IN-TA-S®

Integrated TAPROGGE Services

Taprogge

A fresh impetus for pure efficiency.

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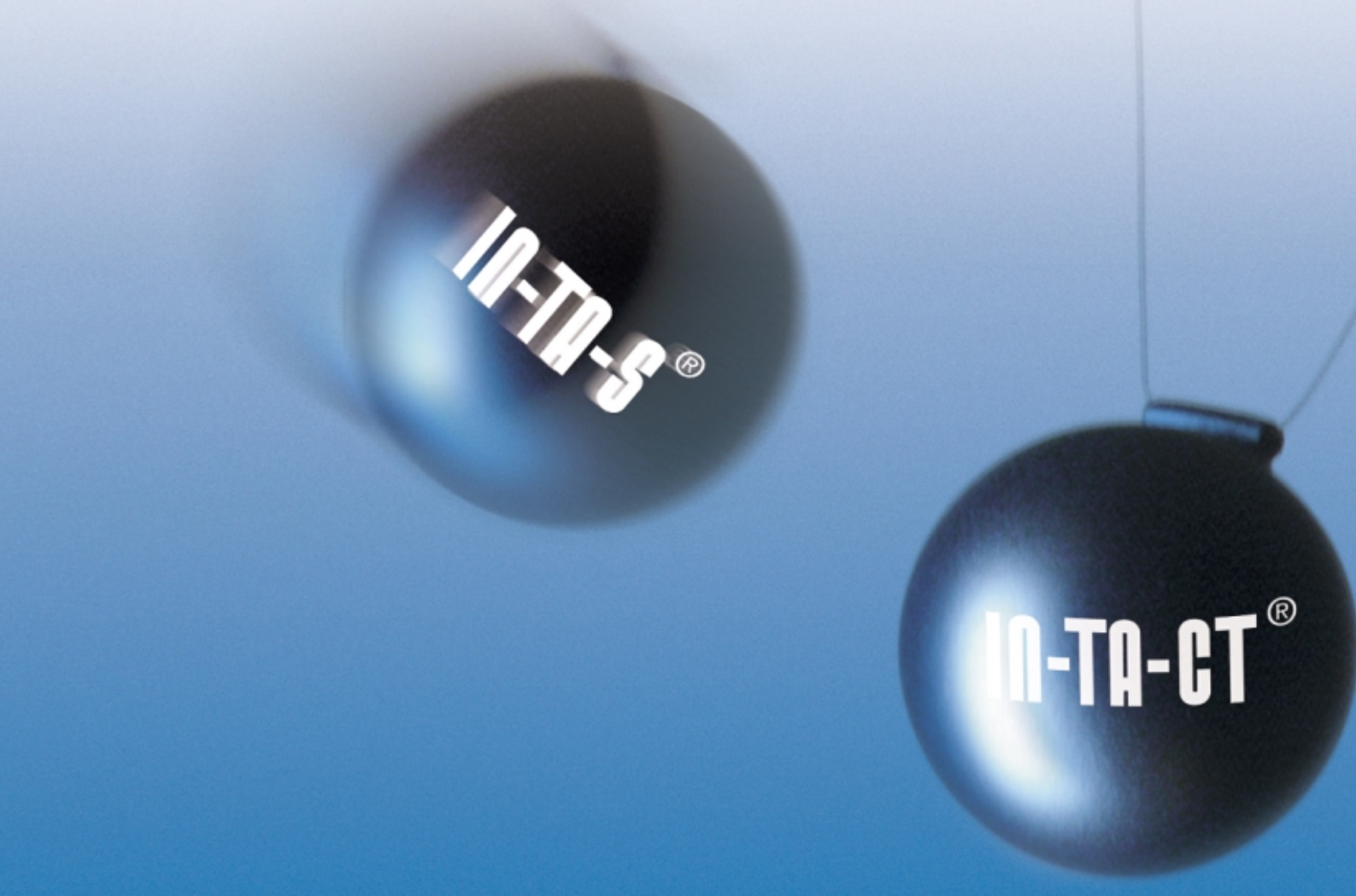
Two who belong together:

IN-TA-S® stands for "Integrated TAPROGGE Services" and is a completely new concept reflecting an all-embracing way of thinking in product aftersales.

