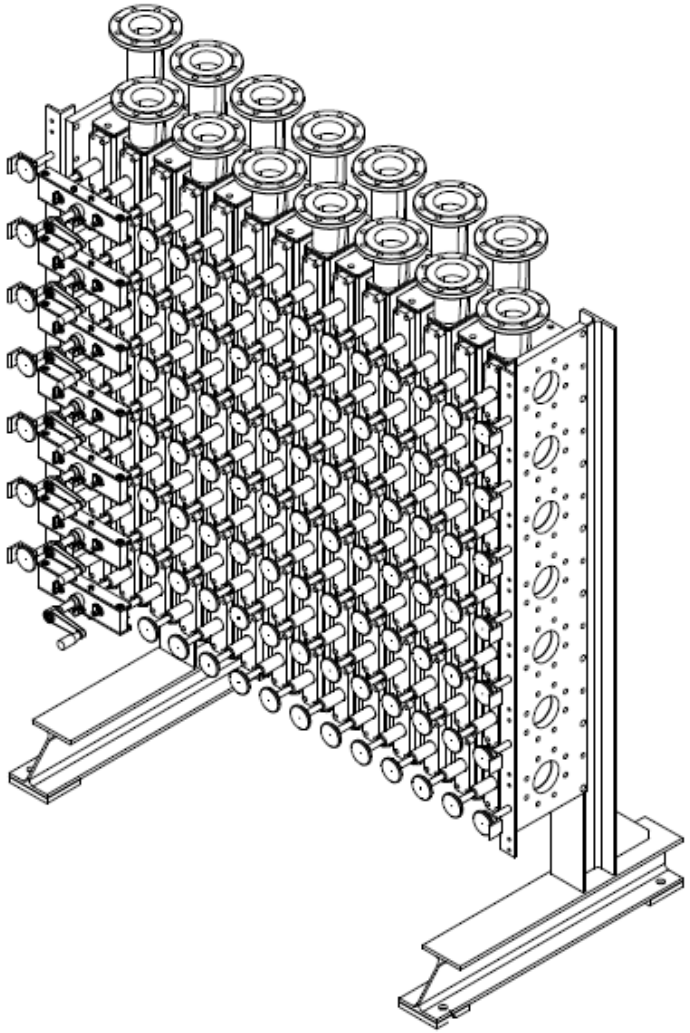
- Mini bulk is suitable in case of higher additive demand
- Mini bulk consists of:
  - heated additive vessel
  - metering pump
- Additive vessel can be heated by steam or by hot oil
- Simultaneous pumping of additive to SMB, ABB or ILB is possible



Blending Equipment

Manifolds

- Additional piping system
  - Dividing of flows
  - Combining of flows
  - Routing of flows
  - e.g. connection from one tank to several filling lines at the same time
- Safety for plant operating personnel
- Saving of handling time
- Handling
  - manually or
  - via DCS



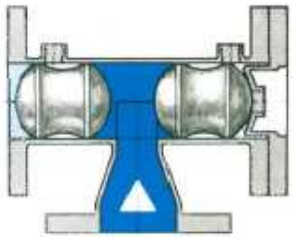
Blending Equipment

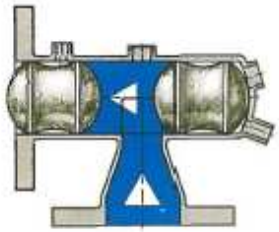
Piggable Lines

Typical Pig

- **Use of modern pigging technology**
- **Cleaning of pipes and valves to avoid cross contamination**
- **Environmental issues**
- **Cost reduction**
- **Saving of product and time**

