E.ON | Anlagenservice

Journal

Customer Magazine E.ON Anlagenservice GmbH

Edition 1, **October** 2002

Right up to standards

In Germany also, there is a continual trend towards outsourcing. Through organizational changes and the requirement to clearly define the tasks of business units, a growing number of companies have been regarding a cooperation with service partners as an attractive alternative.

In the field of plant/installation engineering, in particular, it has become an established fact that overhaul and repair work can often be carried out better, faster and, last but not least, cheaper by using external service companies. Provided that the right partner was chosen.

Due to the economic trend and the necessity involved to apply cost-cutting measures, maintenance intervals have become increasingly longer and companies are quite reluctant when it comes to new investments.

That is the reason why manufacturers as well tend not to keep spare parts in stock. Another determinant is the fact that components are generally produced abroad. In case of damage, the plant operator is often faced with high costs and, above all, with long waiting periods.

E.ON Anlagenservice GmbH has acknowledged these facts. Based on our experience from the operation of large-scale plants and our knowledge regarding the consequences resulting from long-term downtimes, we consider cost-efficiency our main priority.

With this in mind, our specialist departments will always find the most efficient alternative for the removal of damage. In this context, we offer the special advantage of repairing parts or manufacturing complete new ones for components which cannot be purchased any longer or which are not available on short call.

The customer's staff expenses are thus reduced to the checking of results. And they are impressive.

TÜV CERT

ZERTIFIKAT

Die TÜV CERT-Zertifizierungsstelle
der RWTÜV Systems GmbH

bescheinigt gemäß
TÜV CERT-Verfahren, dass das Unternehmen

e·on Anlagenservice

mit den Stützpunkten Aschaffenburg, Gelsenkirchen, Irsching, Landesbergen, Wilhelmshaven sowie der Zentrale

für den Geltungsbereich

Instandhaltung, Reparatur und Wartung
von Industrieanlagen

ein Qualitätsmanagementsystem eingeführt hat
und anwendet.

Durch ein Audit, Bericht-Nr. 20540772

wurde der Nachweis erbracht, dass die Forderungen der
DIN EN ISO 9002 : 1994

erfüllt sind. Dieses Zertifikat ist gültig bis 14.12.2003

Zertifikat-Registrier-Nr. 0410091316

DAR TGA-ZM-30-96-00

Essen, 16.07.2002

RWTÜV

TÜV CERT-Zertifizierungsstelle der RWTÜV Systems GmbH

DIN EN ISO 9002

Due to a change of the certification standard, we will upgrade our certificate in compliance with DIN EN ISO 9002:1994 to a certificate in compliance with DIN EN ISO 9001:2000 in the year 2003.

Our present system, to a great extent, already meets the requirements of the new standard. Only a few minor changes will have to be made in the area of characteristic numbers, analyses, and efficiency evaluations.

Regarding our current internal audits, we are therefore able to focus on the implementation and effectiveness of the specified requirements.

Qualifying for welding and testing

TÜV CERT

ZERTIFIKAT

Die Zertifizierungsstelle des RWTÜV
bescheinigt hiermit, daß das Unternehmen
E.ON Anlagenservice GmbH
Bergmannglückstr.41-43, 45896 Gelsenkirchen

mit den Stützpunkten
- Aschaffenburg (SAb)
- Gelsenkirchen (SGe)
- Irsching (SIr)
- Landesbergen (SLb)
- Wilhelmshaven (SWh)

den Nachweis über die Erfüllung
der Voraussetzungen nach

AD-Merkblatt HP 0, TRD 201, TRR 100, VbF
und DIN EN 729 -2
erbracht hat.

Die Voraussetzungen für eine sachgemäße Fertigung entsprechend den vorgenannten Technischen Regeln sind gegeben:

Insbesondere verfügt die Firma über:

- Fertigungs- und Schweißeinrichtungen,
- Schweiß- und Schweißaufsichtspersonal,
- Prüfeinrichtungen,
- Prüf- und Prüfaufsichtspersonal,

in dem in der Betriebsbeschreibung aufgeführten Umfang.

Essen, 07.12.2001 Registrier-Nr.: 04 702 6468
4.3-3458/98

RWTÜV

We have been certified as a manufacturing and repair company for facilities and components requiring special supervision according to AD-code of practice HP0, TRD 201, TRR 100 and VbF in connection with the standard DIN EN 729-2 (comprehensive quality demands for welding) and, at the same time, as a specialist company according to § 19 l of the German Water Resources Act. The certificates are valid for all maintenance division bases.

The certificated application forms, in compliance with the requirements of standard DIN EN 729-2, describe and prescribe all issues regarding welding tasks. Standard DIN EN 729-2 is the direct update of the process description of DIN EN ISO 9000ff:1994 or DIN EN ISO 9001:2000. They are comparable regarding their contents. As a result of meeting the requirements of this standard, the foundation was laid for the pressure vessel guideline (DGRL) which has been applicable since the end of May 2002.

