BHGE is the world’s first and only fullstream company.

Turbomachinery & Process Solutions is the premium partner for rotating equipment, process flow, and transmission technologies to maximize productivity and minimize risk.

We collaborate closely with our customers and partners around the world to innovate and deliver differentiated products and full lifecycle services for all oil and gas industry segments, from onshore & offshore production, gas processing, pipeline and LNG, refining, petrochemical, and industrial sectors.

WE INVENT SMARTER WAYS TO BRING ENERGY TO THE WORLD
Structured to serve our customers

- 12,000+ employees
- Operating across 120 countries in Europe, Russia and CIS, Africa, Middle East, India, Asia Pacific, China, North and Latin America

- 30 manufacturing facilities
- 12 service facilities
- 1,200 field service engineers
- Solutions tailored to segment needs

Leverage global scale with powerful local impact

Onshore and Offshore Production  Liquefied Natural Gas  Pipeline and Gas Processing  Refinery and Petrochemical  Industrial
Our product portfolio

Drivers
- Aeroderivative Gas Turbines
- Heavy Duty Gas Turbines
- API Steam Turbines
- Industrial steam Turbines
- Slow Speed and Integrated Gas Engines
- Hot Gas and Turbo Expanders

Compressors and Pumps
- Centrifugal and Axial
- Integrated Compressor line
- API Reciprocating
- High Speed Reciprocating
- Centrifugal Pumps

Turnkey Solutions
- Process, Control and Safety Valves
- Air-cooled Heat Exchangers
- Control Systems
- Small Scale CNG
- Small Scale LNG
- Gear Solutions and Bearings

- Modules
- Waste Heat Recovery
- Subsea Compression
- Industrial Steam Turbines

Baker Hughes a GE company
Power Transmission
LUFKIN Evolution before GE

1902
Lufkin Business Line of pumping
Low Speed

1998
Acquisition Comelor
High Speed

2009
Acquisition RMT
Bearing

2014
Acquisition Allen Gear
Epicyclic
Power Transmission part of GE

GE purchase LUFKIN in 2013

Part of OFE

Allen Gear join in 2014

2016

Pumping -> OFE

PT -> TPS

Business Line made of 2 technologies
LUFKIN & ALLEN GEARS
Product Portfolio
Power Transmission Footprint

**Lufkin Texas**

Total under roof as ~37,000 m²

**EQUIPMENT SERVED:**
Gearbox and component manufacture, inspection, repair & Servicing
Lufkin, Allen Gears and other OEM products
Gearbox parts manufacturing | Including OEM and other OEM products
Centrifugal Cast Sleeve/Babbit Bearing manufacturing

**SPECIAL PROCESSES**
Detailed Gearbox inspection
Onsite engineering
Onsite manufacturing
Expert repair services
No load Gearbox testing capabilities
Diagnostics and analytics
24-Hour Service
Training
ISO 9001:2015

**Lufkin France**

Total under roof as ~28,000 m²

**EQUIPMENT SERVED:**
Gearbox and component manufacture, inspection, repair & Servicing Lufkin,
Allen Gears and other OEM products
Standard and Flexible coupling manufacturing, Including OEM and other OEM products

**SPECIAL PROCESSES**
Detailed Gearbox inspection
Onsite engineering
Onsite manufacturing
Expert repair services
No load Gearbox testing capabilities
Diagnostics and analytics
24-Hour Service
Training
PT Driving Critical Equipment in Critical Industries

- Oil & gas
- Power generation
- Wind
- Marine
- Steel & metal
- Sugar
- Rubber & plastics
- General industry
Parallel Shaft High Speed Products

**Main characteristics:**
- Pinion speed up to 50,000 rpm
- Pitch line velocity up to 200 m/s
- Transmitted power up to 90 MW

**High Speed units:**
- Type NM, N and NF
- Single & Multistage drives
- Speed reducers & increasers
- Cast Iron or Steel Casing

