Steam Turbine & Generators

Modernizations & Upgrades

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14th September 2023 | STG Customer Days @ NBG



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Revamps & Footprints

Levers for efficiency increase

1. Steampath developments (last 30 years)

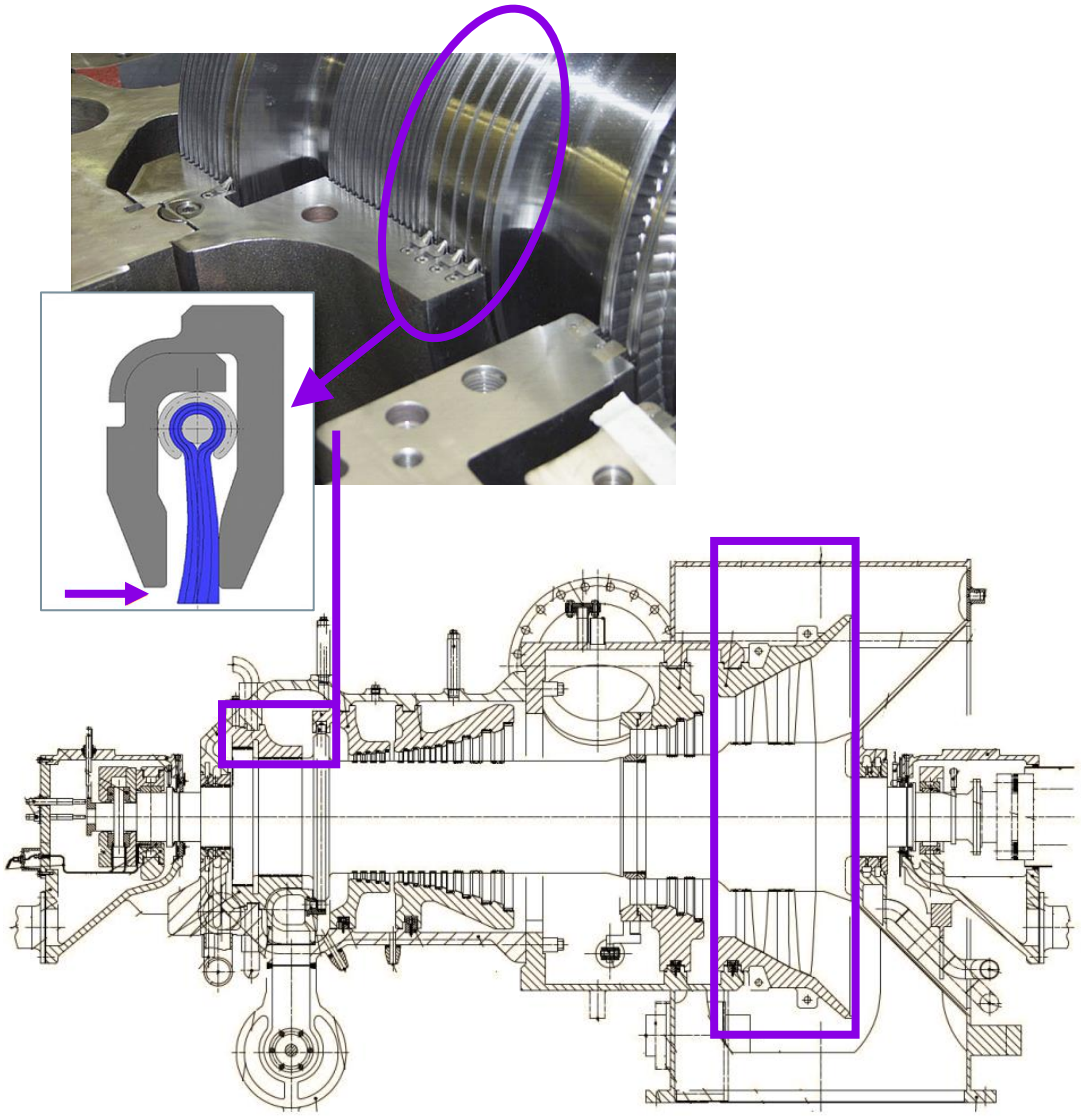
- Shrouded blades — 5 – 7%
- Twisted 3-D Blading
- High Performance LP-Blading Sections — **1 – 3%**
- Improved Seals (Abradable & Brush)
- Improved Valves — 1%
- Increased live steam parameters & Reheat