Regarding welding tasks in the field of power plant technology, we have the important procedure qualifications for the pipe steels 16Mo3, 10CrMo9-10, 14MoV6-3 to X20CrMoV12-1. We have also been qualified for the material P91 (X10CrMoVNb9-1) and for duplex steels (X2CrNiMoN22-5-3).

This requires the respective equipment, tool, and machine standardization, as well as a certificate of proper storage of all necessary base materials and weld filler metals.

The welding supervising staff has been trained in the important non-destructive testing procedures (penetrant tests,

FACHBETRIEB
RWTÜV
BETREUT VOM TÜV

URKUNDE

Hiermit wird bestätigt, dass die Firma

E.ON Anlagenservice GmbH

Bergmannsglückstr. 41-43, 45896 Gelsenkirchen

mit den Stützpunkten

- *ASCHAFFENBURG (SAb)*
- *GELSENKIRCHEN (SGE)*
- *IRSCHING (SIr)*
- *LANDESBERGEN (SLB)*
- *WILHELMSHAVEN (SWH)*

gemäß § 19 ℓ Wasserhaushaltsgesetz als Fachbetrieb

überprüft und anerkannt ist.

Der Geltungsbereich der Überprüfung ist dem

Überwachungsvertrag vom 08./09.-12.09.2001 zu entnehmen.

Essen, den 17.12.2001

RWTÜV e. V.
Dampf- und Drucktechnik,
Fertigungsüberwachung Essen

Dipl.-Ing. Gottschalck

magnaflux tests, and the evaluation of radiographs) examined in compliance with DIN EN 473. They are therefore qualified to carry out such tests independently and parallel to the respective repair work. In this connection, priority is given to the quality of the product and the quantity of performance.

We furthermore have the full-scale proof of competence according to DIN 18800 part 7 supplemented by the proof of competence regarding the manufacturing of crane components according to DIN 15018 and components made of fine-grained steels up to a yield strength of 460 N/mm².

We are therefore qualified to manufacture all components for applications requiring special supervision and which are subject to inspections by the building supervisory authorities. This comprises power plant steel structures, boiler pipes and components, as well as steel structures in the field of hydraulic engineering and chemical plant facilities.

We have more than seventy certified welders at hand from all bases trained for a large range of specialist tasks in the field of high pressure, boiler, piping, structural and plastic applications.

GSI SLV DUISBURG

Großer Eignungsnachweis
Comprehensive Form of Verification

Dem Unternehmen / It is hereby certified that the firm	e•on Anlagenservice GmbH
wird für den Betrieb in / in the plant	45896 Gelsenkirchen, Bergmannsglückstr. 41-43

bescheinigt, daß er geeignet ist, Schweißarbeiten im folgenden Anwendungsbereich durchzuführen: / is qualified to carry out welding works in the following fields of application:

Normen/Vorschriften / DIN-Standards/Regulations	DIN 18800-7 DIN 15018
Schweißprozesse / Welding Processes	Lichtbogenhandschweißen, 111 (E) teilm. Metall-Aktivgasschweißen, 135 (tMAG) teilm. Metall-Aktivgasschweißen mit Fülldrahtelektrode, 136 (tMAG) Gasschweißen, 311 (G) Wolfram-Inertgasschweißen, 141 (mWIG)
Grundwerkstoffe / Parent Metals	S235, S275, S355 nach DIN EN 10025, S460N/NL nach dem jeweils gültigen Zulassungsbescheid des DIBt
Einschränkungen/Erweiterungen / Restrictions/Extensions	keine
Schweißaufsichtsperson (Name, Vorname, Geburtsdatum; Beruf) / Welding Coordinator (Name, christian name, date of birth, profession)	Dipl.-Ing. Büge, Heinz, geb. 21.06.1952, SFI (DVS)
Vertreter (Name, Vorname, Geburtsdatum; Beruf) / Deputy (Name, christian name, date of birth, profession)	entfällt
Bemerkungen / Remarks	s. Anlage
Geltungsdauer / Validity	01. Juni 2004
Eignungsbescheinigungs-Nr. / Verification Certificate No.	2001.0181
ausgestellt am / issued on	05. September 2001 Arnz/Ms
Allgemeine Bestimmungen / siehe Rückseite / General requirements p.t.o.	

