BORNEMANN
MULTIPHASE BOOSTING
A CHANGE OF PERSPECTIVE
WHY DO COMPANIES BUY BORNEMANN MULTIPHASE PUMPS?

INTELLIGENT UPSTREAM SYSTEMS FOR THE OIL AND GAS INDUSTRY
INCREASED OIL RECOVERY WITH MULTIPHASE TECHNOLOGY

UNPREDICTABLE FLOW
The focus is on unpredictable flows, previously considered as unprofitable. Multiphase pumps handle these with ease and at a fraction of the conventional costs.

UNTREATED STREAM
There is a Multiphase solution to suit a whole range of potential flows. Untreated products ranging from wet gas to heavy crude are pumped reliably in any situation – off-shore, subsea, thermal, conventional. In addition flaring can be avoided making this by-product available for profitable use.

INACCESSIBLE ENVIRONMENTS
Exploiting oilfields in harsh environments and subsea. Extending the life of dying oilfields in this way is the perfect opportunity to generate a sizeable profit.

The comparatively small investment and impressively low maintenance and running costs are the benefits.
LESS SEPARATION
MULTIPHASE MAKES WELLHEAD SEPARATORS OBSOLETE AND THE PROFIT IS IN YOUR HAND!

CONVENTIONAL STREAM

LESS COSTS
CAPITAL INVESTMENT AND OPERATIONAL EXPENDITURE DOWN

Multiphase offers cost savings almost everywhere. The only equipment necessary is delivered as a complete fully-functional unit mounted on a skid. Consequently engineering and installation are straightforward and the construction period is shortened.

Coming on stream could not be easier. Just connect the well, Multiphase Unit, Pipeline and Power. The proven mechanical seal and system design guarantee that Multiphase will satisfy the most stringent environmental requirements and work under full safety without extra investment. The Multiphase compact design also requires much smaller land-based installations, resulting in a further saving.
HARVEST THE TREASURE!

Insert multiphase technology near or at the wellhead. Wonder in the knowledge that the throughput of fluids, gases, solids and any mix is guaranteed! Make the most of the conveniently situated existing plant.

FOR NEW FIELDS

Construct the separators and processing plant on land where it best suits. Appreciate the refinement and open up the accessibility!

RUNNING COSTS COULD NOT BE LOWER

A reduced maintenance program combined with a minimal on-site replacement part store results in further savings. The near maintenance-free installation ensures a reduced manpower requirement and coupled with the high reliability leads to virtually no outage. Keep the oil flowing and maximize your margins!
MINIMAL IMPACT
POLLUTION DOWN NEAR ZERO.
LAND REQUIREMENTS REDUCED.
ENERGY SAVING.

MULTIPHASE BOOSTING IS CLEAN

Due to the unique Multiphase pump design there are no leakages of gas or liquid. The energy saved through the use of the previously flared gases is also a contribution to keeping our environment clean.

Separation at source requires costly multi-transport of the separated products. The Multiphase principle of transport before separation protects the environment by consuming considerably less energy and using less land. The gases previously flared off are now available e.g. for power generation, sales, gas injection.

Land-based projects: The same straightforward installation and cost savings apply. Whatever the situation – permafrost, desert, jungle – Multiphase is the solution.
THE BORNEMANN MULTIPHASE DESIGN

YOU WILL GET THE BEST SOLUTION FOR YOUR APPLICATION WITH OUR TAILOR-MADE PUMPING SCREW DESIGN

SELECT – PLUG IN – PUMP OUT

With the benefit of almost 20 years proven experience Bornemann offers customised performance solutions for every situation. In-house design and production and 100% workshop testing guarantee the high performance technology – essential for the oil industry.

DESIGN RANGE

This highly refined version of the positive displacement principle also employs a patented machining process for the screw manufacture. Performance is a function of screw diameter, pitch and speed. In addition there are special degressive screw geometries available to give a further efficiency saving of up to 25%.
DEGRESSIVE SCREW
Screws with a decreasing pitch. Reliable manufacturing process for screws with decreasing pitch. Proven increase in efficiency for multiphase service. Substantial decrease in Total Cost of Ownership by smaller drive train and lower power consumption.