Like IN-TA-CT® which is aimed at the support requirements of architect engineers and contractors, IN-TA-S® is tailor-made to the needs of the operators. IN-TA-CT® and IN-TA-S® are very well harmonized, both provided from the same source.



IN-TA-CT® and IN-TA-S®.

IN-TA-S® assists operators in a comprehensive and reliable way during the whole lifetime of their systems, covering not only installation, operation and maintenance but also permanent optimization and monitoring, including large-scale upgrades for lifetime extension of the IN-TA-CT® modules.

By IN-TA-S® TAPROGGE sets new standards by meeting the latest demands that have been created through the structural changes of competitors' markets in the international power station and water business. As a result IN-TA-S® has been complemented by important service modules that have direct impact on the operational results, above all in view of better possibilities of the optimization of plant operation by our Remote Monitoring schemes and new options of outsourcing within the scope of contracting models.

IN-TA-S® is of outstanding importance for the operators by providing additional, long-term benefits that translate into permanent financial economies:

- TAPROGGE technology is process technology. With the purchase of the system you first receive the tool enabling you to operate your plant more efficiently. However, the extent of the efficiency increase and thus of the commercial benefit depends on the operational mode that is optimal for the relevant application. As a user of TAPROGGE technology you are entitled to make use of IN-TA-S® and receive on-site competence and expertise.
- Competence requires knowledge and experience. In this respect IN-TA-S® is unparalleled because for the optimal adjustment of the systems and the improvement of your performance IN-TA-S® can rely on a data bank that is unprecedented the world over and contains information on more than 5,000 TAPROGGE applications. Our plus of competence is your plus of performance gain.
- By the modular structure of the individual IN-TA-S® services you can choose the scope of our work to match your specific circumstances.
- TAPROGGE offers you local availability. Simply rely on IN-TA-S® centres in 10 regions of the world, dual sources from our two production centres, as well as our IN-TA-S® remote centre.
- As an IN-TA-S® user you can automatically rely on IN-TA-CT® and all further quality features the name of TAPROGGE stands for. Of particular benefit in this respect is the modular compatibility created by IN-TA-CT®: because you as an IN-TA-S® user start from the foundation of IN-TA-CT® you conserve your investment by cutting your cost at the same time.

IN-TA-S® in Survey:

- Installation
- Commissioning and Remote Support
- System Take-Over and Instructions to Operator

- Spare Parts Management
- Error Tracing and Repair
- Maintenance and Inspection Management
- O&M Contracts and Contracting Models

- Filter Monitoring
- Tube Cleaning System Monitoring
- FilterOptimizer
- CMS Condenser Monitoring

- Automatization of Systems
- Modification of Controls
- Modification of Filters (TB/MF)
- Modification of Strainers (HE/MF)

Engineering Studies:
- Feasibility studies for new systems and retrofits
- Economical appraisals

Training:
- Training on site
- TAPROGGE seminars

Diagnostics on Site:
- Inspections of condensers, heat exchangers, and evaporator units
- Ball distribution tests
- Flow rate measurements
- Tests for the optimization of cooling water side operation modes of heat exchangers and evaporators, and for the selection of appropriate tube materials

Diagnostics in the TAPROGGE Technological Centre:
- Tube examinations
- Debris tests for mastering all types of fouling
- Flow tests in the heat exchanger environment

Consultancy in Application Engineering:
- Setting of the operational modes of TAPROGGE Systems
- Optimization of the operational modes of TAPROGGE technologies
- Special solutions to problems of fouling, scaling, and corrosion in cooling water circuits

Applications:
- Monitoring of tube conditions
- Abrasive ball cleaning
- Dosing of ferrous sulfate and other corrosion inhibitors
- Eddy current testing

Installation with IN-TA-S®: As individual as your System Profile.