Schweißtechnische Lehr- und Versuchsanstalt SLV Duisburg
Niederlassung der GSI mbH

Siegel / Seal

Unterschrift(en) / Signature(s)

Schweißtechnische Lehr- und Versuchsanstalt SLV Duisburg
Niederlassung der GSI mbH
Postfach 101262 · 47012 Duisburg / Bismarckstraße 85 · 47057 Duisburg
Tel. 0203/3781-0 · Fax 0203/378128 · Internet: www.slv-duisburg.de
Gruppe Güteslcherung Fax 0203/38 05 69

Mitglied im DVS – Deutscher Verband für Schweißen und verwandte Verfahren e. V.

DVS

TÜV CERT

ZERTIFIKAT

Die TÜV CERT-Zertifizierungsstelle für Managementsysteme der RWTÜV Systems GmbH

bescheinigt gemäß
TÜV CERT-Verfahren, dass das Unternehmen

e·on Anlagenservice

mit den Stützpunkten Aschaffenburg, Gelsenkirchen, Irsching, Landesbergen, Wilhelmshaven sowie der Zentrale

für den Geltungsbereich

Instandhaltung, Reparatur und Wartung von Industrieanlagen

ein SCC-System eingeführt hat
und anwendet.

Durch ein Audit, Bericht-Nr. **20541587**
wurde der Nachweis erbracht, dass die Forderungen des Regelwerkes

SCC**

erfüllt sind. Dieses Zertifikat ist gültig bis **08 / 2005**
Zertifikat-Registrier-Nr. **04 106 009**

TGA-ZM-40-96-62

RWTÜV

Essen, 27.08.2002

RWTÜV

TÜV CERT-Zertifizierungsstelle
für Managementsysteme
der RWTÜV Systems GmbH

We bank on proficiency

- **specialist qualification**
- **logical thinking**
- **reliable methods**
- **full commitment**

our crew

It goes without saying that the continuous optimization and qualification process in all service areas is our top priority.

This is the only way to ensure the development of our staff's skills and know how parallel to the continuously growing demands of our business.

Our master craftsmen, technicians, and engineers always accomplish their tasks proficiently. From all bases, specialists are available for unusual challenges.

Above that, high-standard work safety regulations play an important role.

E.ON Anlagenservice was the first German business unit within the E.ON Energie group to be certified in compliance with the international Work Safety Management System

SCC
(Security-Certificate-Contractors)

Specialist firm in compliance with WHG § 19 l (German Water Resources Act) is expanding activities

In our company and in conformity with the TÜV (Technical Inspection Agency), we train specialists for the assembly and disassembly of overflow safety devices. This includes an annually recurring examination in four steps.

1. Participation in a two-day TÜV-course „Basics of the WHG (Water Resources Act)"
2. Participation in a one-day course „Basics of Plant Safety"
3. Participation in a one-day advanced course „Plant Safety through Overflow Safety Devices and Limit Monitors"
4. Participation in an annual review meeting.

The first course of this kind was the advanced course „Plant Safety through Overflow Safety Devices and Limit Monitors", which took place at the Aschaffenburg base for the bases Landesbergen, Wilhelmshaven and Gelsenkirchen.

On the basis of descriptive material and demonstration objects, the participants learned in which manner a certified specialist firm can ensure the right choice of overflow safety devices (ÜFS) and limit monitors (GWG) in compliance with § 19 l WHG with consideration of technical, safety- and business-related factors.

The lectures dealt with the statutory sources in compliance with the Water Sources Act (WHG), the Model Ordinance on installations for handling substances and specialist firms hazardous to waters (VawS), and the regulation concerning flammable liquids (VbF), as well selection criteria for overflow safety devices (ÜFS) and limit monitors (GWG), index by safety targets, storage fluids, and verifiability

This includes an equipment overview of overflow safety devices (ÜFS) and limit monitors (GWG), a comparison of the different physical measuring principles, capacitive, hydrostatic, radiometric or by vibration. In addition to that, it comprises safety-relevant principles when selecting and installing for overflow safety devices (ÜFS) and limit monitors (GWG) to prevent failures and damage.

This step-by-step training helps younger staff, in particular, to get familiar with the complex and sophisticated topic „Plant safety through the right selection of overflow protection and safety devices and limit monitors".