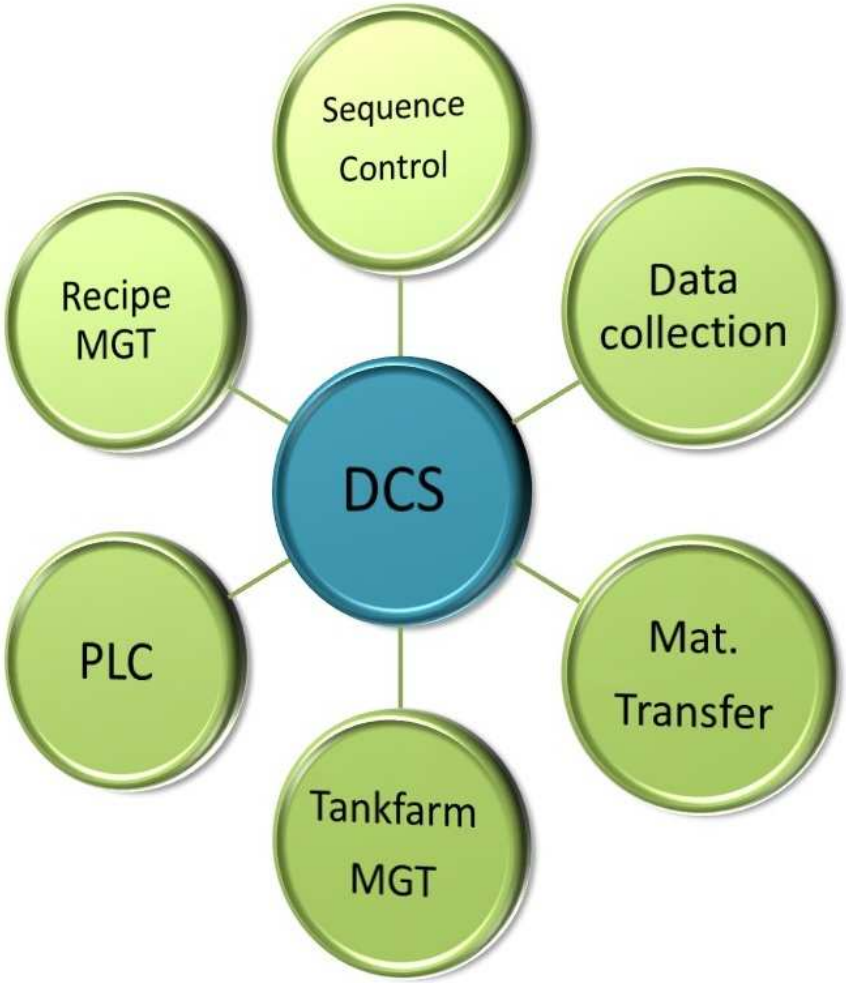
Pig Launching and Receiving Stations





Blending Equipment

Automation



- **Advantages:**
  - **Easy handling and integration into existing automation systems**
  - **Open system**
  - **Following industrial standards**

Skid-mounted Blending Units

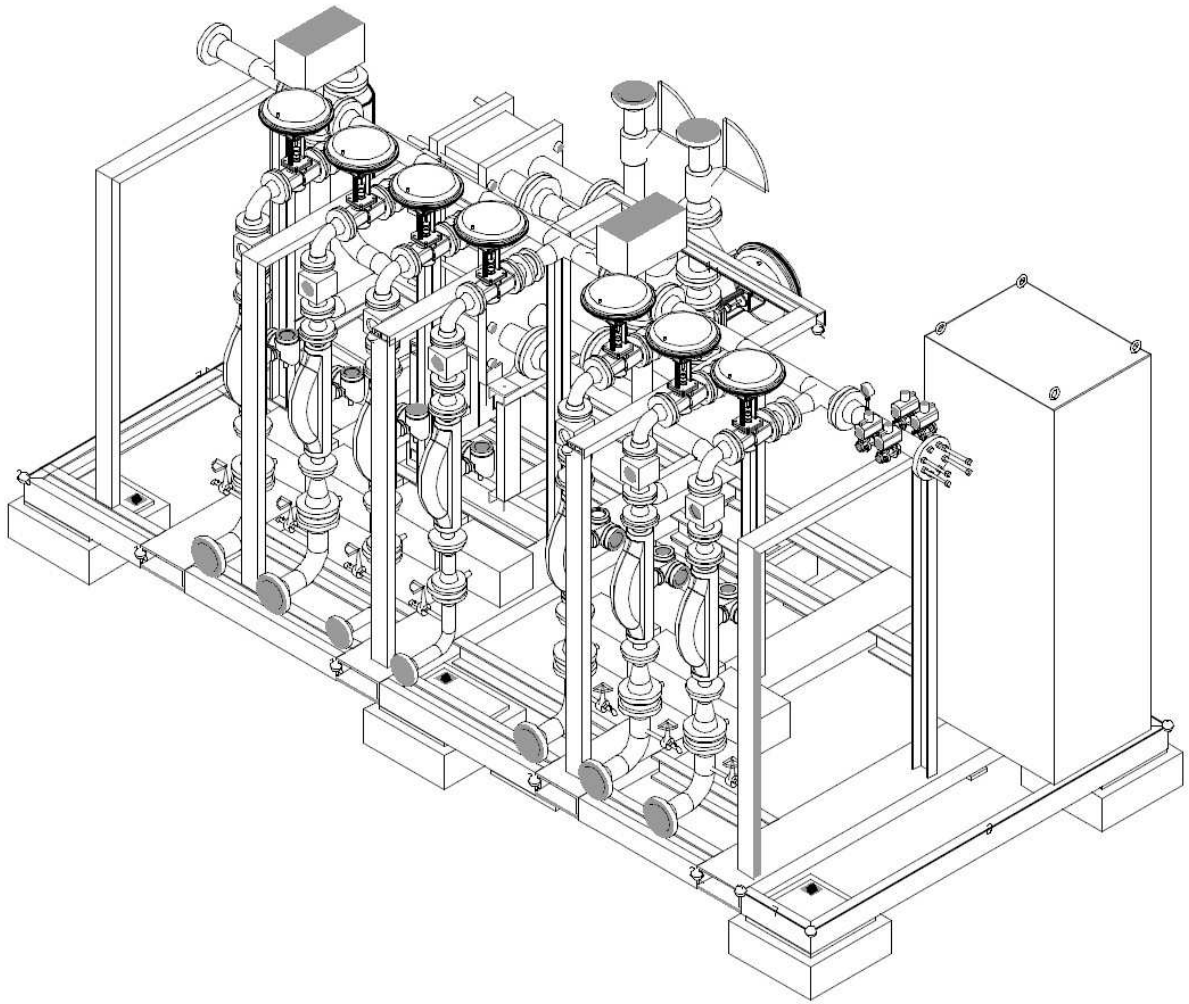
EDL's Blending Equipment is skid-mounted, tested and certified

