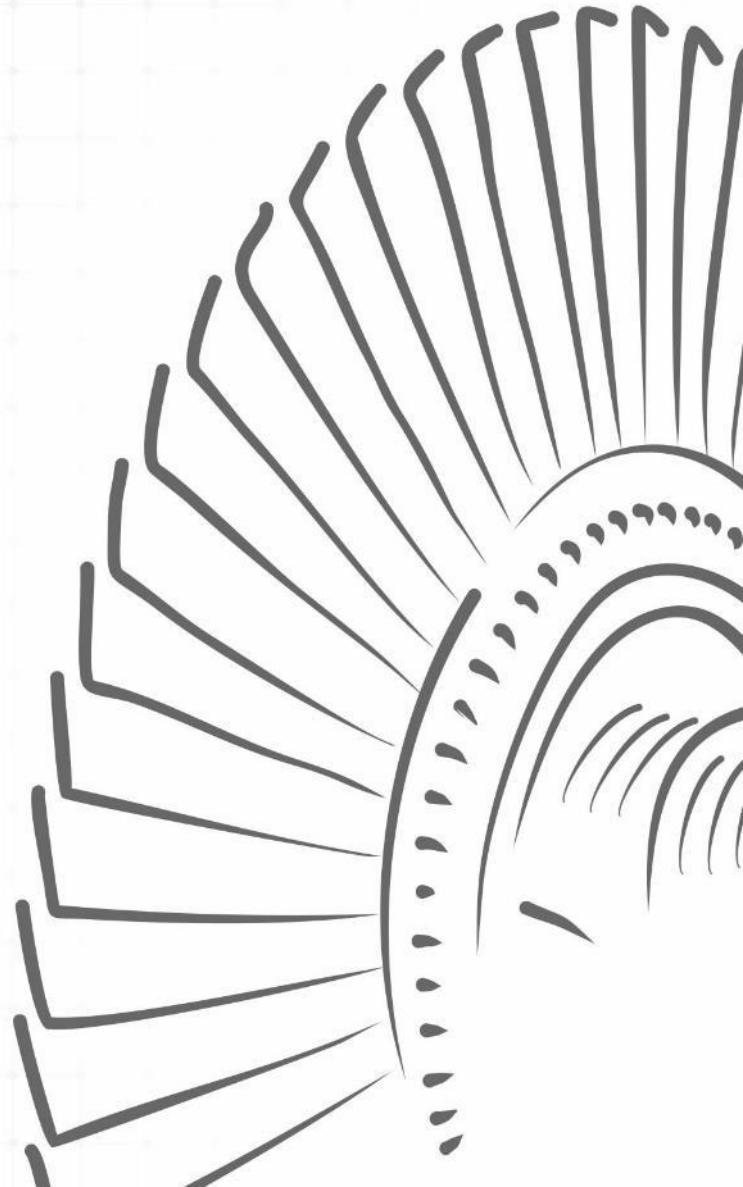
Triveni TURBINES

Reference Supplies/Case studies

All Supplies

www.triveniturbines.com



CASE STUDY - 1 KUWAIT INTEGRATED PETROLEUM INDUSTRIES CO.

Driven by: Triveni 4 Nos. 1.5 MW and 4 Nos. 2.7 MW Steam Turbines as per API 612 + Shell DEP + AMEC FW Project Variations

KIPIC البترولية المتكاملة Al-Zour Refinery Project

2.7 MW Steam Turbine

- Steam Turbines designed, manufactured & tested as per API 612 6th edition + Shell DEP + AMEC FW Project variations at TTL Bengaluru (Peenya – Unit #1) works
- 4 x 1.5 MW and 4 x 2.7 MW Steam Turbines drive 4 nos. each Combustion Air Blower and Flue Gas Fans respectively for the world's largest reformer package (once commissioned)
- Project executed with bare minimum deviations to complete project specifications
- Turbines Designed for outdoor installation with MDMT suitable for -30°C
- Electrical Hazard Area Zone 1, II C, T3

1.5 MW Steam Turbine

- Steam Turbines constructed in full compliance with Shell DEP / AMEC PV requirements for Human Factor Engineering
- Steam Turbines constructed for long service life of 30 years and uninterrupted operation of 6 years
- Steam Turbines, Gear Units, Lube Oil Units, Unit Control Panels, Gland Steam Condensers in Triveni Scope of supply

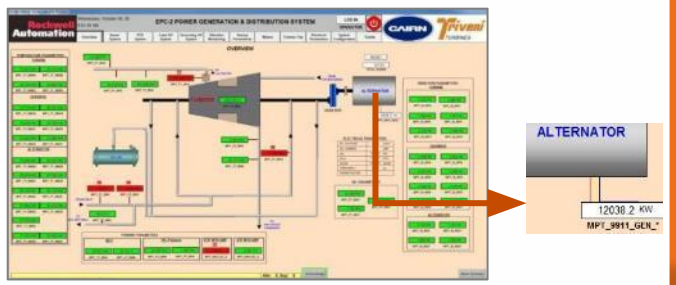
CASE STUDY - 2 CAIRN ENERGY INDIA PTY. LTD.