With the IN-TA-S® installation services every IN-TA-CT® project becomes a closed turn-key solution provided from the same source. Without interfaces - and inclusive of the TAPROGGE System Guarantee. TAPROGGE takes care of the project from the initial planning stage to operational take-over. Contractors and operators can rely on the TAPROGGE experts' indispensable knowledge and operational experience.

Installation

Extra Benefits through IN-TA-S® Installation Services:

- Reliability through interface-free project handling
- Competent performance directly by the market leader's experts referring to experience of more than 12,000 systems installed
- Maximum extent of technical support and quickest assistance possible due to the TAPROGGE Remote Monitoring. Of course, this applies not only to the start-up phase but also to the current operation of the systems.
- Skilled system hand-over and instructions to operating staff by the TAPROGGE experts

- **Installation**
- **Commissioning with Remote Monitoring**
- **System Take-over and Instructions to Operators**

Your System was built by Professionals.
Do you have it serviced by Professionals as well?

Operators rely on TAPROGGE for the professional maintenance of their systems: more than 50 TAPROGGE service experts on 10 sites the world over, together with the international Remote Monitoring Centre, guarantee a maximum of availability. In addition to that, more than 12,000 installations of IN-TA-CT® modules in more than 100 countries stand for the knowledge and experience of the service team. A further proof of TAPROGGE's high quality claims is the certification of all IN-TA-S® services as per DIN EN ISO 9001 and SCC (Management system for safety, health and environmental protection).

Operation and Maintenance

Extra Benefits through IN-TA-S® O&M Services:

- Professional management of spare parts and TAPROGGE cleaning balls: IN-TA-CT® modules are individual makes whose spare parts procurement sometimes necessitates a long lead time not only in the production process but also in the client's procurement procedure. Special TAPROGGE Programmes enable transparent evaluation of needs, stockpiling at favourable cost, as well as timely availability of the parts on site.

- IN-TA-S® O&M Services are available ad hoc or in the form of fixed contracts, for instance as maintenance or one-year contracts.

- New ways of outsourcing of maintenance and operation by means of contracting models with several years' terms. This is linked with an extremely high customer benefit: today more than 15,000 MW of installed power station capacity are in this way operated by TAPROGGE experts.

- **Spare Parts Management**
- **Cleaning Ball Management**
- **Error Tracing and Repair**
- **Maintenance and Inspection Management**
- **O&M Contracts and Contracting Models**

TÜV CERT

CERTIFICATE

The TÜV CERT Certification Body of RWTÜV Systems GmbH

hereby certifies in accordance with TÜV CERT procedure that

Taprogge Gesellschaft mbH

has established and applies a SCC system for

RWTÜV

RWTÜV

CERTIFICATE

RWTÜV e.V.

hereby certifies that the company

Taprogge Gesellschaft mbH

Service Division (400)

SCC**

is hereby issued.

This Certificate is valid until

June 2004

Certificate Registration No.

SCC 18 0017

Nothing is nearer at Hand.
Remote Monitoring with IN-TA-S®.

The new IN-TA-S® Remote Monitoring System has established itself within a short time as intelligent service technology on a large scale. It discovers hidden efficiency reserves and, moreover, represents the absolutely fastest and most effective means of error elimination in the case of breakdown, resulting in better performance and higher availability. With this new IN-TA-S® module the operator achieves the effective improvement of his own competitive situation, essential for survival in the highly competitive energy and water markets of today.

Remote Monitoring

From its international Remote Monitoring Centre TAPROGGE monitors systems of operators in more than 15 countries of the world. The respective forms of contract are closely governed by the operators' tasks.