2. Steampath Optimization for loadpoint profile

Avoid Partload — 5 – 30%

3. Optimization of Plant

Combined HEAT and Power Generation — → 2x MW th



Revamps & Footprints
Solutions developed from the Core

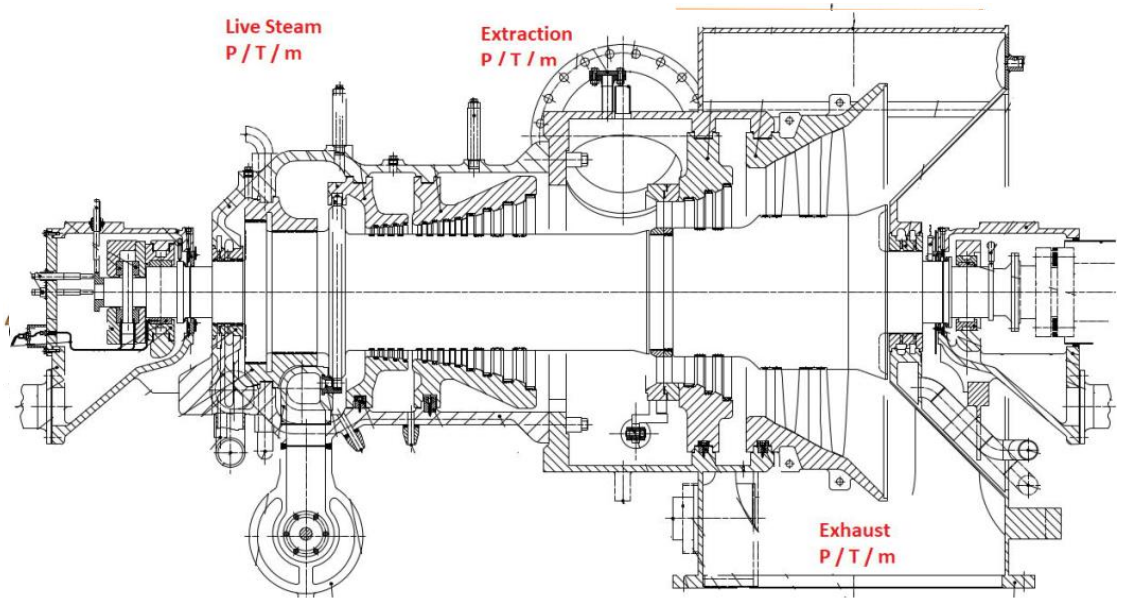
Start: Change in Loadpoints/ Steamparameters