STANDARD SCREW
The unique rotor design enables Bornemann to maintain a short bearing span and compact pump design. The best suitable material selection for the feed screws and shafts in respect to bending and corrosion resistance.
FROM PUMPS TO SYSTEMS TO SOLUTIONS

CONTACT, CONSULT, SELECT, TRUST BORNEMANN

COMPLETE MULTIPHASE PUMPING SYSTEMS

With our experience in research & development, engineering, production and commissioning all over the world we are able to supply complete system solutions – for a wide range of performance conditions and harsh ambient environmental conditions.

PLUG AND PUMP

The skid mounted pump is equipped with all necessary instrumentation and transformer cabinets. You will get a complete system incl. electrical drive system with motor, variable frequency converter and transformer cabinets will undergo a complete system factory acceptance test prior to shipment.

Cairn Energy India - RAVVA Onshore Terminal
SAFETY FIRST

The Bornemann system guarantees full safety and automatic operation under all circumstances.

- Installation of inlet and outlet fail and fire safe ball valves
- Automatic shut down in case of out of range measuring value
- Hard wired emergency chains
- Constantly monitored multiphase process
ONE SMALL STEP FOR A MAN, ONE GIANT LEAP FOR MANKIND.

MULTIPHASE GOES SUBSEA.

MAINTENANCE-FREE OIL EXTRACTION AT SEABED LEVEL

MOVE BORNEMANN MULTIPHASE TECHNOLOGY CLOSER TO THE DEEPER AND UNDEVELOPED RESOURCES.
CONVENTIONAL RECOVERY
Separation at source, flaring and closing down wells with weakened output are wasteful and environmentally unfriendly.

STRAIGHT TO THE SEABED
Multiphase has gone subsea. Weather and sea conditions are irrelevant. Prolonged production is a reality. The oil industry discovers new profit opportunities.

THE CHANGE OF PERSPECTIVE
Improved high pressure design means unlimited water depth. Superior execution of pump and motor cartridges are leading the trend to maintenance-free operation. Installations at seabed will last a life-time. The oil industry will change their perspective.
OUR MULTIPHASE PUMPS AND WORK ENVELOPES TO SUITE

- Differential pressure: up to 100 bar (1,780 psi)
- GVF: 0 bis 100%
- Capacity: 2 to 8,000 m³/h (300 to 1,200,000 BPD)
- Unlimited temperatures and viscosities
- Inlet pressures down to atmospheric level
- Pressure rating up to 1,500 lbs
- All materials, hardened surfaces, and coatings are possible and fulfill common standards such as NACE, PED, ASME, etc. when required.
BORNEMANN SERVICES WORLDWIDE

DRIVE, COURAGE, RESPONSIBILITY, RELIABILITY - THAT’S OUR TEAM SPIRIT. IN THE DESERT, AT SEA, IN ICE AND SNOW - WE ARE EQUIPPED FOR EXTREMES. SERVING YOU NIGHT AND DAY - WE HAVE THE KNOW-HOW AND MAINTENANCE CAPABILITY.

MAINTENANCE

- Pump check
- Inspection
- Overhaul
- Multiphase testing
- Preventive Maintenance
- Condition Monitoring

SERVICE ON SITE

- Specialist Hotline
- Inspections – Pumps & Systems
- Maintenance Plans
- Preventive Maintenance
- Repairs
- Mechanical seal service

SPARE PARTS - WEAR PARTS

- Consultant Service & Advise
- On-site stocking proposals
- High availability from central stocks
- Excellent backlist availability
- Rapid delivery worldwide
- Overnight and courier options
**REPAIR SHOP**
- Rapid job completion
- Damage and wear inspection
- Quotes for repair services
- Optimization of capacity rates for each specific application
- Adaption of pumps for changed applications
- Test bed check and performance certificate as standard
- Pick up and delivery service

**TRAINING**
- Training at Bornemann
- Training on-site
- Theory and practice
- Clear and complete training documentation
- Systematic operation; maintenance; trouble shooting procedures

**SERVICE LINE**
- +49 5724 390-100
- service@bornemann.com
SEVEN OF THE BEST
OUR CREDENTIALS

BP
- BP King – Gulf of Mexico
- Subsea installation
- Installed in 2007
- Fluid Multiphase Mixture
- Capacity 485 m³/h
  73,484 BPD
- Water depth 1,700 m
- GVF up to 98%

CNRL / ESSO / IMPERIAL OIL
- Thermal Fields in Canada
- 148 pumps in operation
- Fluid Multiphase Mixture
- Capacity up to 2,000 m³/h
  303,030 BPD
- GVF 99%