Contracting model	Call by Call	Flat Rate
Basic conception	TAPROGGE makes IN-TA-S® remote monitoring available against flat rate; however, customer wants remote monitoring only if necessary and against call by call invoicing. A separate telephone extension with direct dialling connection must be established for this purpose.	Customer makes use of IN-TA-S® continuously and during fixed periods against flat rate for the services A-D (see below). A separate telephone extension with direct dialling connection must be established for this purpose.
Minimum Term	1 month	1 year
Prolongation Period	monthly	yearly
Scope of Service:		
A Data Inquiry	Call by call as per customer`s request	Daily, over several days, or according to fixed agreement
B Current Documentation	no	yes
C Data Analysis	Call by call as per customer`s request	Daily, over several days, or according to fixed agreement
D Current Report	no	optional
E Event-orientated Actions	Call by call as per customer`s request	Call by call as per customer`s request
Invoicing of Services	Provision free for the call-by-call monitoring. Services A-E at cost	Flat rate for the services A-D. Sercice E at cost

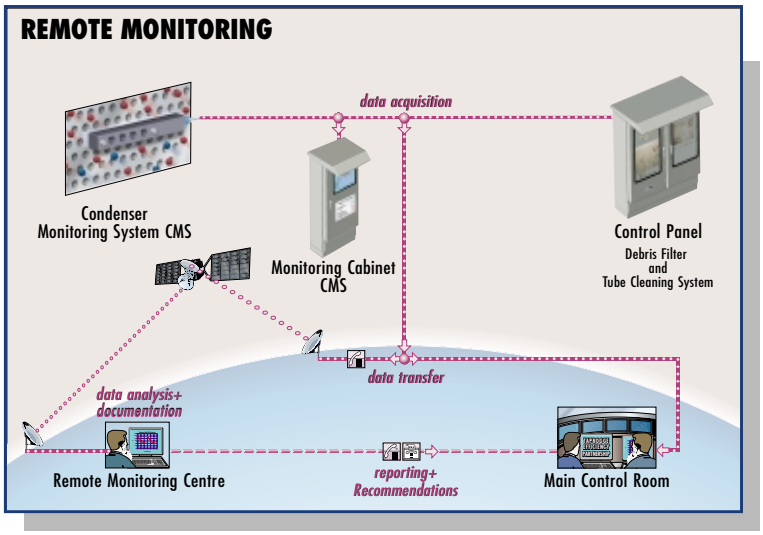
- **Select your Contracting Model**

- **Remote Monitoring of TAPROGGE Debris Filters and Tube Cleaning Systems**

For the monitoring of TAPROGGE Systems an extra module is integrated into the control of the TAPROGGE Debris Filters and Tube Cleaning Systems. By modem the respective system is connected to the TAPROGGE Remote Monitoring Centre. A telephone connection is all that the operator has to provide.
A remote monitoring system is also available as a retrofit kit.

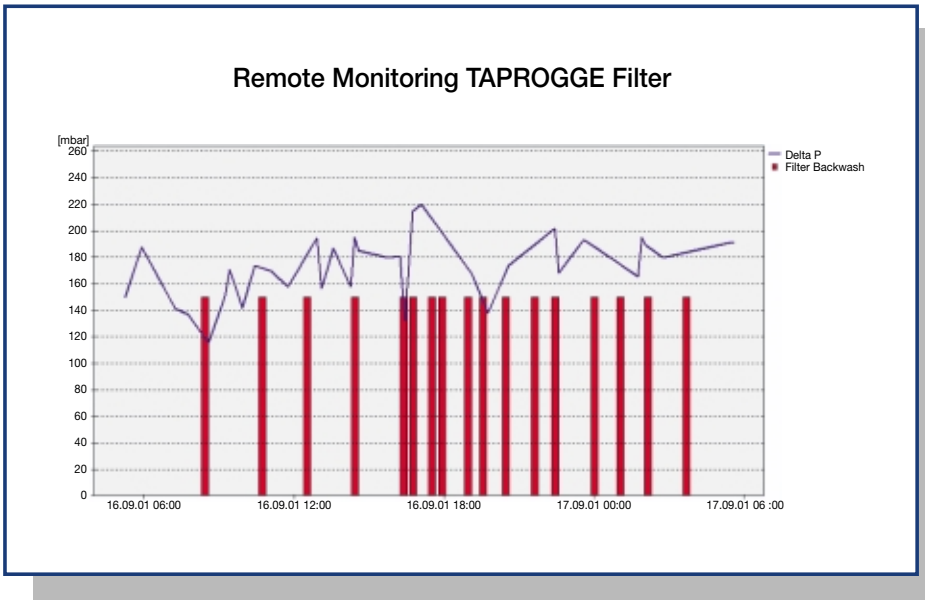
Essential benefits of this IN-TA-S® module:

