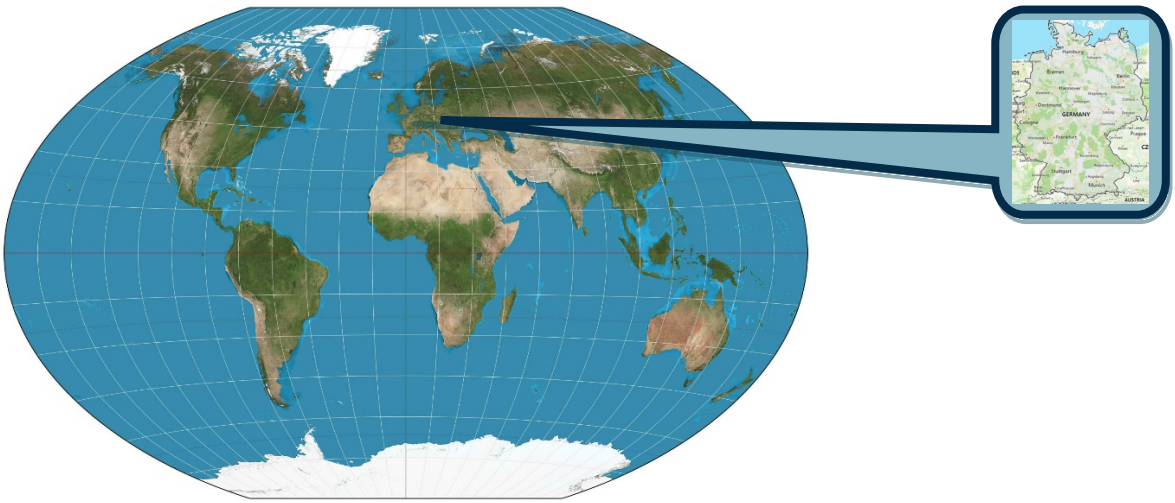
PIC PRECISION ICEBLAST CORP **HRSG DEEP CLEANING™**
by PRECISION ICEBLAST CORPORATION

COMBINED CYCLE POWER PLANT **Germany**
Post Cleaning Summary



BACKGROUND:

- 2003 Commissioned
- Natural Gas
- Horizontal Gas Flow
- Base load
- No cleaning history
- 2013 June: PIC Deep Cleaning
- 4.5 Modules Cleaned
- 20 rows largest module 3 m depth

HRSG	GT & Design	Output
• Nooter Eriksen • Triple wide (90’ x 36’)	• Siemens SGT5 4000F GT • KN Steam Turbine • 1 X 1	• 278 MW GT / 147 ST • 425 MW Total