Powered by: Triveni 5 Nos. 12 MWe Steam Turbine Generator Sets as per API 612

12 MWe Steam Turbine Generator during installation

- Steam Turbines inlet steam 41.35 bara, 370 Deg C as per API 612 commissioned during 2008-09, 2014
- Gear boxes as per API 613 | Lube oil system as per API 614
- Air Cooled Oil Cooler as per API 661
- PLC – Alan Bradley (Failsafe) with redundancy and SIL-3 rating
- Machine Monitoring System (MMS) Bentley Nevada model 3500 series with System 1 Analysis system
- 12 MW AC Generator, IP 54 enclosure, Class F Insulation, Air cooled CACA, 50 Deg C Ambient

DCS Screen shot showing achievement of performance



CASE STUDY - 3 LAVAN OIL REFINING COMPANY

Powered by: Triveni 4 Nos. 7 MWe Steam Turbine Generator Sets as per API 611

7 MWe Steam Turbine Generator during installation

- Steam Turbines inlet steam 41 bara, 380 Deg C as per API 611 commissioned during 2012-13
- Lube oil system as per API 614
- Surface Condensers suitable for Sea Water Cooling (Cu-Ni Tubes)
- PLC – Siemens S7 400-FS (Failsafe) with redundancy and SIL-2 rating
- Machine Monitoring System (MMS) Shinkawa, Japan model VM-5 with RV-100 Analysis system
- 7 MW AC Generator, IP 54 enclosure, Class F Insulation with Sea water cooled Air cooler (Cu-Ni tubes)

Training Session for Lavan Operators & Maintenance staff at site

CASE STUDY - 4 PETRONAS MALAYSIA

Drive Solution by: Triveni 1 Nos. 1100 kW Boiler FD fan drive Single-stage turbines as per API 611

1.1 MW Steam Turbine Steam Testing at Triveni Factory

For Petronas, Malaysia-

Steam Turbines inlet steam 41 bara, 360 Deg C and exhaust at 5.1-5.5 bara as per API 611 commissioned during 2021

- Lube oil system as per API 614
- Driving Boldrocchi forced draught Fan for a critical package
- Tilting pad bearings
- Solid forged rotor

CASE STUDY 5 -KOREA ZINC LTD, SOUTH KOREA

Powered by 23.9 MWe Steam Turbine Generating Set

Project Highlights

- Korea Zinc Co. Ltd is world's No.1 producer of Zinc with production of 1.14 million tons of Zinc an year
- The requirement was to operate turbine in both, superheated (45 bar, 450 Deg C, 100 TPH) and saturation steam (40 bar, 250 Deg C, 100 TPH) case which have inlet from 3 different sources

Challenges

- The delivery time for the turbine was 7.5 Months FOB basis
- The last stage blades are designed to withstand the wet steam and provisions made to remove the water by providing water pockets in last stages for saturation case operation
- Triveni Turbines' high efficiency impulse - reaction steam turbines will increase complete plant efficiency

CASE STUDY 6 -KARADENIZ HOLDINGS, TURKEY (WORLD'S FIRST & LARGEST FLOATING POWER PLANTS)

Powered by 12 Nos x 16 MWe Steam Turbines delivered

Project Highlights

- **Application:** World's first floating power plant, Karadeniz owns a large fleet a such Ships. Each ship with power output of typically 100 to 300 MWe

- **Primary Process:** Top cycle with Gas/Diesel Engine and Bottoming cycle with Steam Turbines. The ship can be taken to any country where there is a power shortage, supplied with Diesel or Gas and gets Electricity as power output
- **Value Addition:** Supply of Reliable Low Inlet Steam pressure, High Volume steam Turbine Generators for their 12 fleets (12 projects) - 16 MWe x 12 Nos (192 MWe)

CASE STUDY - 7 IOCL DUMAD – ATLAS COPCO

Drive Solution by Triveni : 1 no. Steam Turbine Generator cum Compressor Drive as per API 612

MRT of Steam Turbines Testing at Triveni Turbine Ltd Factory

- The steam turbines supplied successfully for IOCL DUMAD- TECHNIMONT EPC and WORLEY as PMC.
- Turbine is rated 3.6 MW and is driving an induction generator / motor (BHEL make) and an air compressor (Atlas Copco make)
- Turbine is equipped with sophisticated governing & control systems such as Woodward FT 5009 TMR Governor, MOOG Hydraulic actuator.
- Instrumentation is suitable for Zone 1, IIC, T3 and for high humidity atmosphere
- Common base frame as per API RP 686 for Steam turbine.