- Highest extent of TAPROGGE competence on site without cost for the physical presence. This applies to the commissioning stage (contractor benefit), as well as to the continuous operation (operator benefit).
- Unparalleled speed of support in problematic cases
- Maximum availability through permanent control of the systems
- More qualified and thus better aimed and faster tracing of failure causes by documented system history
- Preventive maintenance by recording of operating times and switching cycles
- This remote monitoring system can be operated under the contractual options "call by call" or "flat rate". Whereas the flat rate option recommends itself to the operator for continuous operation, the flexibility of the call by call option is recommendable for the contractor for the commissioning phase and warranty period.

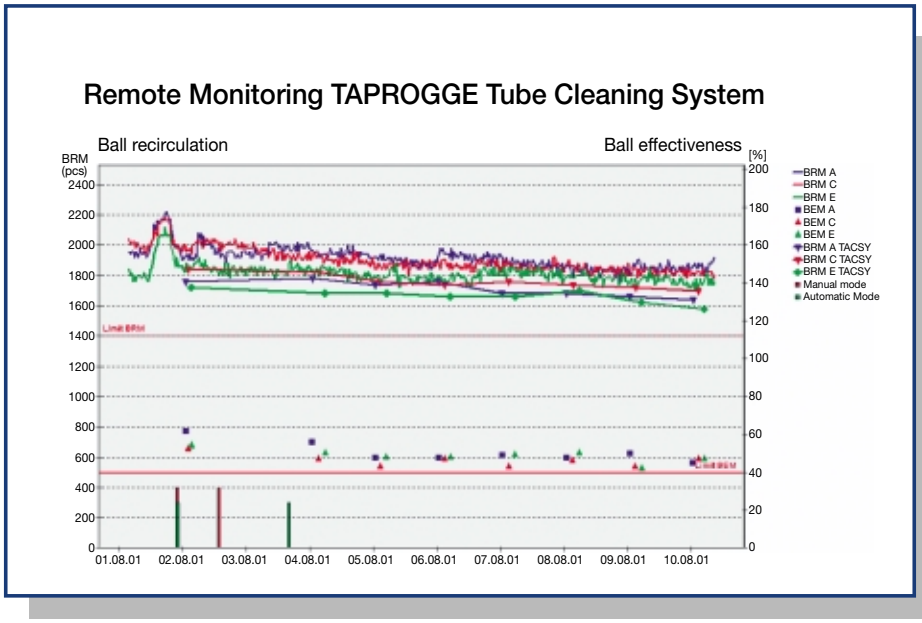


Remote Monitoring

Remote Monitoring - TAPROGGE Debris Filter (excerpt)



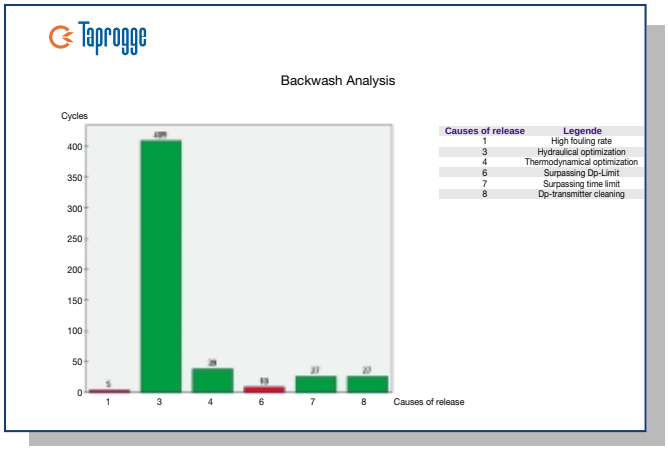
Remote Monitoring - TAPROGGE Tube Cleaning System (excerpt)