PDVSA
- nearly 80 pumps in operation
- Fluid Multiphase Mixture
- Capacity up to 768 m³/h
  116,363 BPD
- GVF up to 99%
- Heavy Crude Oil
**LUKoil**
- Siberia, Russia
- Harsh Environmental Installation
- 100 Installations
- Capacity up to 500 m³/h
  - 75,757 BPD
- GVF 96%

**RWE-DEA**
- Mittelplate – Germany
- MPC 335
- Installed in 2005
- Fluid Multiphase Mixture
- Capacity 470 m³/h
  - 71,212 BPD
- GVF up to 74%

**CAIRN Energy**
- Ravva Terminal – India
- Installed in 2007
- Fluid Multiphase Mixture with H2S
- Capacity 2,414 m³/h
  - 365,757 BPD
- GVF 95%

**Wintershall Noordzee**
- P12 South West
- MPC 268
- Installed in 2005
- Fluid Multiphase Mixture
- Capacity 610 m³/h
  - 92,424 BPD
- GVF 99%
MEET THE MULTIPHASE-TEAM

“Take advantage of our depth of experience. Our team includes Project and Procurement Managers, System Integration Experts and Product Development and Research Groups. Consult our portfolio of completed projects and enjoy the diversity and dependability of immediate professional support!”

Gero von der Wense,
Leader Bornemann
Multiphase Boosting Team

FROM ENQUIRY THROUGH FEASIBILITY STUDY TO HANDOVER

Complete Project-Management ...

... including Transport-Logistics worldwide.
Expert Advice, specific Planning ... ... made in Germany, supplied all over the world.
WELCOME TO BORNEMANN GERMANY
OVER 150 YEARS OF TECHNOLOGY DEVELOPMENT

Twin screw and progressive cavity pumps are historically in great demand. Multiphase twin screw pumps are continuing to rise. The variety of uses for Bornemann pumps seems to have no boundaries.

MILESTONES

<table>
<thead>
<tr>
<th>1853</th>
<th>1934</th>
<th>1985</th>
<th>1989</th>
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<tbody>
<tr>
<td>Joh. Heinrich Bornemann opens his Locksmith Shop</td>
<td>Development of twin-screw pumps, patent granted</td>
<td>Development and introduction of multiphase pumps</td>
<td>First field test of multiphase pumps</td>
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<tr>
<th>1993</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
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<tbody>
<tr>
<td>First patent for multiphase boosting</td>
<td>First subsea multiphase pump in operation</td>
<td>First 3,000 kW (4035 HP) pumps</td>
<td>World record – 1,700 m deepest subsea multiphase pump in operation</td>
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UNIQUE SOLUTIONS
MADE BY THE LEADING COMPANY
IN MULTIPHASE SYSTEMS

Joh. Heinr. Bornemann GmbH
Industriestraße 2
31683 Obernkirchen
Germany
Fon: +49 5724 390-0
Fax: +49 5724 390-290
info@bornemann.com
www.bornemann.com

USA
Bornemann Pumps Inc.
P.O. Box 1769
Matthews, NC 28106
USA
Fon: +1 704 8498636
Fax: +1 704 8498637
info.usa@bornemann.com

CANADA
Bornemann Inc.
320 441, 5th Avenue S.W.
Calgary, Alberta
Canada T2P 2V1
Fon: +1 403 6680552
Fax: +1 403 2624073
info.cdn@bornemann.com

ARGENTINA
Bombas Bornemann S.R.L.
Armenia 2898
B1605CDP Munro
Prov. Buenos Aires
Fon: +54 11 47568008
Fax: +54 11 47565541
info.cn@bornemann.com
www.bornemann-ar.com

CHINA
Bornemann Pumps & Systems
(Tianjin) Co., Ltd.
Jinbin General Building No. 6,
No. 45 Muning Road
TEDA, Tianjin
P. R. China 300457
Fon: +86 22 66297800
Fax: +86 22 25326799
info.cn@bornemann.com
www.bornemann-cn.com

SINGAPORE
Bornemann Pumps Asia Pte. Ltd.
25 Intern. Business Park
German Centre, # 04-08
Singapore 609916
Singapore
Fon: +65 6 5616782
Fax: +65 6 5616784
info.sg@bornemann.com

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