Options

1. Modification in Steampath – Blades and Valves
2. Revamp – New Rotor-Stator Set
3. Footprint – New Core Turbine

Criteria for scope

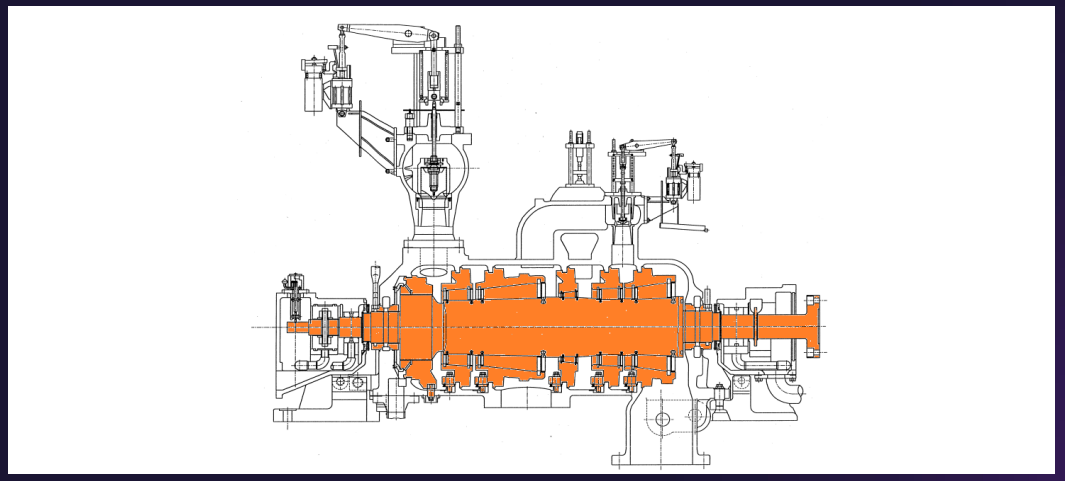
- Technical suitability of reused hardware
- Condition of existing turbine
- Time available for turnaround

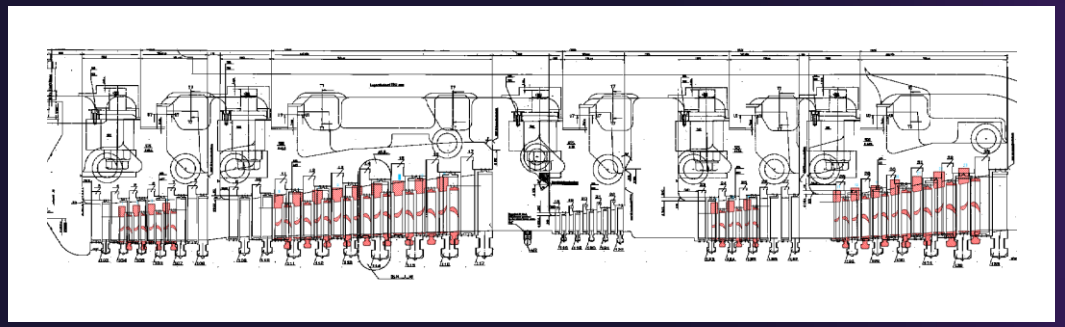


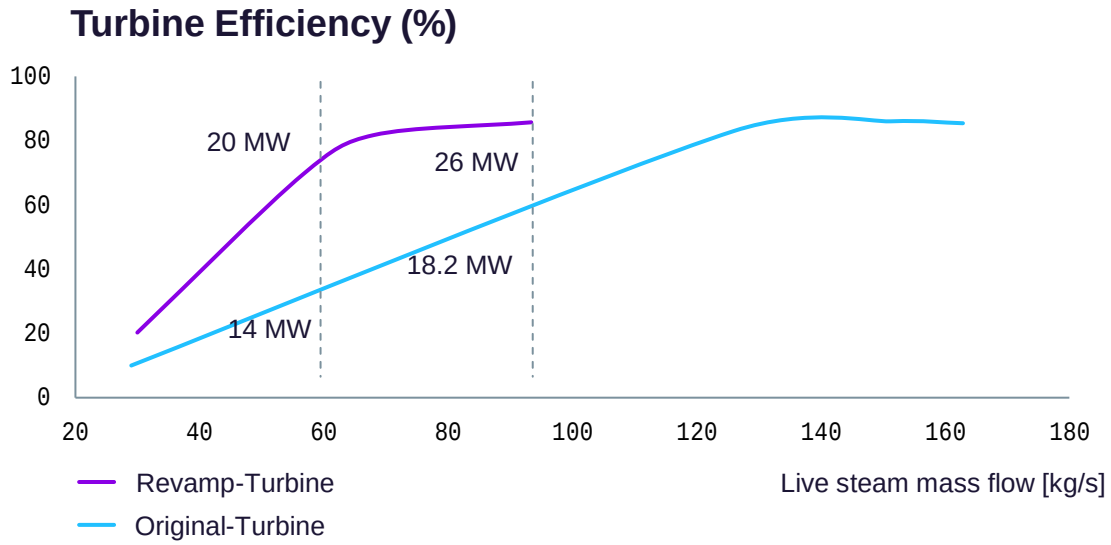
Loadpoint Optimization

46 MW Turbine Generator Drive (US)

- Operated at 30 – 50 % of Design Capacity
- New downsized Rotor-Stator Set – 26 MW rated