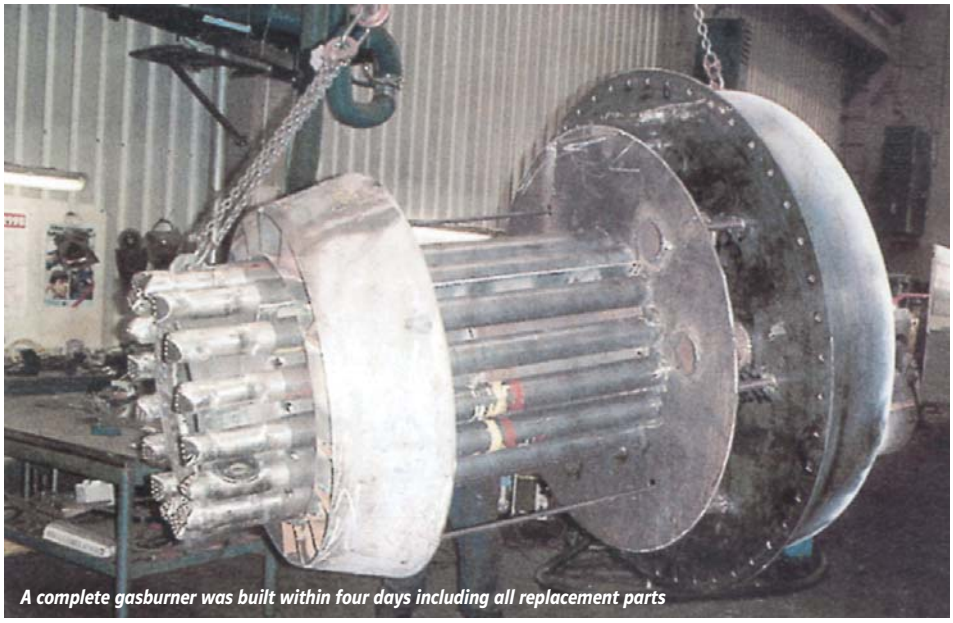
Smart solutions – measurable success

Site workshop

We work according to the motto: Complete and continuous handling of all tasks.

Our central workshop carries out shop-specific tasks as a supporting measure for the repair work of the mobile teams.

We save time and costs for our customers by reconditioning and manufacturing urgent spare parts for appliances and turbines.



A complete gasburner was built within four days including all replacement parts

In site workshop

Our valves and accessories team is on the road all over Germany with a complete workshop.

The service vehicle is equipped with a lathe, drilling machine and grinding table, as well as all grinding attachments for sliders and valves up to a nominal diameter of 400. Hoisting and lifting equipment are, of course, also part of the extensive workshop equipment.

This has a positive effect on the time schedule because our team has all the important tools at hand and is able to carry out repair work directly on the job site.

Electrical laboratory

Energy-related secondary equipment and systems are checked, tested and repaired in the laboratory and test fields. A service which often saves our customers the expenses for new equipment because more and more manufacturers are not willing any longer to perform repair work on what they consider unimportant structural groups and components (electromechanical-, analog-, digital- and MC technology).

The equipment meets state-of-the-art requirements. High-voltage test field up to 100,000 V and 6,000 A test current. PC-controlled testing equipment, a shielded test chamber, among e.g. for partial discharge measurements on high-voltage instrument transformers.

Tool and equipment warehouse

1,000 sqm of tools and equipment are available to our mobile teams.

For each individual contract, the required equipment is assembled from several thousand single parts and complete tool containers for specific tasks. The transport to the job site and back is organized on schedule after the contract has been closed.

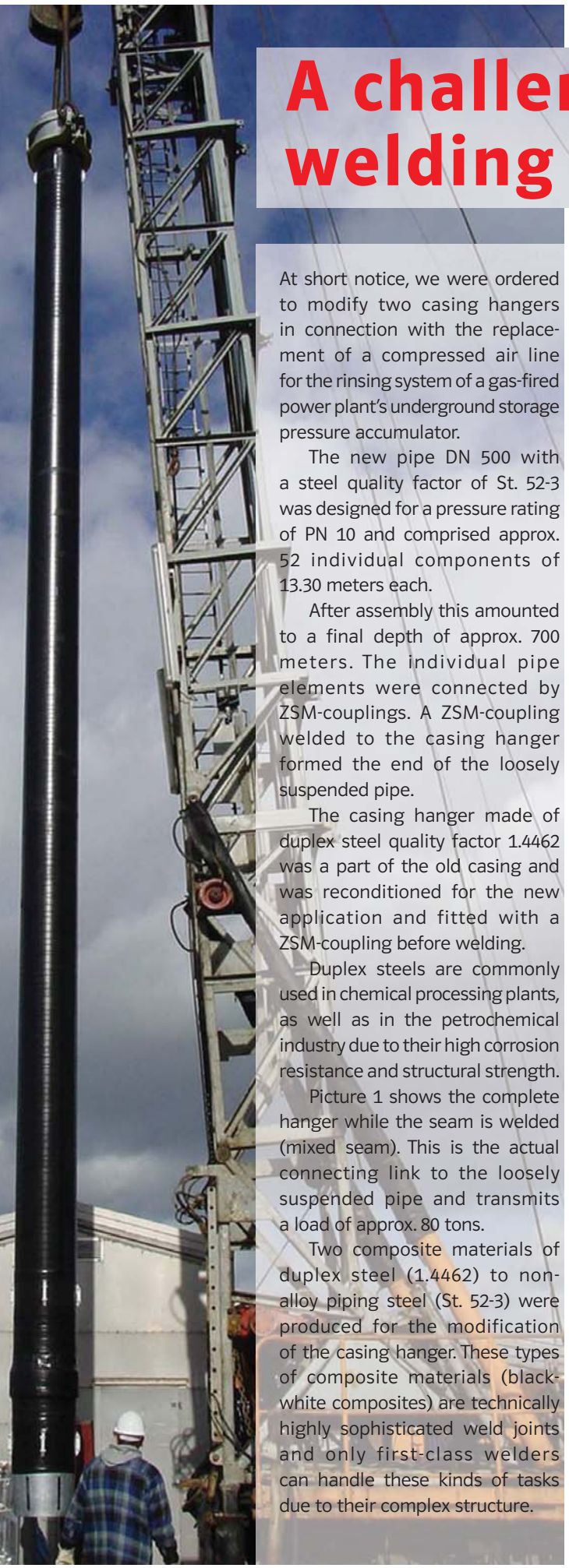
Regular maintenance and repair work ensures trouble-free operation for any type of application.