CASE STUDY - 8 IOCL BARAUNI – TECHNIP ENERGIES

Drive Solution by Triveni : 4 Nos Steam Turbines for pump drives as per API 611

Project Highlights

- The steam turbines of following ratings are executed with Technip Energies , Mumbai , IOCL Barauni is the end user

  1 x 22 kW , 3000 Rpm
  1 x 55 kW , 3000 Rpm
  1 x 90 kW , 3000 Rpm
  1 x 255 kW , 3000 Rpm

- API 611 Steam turbine with Mechanical governor and pneumatic ON/OFF valve

- Steam Pressure - HP to MP (44kg/cm2g to 17 kg/cm2g)

CASE STUDY - 9 PEMEX REFINERY – FLOWSERVE (ARGENTINA, MEXICO)

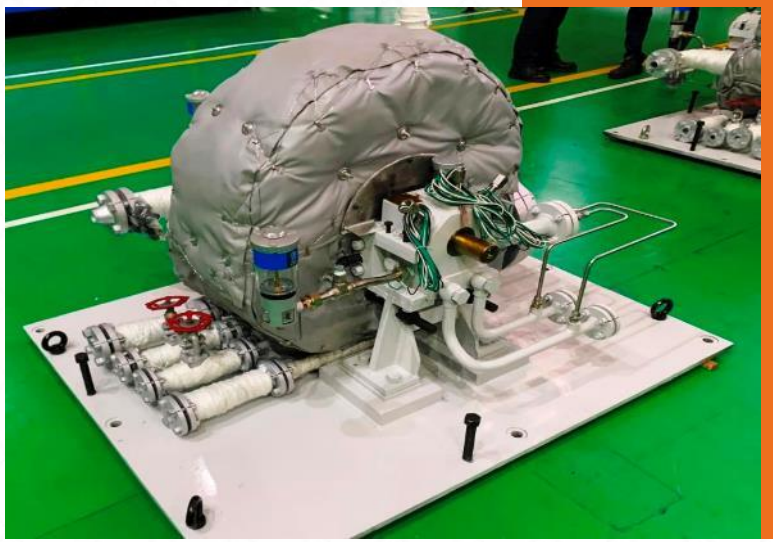
Drive Solution by Triveni : 12 no's Steam Turbines for Various pump units as per API 611

Project Highlights

- The steam turbines of following ratings are executed with **Flowserve Mexico & Argentina**, ICA FLUOR is the EPC. PEMEX is End User

  - 2 x 37 kW
  - 3 x 200 kW
  - 3 x 1300 kW
  - 2 x 1200 kW
  - 2 x 110 kW

- API 611 Steam turbine with Peak 200 governor & Pneumatic actuator



CASE STUDY - 10 SAUDI ARABIA– MEPCO, JEDDAH

Solution by Triveni : 1 x 9 MW + 2 X 15 MWE Steam Turbine Generating Set

Project Highlights

Total 3 turbines installed at site

Package 1 : 2 x 15 MW

Package 2 : 1 x 9 MW

- MEPCO, Jeddah is the largest Paper Mill in Middle East.
- The steam is used for generating power with (2 x15 MWe and

1 x 9 MWe) Extraction condensing machines and then taken to produce paper.

- 30 % Energy saving because of cogeneration.
- Successfully completed 10 years of operation in Saudi Arabia, Extremely happy client.

CASE STUDY - 11 SAUDI ARABIA– AL MASIRAH INTERNATIONAL

Solution by Triveni : 2 x 8.5 MWe Extraction Condensing steam turbine

Project Highlights

- Al Masirah Starch & Chemicals was established for the production of Starch & Chemicals. The facilities are situated in Yanbu Industrial area.
- 2 x 8.5 MWe Extraction Condensing steam turbine. These turbines to be commissioned in Feb'20.
- With the satisfaction and trust in Triveni by MEPCO their sister company, Al Masirah Starch & Chemicals ordered 2 x 8.5 MWe Extraction Condensing STGs for their new plant in Yanbu

CASE STUDY - 12 SAUDI ARABIA– GERMAN SAUDI, SAUDI ARABIA

Drive Solution by Triveni : 2 x 300 KWe Backpressure steam turbine

Project Highlights

- This is for 2 X 300 KW Blower drive
- Complete unitization in TTL facility.
- Live steam MRT coupled with blower.