**Markets:**
- Power Generation
- Petrochemical
- Oil & Gas
- Test Bench
Parallel Shaft High Speed Products

E line
(Welded casing with drop sump)

D line
(Welded casing)

C line
(Cast iron casing)

Test Bench

E line
(Welded casing without drop sump)
Low Speed Products

**Main characteristics:**
- Speed up to 3 600 rpm
- Torque up to 2 000 000 Nm
- Gearboxes running on rolling bearings

**Low Speed units:**
- Vertical & Horizontal offset gearboxes
- Epicyclic gearboxes
- Bevel gearboxes
- Vertical gearboxes

**Markets:**
- Iron & Steel
- Nuclear
- Water turbines
- Test Bench
- Extruders & Mixers
- Drilling
- Petrochemical
- Sugar
- Mining
- Cement
- Rubber
- Sugar
Low Speed Products

- Pinion stand 4 000 kW – 20 T
- Calendar for Plastic Industry
- Reducer Power Swivel 1400 kW
- Planetary gearbox - nuclear
- CPH3D 250 for conveyor drive
- Vertical Kaplan speed increaser
Epicyclic Products

Industry leading expertise in high quality, high performance epicyclic gear units.

- 0.5 to 45 MW
- Three configuration options accommodate ratio, torque transmission and shaft rotation
- Critical components designed and manufactured in-house
- Turbine or generator mounted gearboxes
- Lubrication pump, fuel pump, etc.
- PTO drives, Starter drive PTI's
- Integrated barring drive systems
- Instrumentation packages for condition monitoring
Marine Application
Lufkin and Allen Gears – Broad Marine industry fit and Experience

Tugs / Workboats
- Propulsion
- Winch
- Fire pumps

Dredging
- Propulsion
- Dredge pumps
- Winch

Military
- Propulsion
- Gensets

Offshore O&G
- Propulsion
- Winch
- Fire pumps

FPSO/Drill ships
- Compressors
- Fire pumps
- GT generators

Rigs
- Jacking System
- Fire pumps
- Generators

Cruise/Ferries
- Propulsion

Fishing
- Propulsion
- Winch

Cargo vessels / Inland Water
- Propulsion
- Winch
Specialist OEM for Marine Transmissions

Lufkin specializes in the design and manufacture of high-quality marine gearing, providing customers with the most cost-effective, dependable and timely solutions for critical propulsion application.

Features and benefits

- Lufkin adheres to AGMA and API ratings which exceed ABS (ISO 6336) standards
- Robust design for low life cycle costs and long life
- Hydraulic clutches mounted externally for easy accessibility
- Heavy duty construction to last the life of the vessel
- Lufkin specializes in custom engineered marine drives to your exact requirements

### Strong References - over 2000 units supplied
Specialist OEM for Marine Transmissions

Options:

- Reversing
- PTO / PTI
- PTH
- Hybrid
- Clutches
- Thrust Bearing
- 2-speed
- CPP
- Controls

Unparalleled Reliability
Norway 6 Ferries repower project - 12 gearboxes

Why PT: Custom design, Lufkin/AG brand: History, Experience & Reliability
Allen Gears offer high-speed, high-power gearing solutions specializing in “epicyclic” gears that are lighter, more compact and typically have a higher power density than more traditional parallel shaft gear systems.

Over 60 years experience, over 1300 references
Specialist OEM for Marine Transmissions

Features and benefits:

• Focus on military vessels and luxury yachts.
• Shock proof, Ultra low Noise & Vibration
• Weight critical:
  Aluminium cases, Electron Beam Welding
• Epicyclic and Parallel Shaft or combination
• Complex configurations requiring specialised engineering skills
• Integral lube oil systems and controls
• Strong references established
Specialist OEM for Marine Transmissions

Gearbox is combination of DE + GT inputs
Twin CPP Output
Gearbox space envelope: 11.2 M wide x 6.3 M over shaft ends
Gearbox total weight 156,000 kg

GT Input (21.7 MW)
 CPP Output
 DE Input (4.8 MW)