Working together without borders

Five bases ⟷ Five specialist fields ⟷ One team

Boiler technology
Mechanical engineering
Process technology
Electrical engineering
Instrumentation and control

Each base offers the complete scope of services and can supply the entire range of specialists.
Our staff is mobile and flexible. They are ready to serve wherever they are needed – in Germany and all over Europe.



A challenge for welding specialists

At short notice, we were ordered to modify two casing hangers in connection with the replacement of a compressed air line for the rinsing system of a gas-fired power plant's underground storage pressure accumulator.

The new pipe DN 500 with a steel quality factor of St. 52-3 was designed for a pressure rating of PN 10 and comprised approx. 52 individual components of 13.30 meters each.

After assembly this amounted to a final depth of approx. 700 meters. The individual pipe elements were connected by ZSM-couplings. A ZSM-coupling welded to the casing hanger formed the end of the loosely suspended pipe.

The casing hanger made of duplex steel quality factor 1.4462 was a part of the old casing and was reconditioned for the new application and fitted with a ZSM-coupling before welding.

Duplex steels are commonly used in chemical processing plants, as well as in the petrochemical industry due to their high corrosion resistance and structural strength.

Picture 1 shows the complete hanger while the seam is welded (mixed seam). This is the actual connecting link to the loosely suspended pipe and transmits a load of approx. 80 tons.

Two composite materials of duplex steel (1.4462) to non-alloy piping steel (St. 52-3) were produced for the modification of the casing hanger. These types of composite materials (black-white composites) are technically highly sophisticated weld joints and only first-class welders can handle these kinds of tasks due to their complex structure.

Picture 1

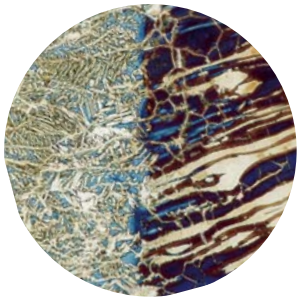
A composition metal similar to the base material, which is the higher-grade alloy (duplex steel), was used as weld filler metal.

The required ductility and strength of the welding joints were reached by means of adapted heat input per unit length of weld and low intermediate layer temperature.

Picture 2 shows the typical two-phase structure of a duplex weld joint. The two structural components ferrite and austenite can be clearly identified due to the difference in coloring. The polished section was made during our process inspection and testing work.

Our company puts a lot of emphasis on the use of high-quality materials and special alloys for welding tasks. In the future, our pool of highly qualified welders will be further enlarged. As knowledge carriers, they will be instrumental in developing the company's quality and performance profile.

Duplex structure (Two-phase structure)



Picture 2 *Microetch section - 100:1 (Color etching)*

In the mid eighties a hard coal-fired unit was built north of the German town Porta Westfalica. At present, this unit has the highest capacity in Europe at 865 Megawatt.

Overhaul in Europe's largest hard coal-fired monoblock

Six week were scheduled for the extensive overhaul of major and about 430 smaller components.

Additionally, more than 150 individual orders accrued during the overhaul period, which had to be processed in a rather short time.

This task presented a challenge for the base Landesbergen, which was in charge of this assignment.

A competence team was formed with specialists from different bases and the central workshop.

Apart from onsite overhaul and maintenance work on mills, fans, valves, accessories, and the turbine, two inspected fans, a 5 MW forced-draught fan and a 7 MW induced-draught fan built by Turbo-Luft-Technik (TLT) were disassembled and taken to the central workshop in Gelsenkirchen by heavy load vehicles where they were overhauled and then reassembled, balanced and re-commissioned.