Customer Benefits

- Efficiency increase 20 – 30% | + 6 MW typical
  - +48,000 MWh/a equivalent + $2.4 m/a
  - Decarbonization ~20,000 to CO_2/a
- Turbine revamp with <2 years ROI
- Reduced cost and downtime in MaO

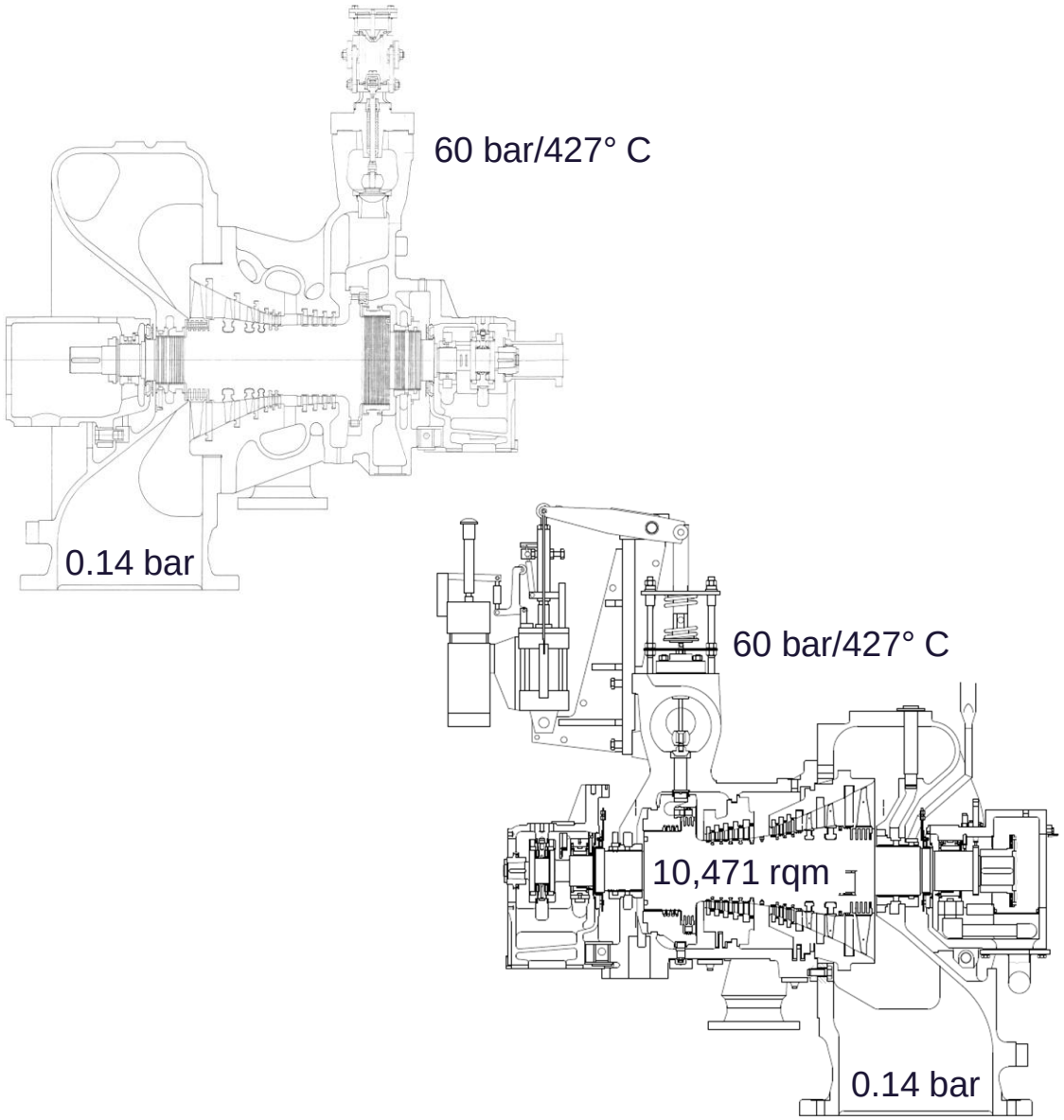
Case Study
Footprint K801 -2/WK40/36 -3

Compressor Drive – Condensing Turbine 24 MW

Targets of Modification
- 17 % power increase to 28.2 MW
- Lifetime extension