- **Process Equipment:**
  - **ABB … Automatic Batch Blender**
  - **DDU … Drum Decanting Unit**
  - **SMB ... Simultaneous Metering Blender**
  - **ILB … Inline Blender**
  - **Mini Bulk**
  - **etc.**

- **Advantages:**
  - **Easy handling and integration into existing units**
  - **Significant reduction of assembly costs at site**
  - **Significant reduction of installation (plant shut-down) time at site**
  - **Increase of manufacturing quality based on manufacturers' experience**

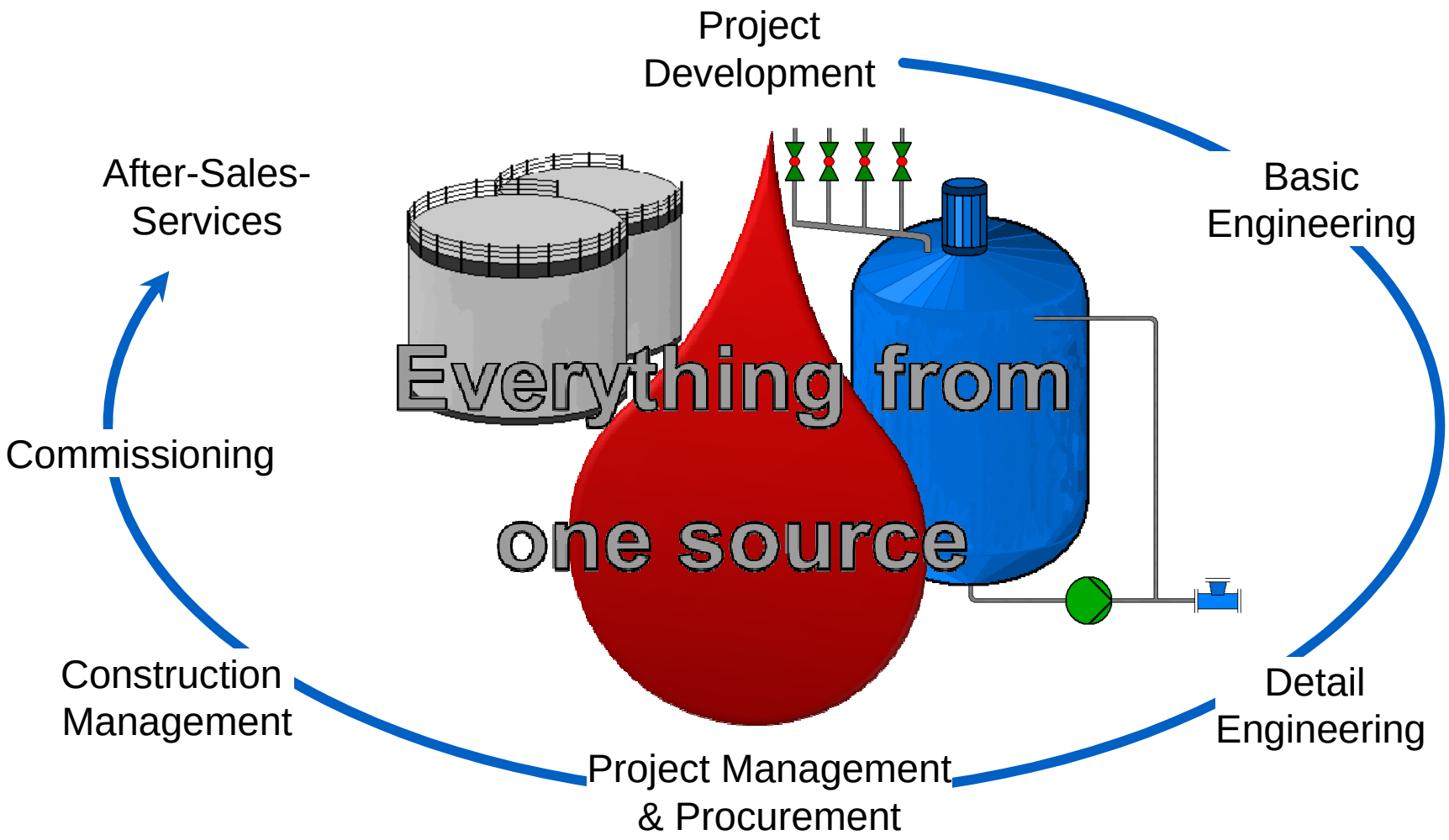
Skid-mounted Blending Units

Skid-mounted Simultaneous Metering (SMB) / Inline (ILB) Blender



Summary

EDL services for the complete blending plant life cycle



EDL – Engineering with Competence

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