164 Schoppe und Faeser (S&F) variable-speed drives were inspected and reconditioned.

The successful completion of the general contract within the prescribed time schedule has once again shown that the traditional pre-eminence of manufacturers can be broken down, resulting in benefits for all parties involved.

Teamwork was also required during the overhaul of a mill. A tight schedule of only 10 days had to be dealt with.

With pooled proficiency, the specialists from the bases Landesbergen, Wilhelmshaven, and Gelsenkirchen carried out the overhaul successfully and on time, as well as other repair tasks which, as a result of further inspections during the overhaul, had turned out as imperative.

Without the manufacturer's support, wear parts were replaced in the PF mill and repair work was carried out on the turbine-driven feed pump.

Always ready – round the clock – every day

On the spot

At 10 o'clock in the morning, there was an emergency phone call at the Aschaffenburg base from a power plant in Northern Germany. "The unit is down, we have a generator circuit-breaker failure."

Immediate action was required.

One hour later, a specialist for main circuit breakers was on the road and arrived at the customer's in the evening. Almost at the same time as the spare parts, which the project manager in charge had ordered in the meantime.

During a thorough inspection the following morning, a decomposing, hardened seal was found and replaced immediately.

After overhauling the three connected control units, the generator circuit breaker was operational that same evening.

The following morning a small inspection was carried out as a precautionary measure. It confirmed that the unit could continue operating until the next scheduled inspection.

The failure was dealt with, the customer was more than satisfied – the only cutback was the fact that our specialist had another 900 km of motorway ahead of him to get back home.

From right to left

It was just the traffic that presented some problems – not the work at the plant.

An English power plant had our switchgear specialist from the Aschaffenburg base flown in to inspect two groups of generator circuit breakers type HEC 3.

LK-push rod

Within one week, a complete inspection of the generator circuit breakers on both gas turbines GT 11 and GT 12 including leakage measurements, as well as dew point measurements of the SF6 gas was performed. It also comprised an inspection of the generator high-voltage terminal on the turbines GT 10 / 11 / 12 and 20.

Ground electrode drive

Joining elements and drive shafts of both generators were heavily corroded. The cause for this was the fact that the plant is exposed to the sea (outdoor plant). These parts are scheduled to be exchanged during the next overhaul.

For the E.ON AS specialist this will again mean changing over to left-hand drive.

Within one day

Fault report on a Saturday: „MPS grinding roller wear ring busted."

The cooperation between the bases in Aschaffenburg and Gelsenkirchen made it possible.

After a few hours only everything had been prepared for the necessary work and on Sunday morning a team started disassembling the classifier head and the grinder rollers.

The reassembly was completed only four days later and the coal handling plant was ready for use again.

It works ... fast, reliably, efficiently

„I've never seen anything like that", one of our customers stated in surprise when, after an FGD overhaul of the combustion line of a South German hazardous waste incineration plant, all flange connections, manholes, and covers were tight at the time of commissioning.

The complete overhaul was carried out under our direction without the plant manufacturer's support. The overhaul plan was, as usual, prepared in close cooperation with the customer. Determining the components which required overhaul work, was part of our assignment.

Within three weeks, a crew of eighteen staff members and two base managers from the Aschaffenburg base carried out repair work on scrubbers, containers, bag filters, pumps, flue gas ducts, ESP, flue gas dampers, rinse water pipes, and other procedural plant components.

It goes without saying that we also arranged and coordinated all required secondary work involving external companies.

The entire project was executed without any obstructions and on schedule, and above all, without any accidents.

Our customer was satisfied and immediately placed the next order with us.

Complex turbine overhaul in a hydroelectric power plant on the river Main

In this case the assignment referred to a Kaplan turbine with a blade wheel diameter of four meters, a maximum capacity of 2.9 MW, and a height of fall amounting to six meters.

These turbines are especially designed for rivers with a large volume of water and a small gradient.

Large Kaplan-turbines are usually installed vertically to allow the water to flow from the top to the bottom. The guiding water device consists of louvre-type blades. The objective of this device is to guide the incoming water masses to the blades of the blade wheel parallel to the turbine shaft.

These blades are hydraulically controlled. The blades of the guiding device, as well as the blades of the blade wheel are adjustable. They are adjusted to the fluctuations of the water flow and the gradient. Depending on the application area, Kaplan-turbines have three to six guide blades.