- Reduction of turnaround time (casing repairs)
- Improved maintenance with guide blade carriers

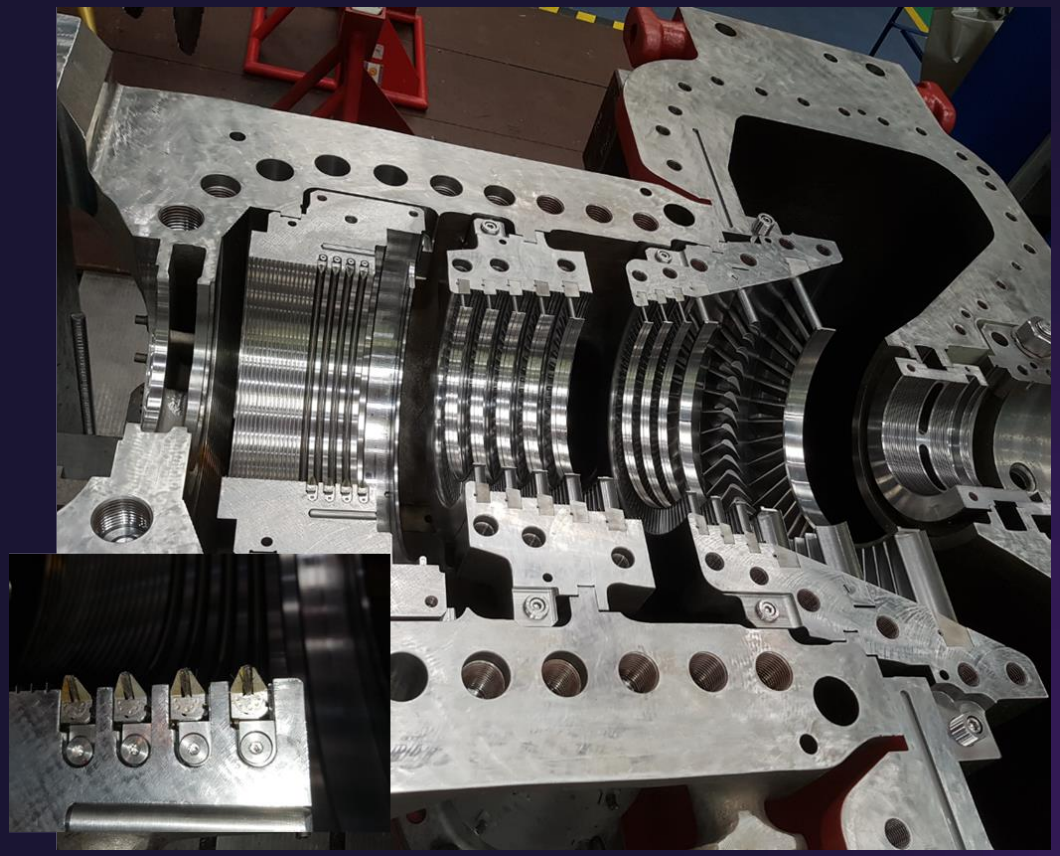
New Turbine type NK32/36 -7 customized
- Reuse of bearing pedestal
- Maintaining turbine interfaces

Footprint turbines can be designed on combinations of various turbine type elements historic and latest technology.



Footprint NK32/36 -7/WK40/36 -3

Steampath at final assembly



PDMS Model – Arrangement and Piping