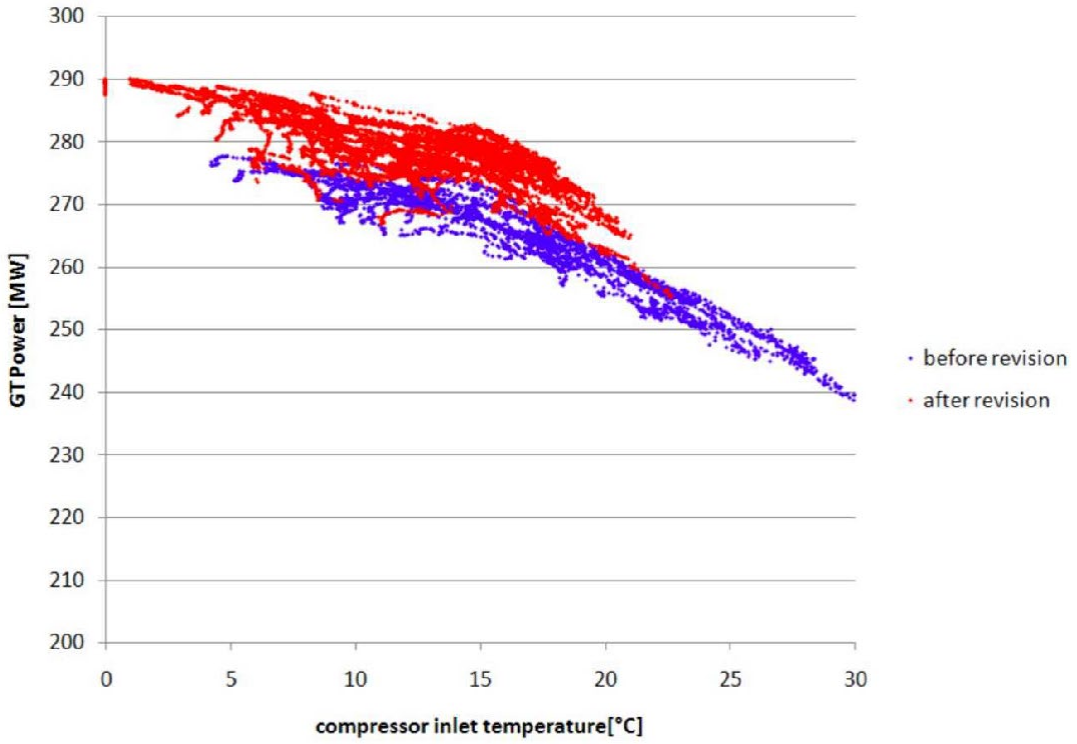
ASSESSMENT: HRSG fouling causing issues

- Loss of MW output from design
- Low GT efficiency
- Increased back pressure on gas turbine
- Shut-off set point of back pressure limits load of GT, especially in winter months

CLEANING RESULTS: Benefits to the Plant

Output

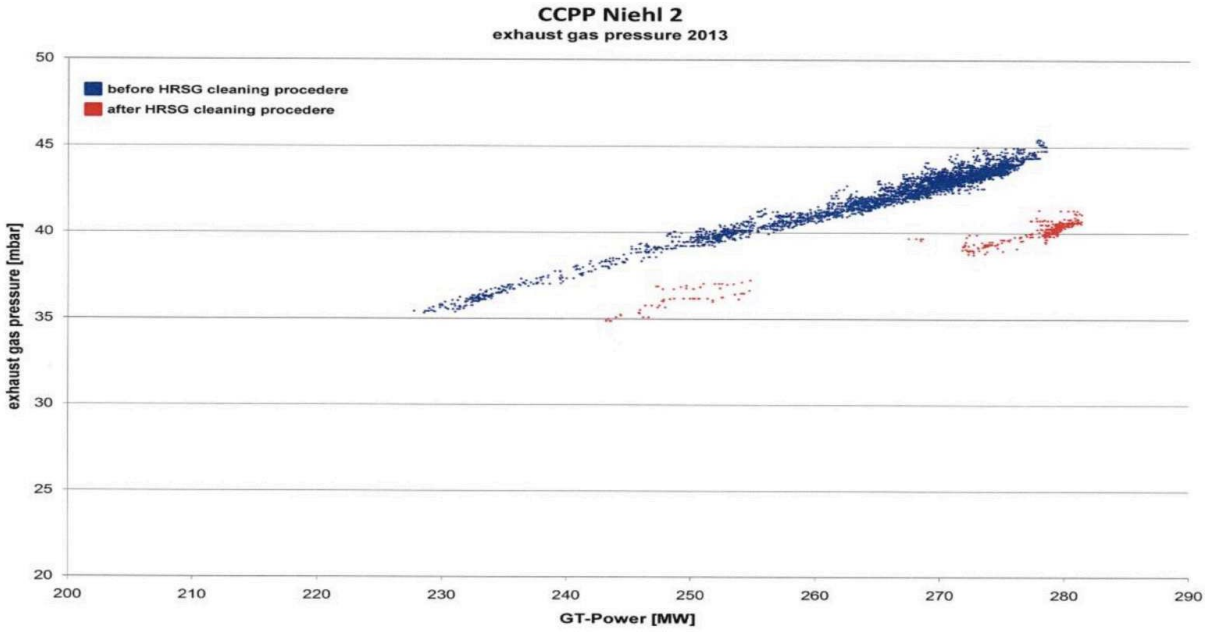
Before	After	Change
n/a	n/a	+ 15 MW



GT Back Pressure

	Before	After	Change
GT	45 mbar	40mbar	-5 mbar

- Design Back Pressure was 38mbar at 278 MW therefore 71.43% return to design from cleaning



FINANCIAL BENEFITS:

Fuel Savings

Impact Fuel Savings	Fuel Savings	Annual Savings Estimate
n/a	n/a	n/a

Increased Output Revenue

Increased Output	Estimated US $ / MW	First Year Revenue Increase
+ 5.4 MW	$117.00	$14,708,717.00 USD

- (350 days x 24 hr/day x 15 MW/hour x $117.00)

SUMMARY:

- The plant no longer was concerned about tripping in the winter months
- Financial benefits would have been realized much sooner and this plant should have cleaned after 5-6 years of operation and had not left it for 10 years
- The payback on cleaning was extremely fast and the plant should have cleaned years earlier

Dear Sirs,

Attached please find an evaluation regarding back pressure decrease after the HRSG cleaning procedere. We estimate: about 4 mbar.

The original back pressure after plant erection in 2003 was 38 mbar at 279 MW. Back pressure before cleaning procedere was 44...45 mbar. Actually it is about 40 mbar.

Now we do no longer expect the risk of approaching pressure limits for gasturbine shut-down in winter season.

Thanks for the good job!

Kind Regards

Christian Baßow