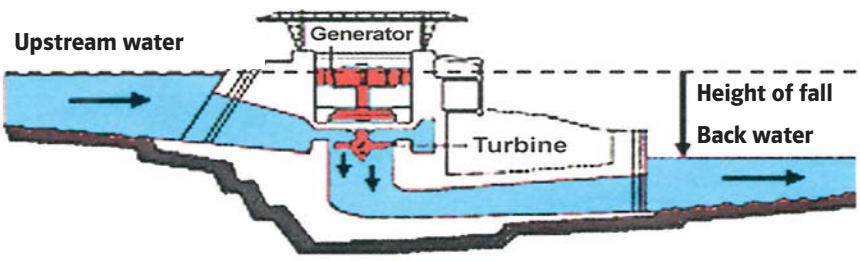
This type of project required thorough planning due to the need to award contracts to external companies e.g.- for special scaffolding or for the erection of dam panel, divers, and dredges.

Six weeks were scheduled for the overhaul and any arising repair work.

The results were satisfactory regarding the time schedule although diverse damage was not discovered until the overhaul and had to be repaired then.

The reconditioning of 24 guide blades of a Kaplan-turbine in a different hydroelectric power plant was professionally carried out by the same Aschaffenburg base crew.

Dis- and reassembly work, as well as comprehensive shop work and the manufacturing of new components were executed on time within a tight time schedule and the high quality demands of the customer were fulfilled in every respect.



Cost benefits through custom-made solutions

As a part of overhaul measures in a north German power plant, our central workshop reconditioned two swing check valves of the cold reheat line.

The bolt bearing of the check valve disk and check valve lever were worn down to 10 mm due to excessive strain and had to be replaced. A flush fit of the check valve disk resulting in an air-tight sealing of the check valve was no longer granted due to an insufficient function of the bearing.

The check valve, which is installed between the HP turbine section and the reheater, serves as a safety device in case of load rejection or turbine trip. When the safety valves are activated, the check valve prevents a backflow of the reheater steam to the HP turbine section.

In view of the high mechanical stress, a custom-made solution was selected for the maintenance work. It involves a transmission of the occurring forces and moments through a combination of squeezed and weld joints.

Picture 1 Valve lever with installed bearing bush

The assembly of bolts and check valve disk or bearing bush and check valve lever respectively was accomplished by using a squeezed joint (shrink-expansion joint) of the fit series H6/s7 (Picture 1). The components were connected by heating the check valve disk or the check valve lever respectively and by cooling down the bearing bolt or the bearing bush respectively.

This connection ensures a centric positioning of the transmitting elements.

A special alloy containing nickel was used as weld filler metal. Due to a special build-up sequence, as well as an adapted welding sequence, a subsequent heat treatment of the components was not required.

The weld deposit including the fusion line (phase boundary to the base material) can be considered structure-stable under operating conditions (max. 450 °C).

The weld preparation was carried out according to the composite materials, weld filler metals, and welding process (111/electrode manual welding).

The following materials were combined:

Composite materials		
1 Check valve disk of material 13CrMo 4-5	with	bearing bolt of material 13CrMo 4-5
2 Check valve levers of material GS 17CrMo 5-5	wirh	bearing bush of material 13CrMo 4-5

Quality control of the weld seams

After the mechanical treatment, the components were checked for cracks by liquid penetrant examination.

Picture 2 shows the negative result of the installed bearing bolt in the center of the check valve disk.

Picture 2

The macroscopic evaluation by liquid penetrant examination grants a limited insight only regarding the quality of the completed weld joint. Macrocracks and the complaints resulting from the above usually occur at a later point in time.

The reason for this are structural instabilities, which are already latently existent as microcracks in the weld structure and which can increase during operation due to thermal stress. Therefore additional micrographs were taken for the assessment of the completed weld joints, as well as their crystalline structure (structural examination of the finished component surface by means of surface replication).

Picture 3 depicts the weld joint structure.
Picure 4 depicts the structures of the weld joints on micrographs.

The different structural constituents were lined up, starting with the unaffected base material, followed by the heat-affected zone (HAZ) to the weld filler metal. One hundred-times magnified pictures were then taken in an incident-light microscope.

The base material and the weld filler material have different corrosive potentials. Therefore the component surface had to be prepared by different caustics depending on the alloying constituents.

The pictures show a homogeneous structure although a postweld heat treatment was not carried out. This results from an optimized build-up sequence and an optimal welding sequence. The measured hardness profile remained within the permissible limit values.

Economic considerations

The components to be reconditioned are usually not kept in stock. According to the manufacturers, the delivery time for a new component takes approx. **four to five months.**

An overhaul takes us seven days.

Another financial benefit are the considerably lower maintenance costs. Depending on the valve type and size, they amount to approx. **55 % of the procurement costs** for a new part.

Additional costs for redundant stocking or downtimes due to a lack of operational readiness have not been taken into account.

