EDL Anlagenbau Gesellschaft mbH
Lube Oil Blending
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• Summary
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

BASE OIL

ADDITIVES

MINI BULK

DDU

SMB / ILB

ABB

FINISHED PRODUCT

MANIFOLD

Filling Small Packs
0,5l  1l  2l  4l  5l
Filling Big Packs
20l  25l
Filling Drums
50l  200l

BULK LOADING

EDL Anlagenbau
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
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
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
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
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

- 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

Typical Pig
Blending Equipment

Automation

- Advantages:
  - Easy handling and integration into existing automation systems
  - Open system
  - Following industrial standards
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
EDL services for the complete blending plant life cycle

Everything from one source

Project Development

Basic Engineering

Commissioning

Construction Management

Project Management & Procurement

Detail Engineering

After-Sales-Services
EDL Anlagenbau
Gesellschaft mbH

Lindenthaler Hauptstraße 145
D-04158 Leipzig / Germany

Phone: +49-341-4664-400
Fax: +49-341-4664-409
E-mail: GF@edl.poerner.de
Internet: www.edl.poerner.de
VIDEO IP 194.25.217.60