Latest delivery 2018:
Cross-connect gearbox for South Korean Navy - ATX
Specialist OEM for Marine Transmissions

Lufkin Differentiators and Advantages:

- Lufkin specializes in custom engineered marine drives to exact requirements
- Lufkin designs to AGMA and API ratings, alternatively to ISO 6336 standards
- Proven reliability for critical propulsion solutions
- Robust quality for low life cycle costs and long life
- Hydraulic clutches mounted externally for easy accessibility
- Heavy duty construction to last the life of the vessel
- Lufkin custom design for drop-in replacements

Over 2000 Lufkin gearboxes supplied

Allen Gears Differentiators and Advantages:

- AG focus on military market and high-end yachts
- Unparalled Epicyclic gearbox designs and Parallel shaft designs to the highest military standards
- Gearboxes supplied for European, American and Asian Navies
- Meeting strict navy requirements for noise and vibration
- Weight critical: Aluminum casings, Electron Beam Welding
- Including gas turbine, diesel engine or combination drives: - CODOG, CODAG, CODOD, CODAD, CODLOG

Over 1300 Allen Gears gearboxes supplied
Couplings
Couplings

- Standard Coupling
- Disc brake coupling
- Shear pin coupling
- Disengageable coupling
- Large misalignment coupling
- High speed coupling
- Telescopic coupling
Repairs
Gear Repair ... all brands, all types
Our repair activity

1100 GB overhauled since 2000 ... 32% from other OEM

Brands frequently overhauled:
- BHS
- CMD
- Danieli
- David Brown/Weco
- Flender/Graffenstaden
- Hansen
- Voith

Sector of activity:
- O&G / Gas - Power generation
- Nuclear
- Steel industry
- Rubber
- Paper Mills
Factory Repair

Sample of activities

- Global visual inspection
- Dismouting instrumentation
- Couplings inspection
- Teeth visual inspection
- Axial clearance checking
- Blue tooth contact check
- Backlash check
- Removing gearset
- Magnetic particle on teeth of all gears
- Gear dimensional check on 3D machine

Weld bore & Re-bore

Backlash check

Blue tooth contact
Failure Analytics

Different type of analysis

- Metallurgical analysis
- Forensic analysis of failed parts
  - Nital Etch
  - Ultra Sonic
  - Magnetic Particle
  - Barkhausen inspection
  - Dye Penetrant Inspections

Additional diagnostic

- Engineering review in addition to forensic analysis
- Oil sample test & evaluation
Reverse Engineering

LUFKIN has high technology equipment's able to redesign and improve any type of custom gearboxes
Reverse Engineering

3D teeth checking machine

3D CNC checking machine

Options for measuring on-site

3D arm FARO
Reverse Engineering

Gearset

Bearing
Reverse Engineering

Complete gearbox

Sub - Element
Reverse Engineering

HITACHI: GNX 50 for FRAME 5 G/T

Customer: MJB Qatar
Power: 28 MW
Turbine speed: 5106 rpm
Generator: 3000 rpm

Ready for a new life!
Field Services
On Site Services

Our Team

- 10 FSE in France
- 7 FSE in UK
- 11 FSE in USA
- Additional FSE from BHGE fully trained on Power Transmission product line
On Site Services

- All types, all brands...
- Borescope inspection
- Vibrations checking
- Laser alignment
- Commissioning
Field Services

Minor Inspection

• Visual inspection of the gearbox
• Removal of inspection cover
• Visual inspection of teeth
• Soft blue tooth contact
• Backlash check
• Levelling Check
• Alignment check
• Service report
Field Services

Major Inspection

- Visual inspection of the gearbox
- Removal of instrumentation
- Removal upper housing
- Backlash & tooth contact check
- Removal of shaft lines
- Visual inspection of journal bearings
- Clearance check
- Dye penetrant inspection
- Magnetic particle inspection of gearing
- Replacement of parts if necessary
- Reinstallation of all parts
- Backlash and tooth contact check
- Levelling & alignment check
- Service report