Conclusion

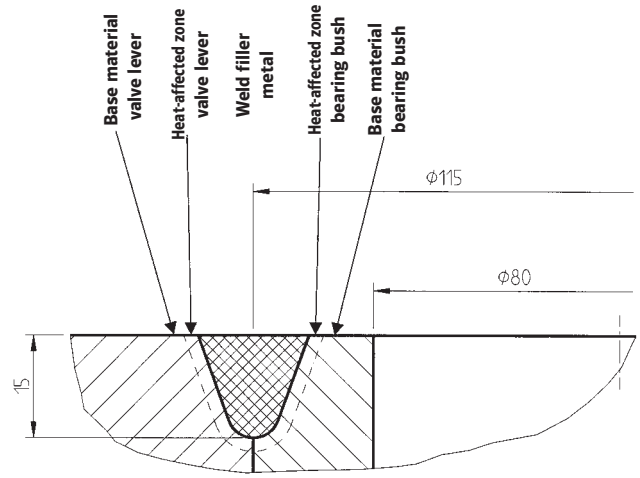
The above stated facts clearly illustrate the benefits of our maintenance services.

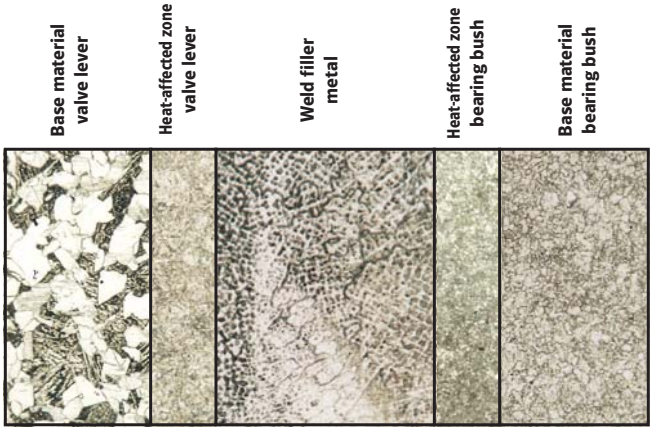
The decisive factors are distinctly lower costs, as well as the time savings compared to having a new component manufactured at equally good quality. The micrographs of weld joints depicted this unequivocally.

The bolt bearing of check valve disk and check valve lever and consequently the availability of the swing check valve can be optimized even further by a targeted modification of the bearing surfaces.

Our technical scope comprises these special tasks and can be ordered. Upon customer's request, our specialist department TS can supply further information.

Picture 3: Weld joint structure valve lever/bearing bush
Section scale 1.5 : 1





Picture 4: Structures of the weld joints on micrographs
Colour picture, Enlargement 100:1
Caustic: 5% Nitric acid und 40% Adler

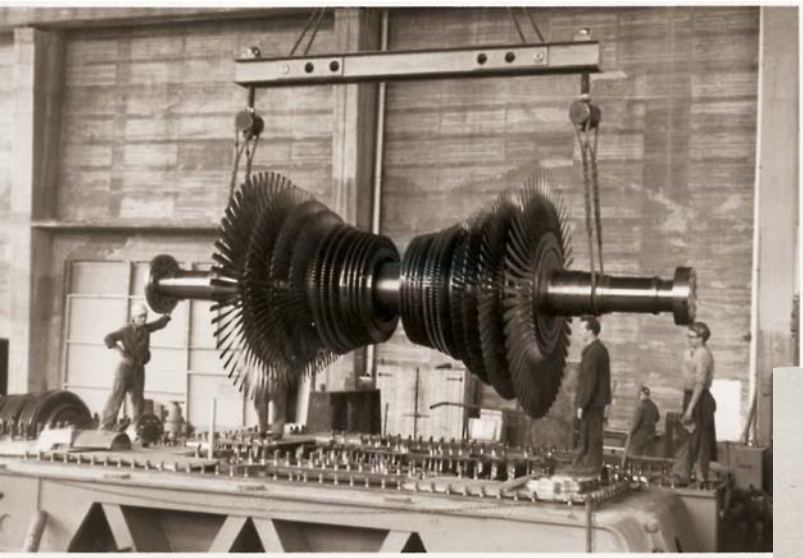
Boiler deflagration in a pulp and paper mill

The damage was reported on a holiday. The responsible staff members at the Irsching base immediately took the required steps in order to allow the reconditioning work on an industrial boiler with 120t/h steam capacity and a main steam temperature of 525 °C to commence the very next day. After carrying out some individual investigations and extracting a pipe sample near the evaporator, the subsequent stress analysis resulted in the necessity to perform the following jobs:

- Complete replacement of the flue gas hood including the steel expansion joints
- Replacement of the sheet metal housing of the finned tube economizer
- Replacement of damaged boiler pipes
- Reinforcement of existing and installation of additional tie
- Alignment of gas pipes with relocated burners

Flexibility during assembly and continuous quality control ensured that the boiler could be started up faultlessly after a joint inspection with the TÜV (Technical Inspection Agency).

A young company with decades of experience



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