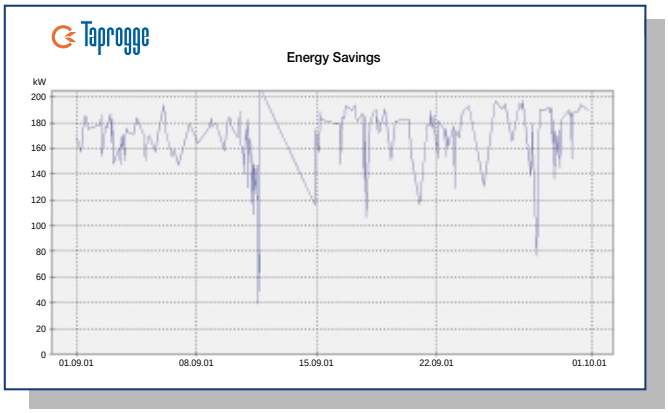
- **Optimization with FilterOptimizer**

The FilterOptimizer is an add-on unit for a well-aimed amelioration of the economy of TAPROGGE Debris Filters. In contrast to traditional filter operation with pre-selected, fixed backwash point, this patent-protected system allows the automatic setting of the backwash point. The marginal cost resulting from the pressure loss of the filter are optimized in relation to the thermal losses caused by filter backwash processes. The economies achievable allow a return of investment of the system within about 1 to 2 years. The FilterOptimizer data can be inquired on a remote basis which is why it is operated preferably in the flat rate version. FilterOptimizers are successfully functioning in power stations in 15 countries the world over.

FilterOptimizer analysis for backwash behaviour



Energy saving by FilterOptimizer

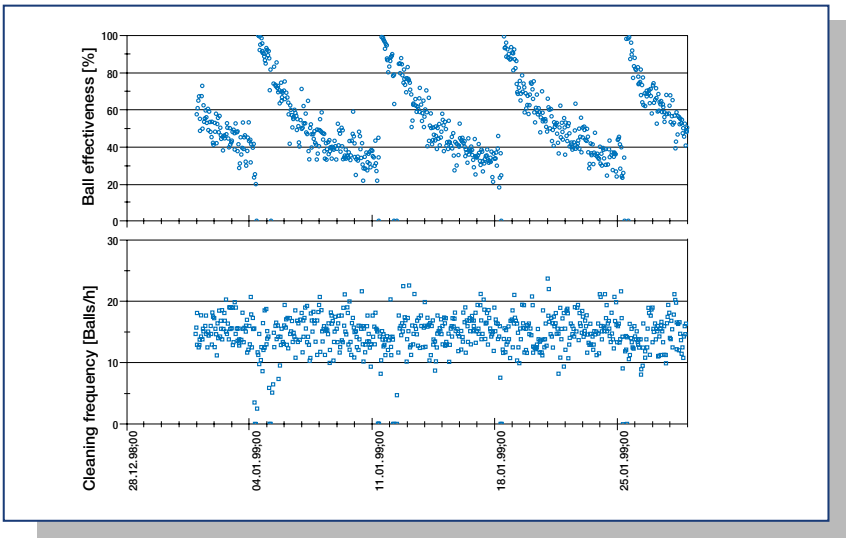


Remote Monitoring

The CMS Condenser Monitoring System is a tool for the monitoring and assessment of the condenser condition and the cleaning operation that has been specially developed by TAPROGGE.

It excels by its unique accuracy of individual tube measurement and its unparalleled speed in obtaining results. By the instrument of the cleaning ball a drop of the heat transfer in the condenser can be counteracted in time. And, what is more, by means of Remote Monitoring the condenser can be permanently put in a “glassy” condition. This is a process that furnishes unrivalled evidence - which is proven by numerous CMS installations, particularly in major and nuclear power stations.

Monitoring of ball effectiveness and frequency of a TAPROGGE tube cleaning system

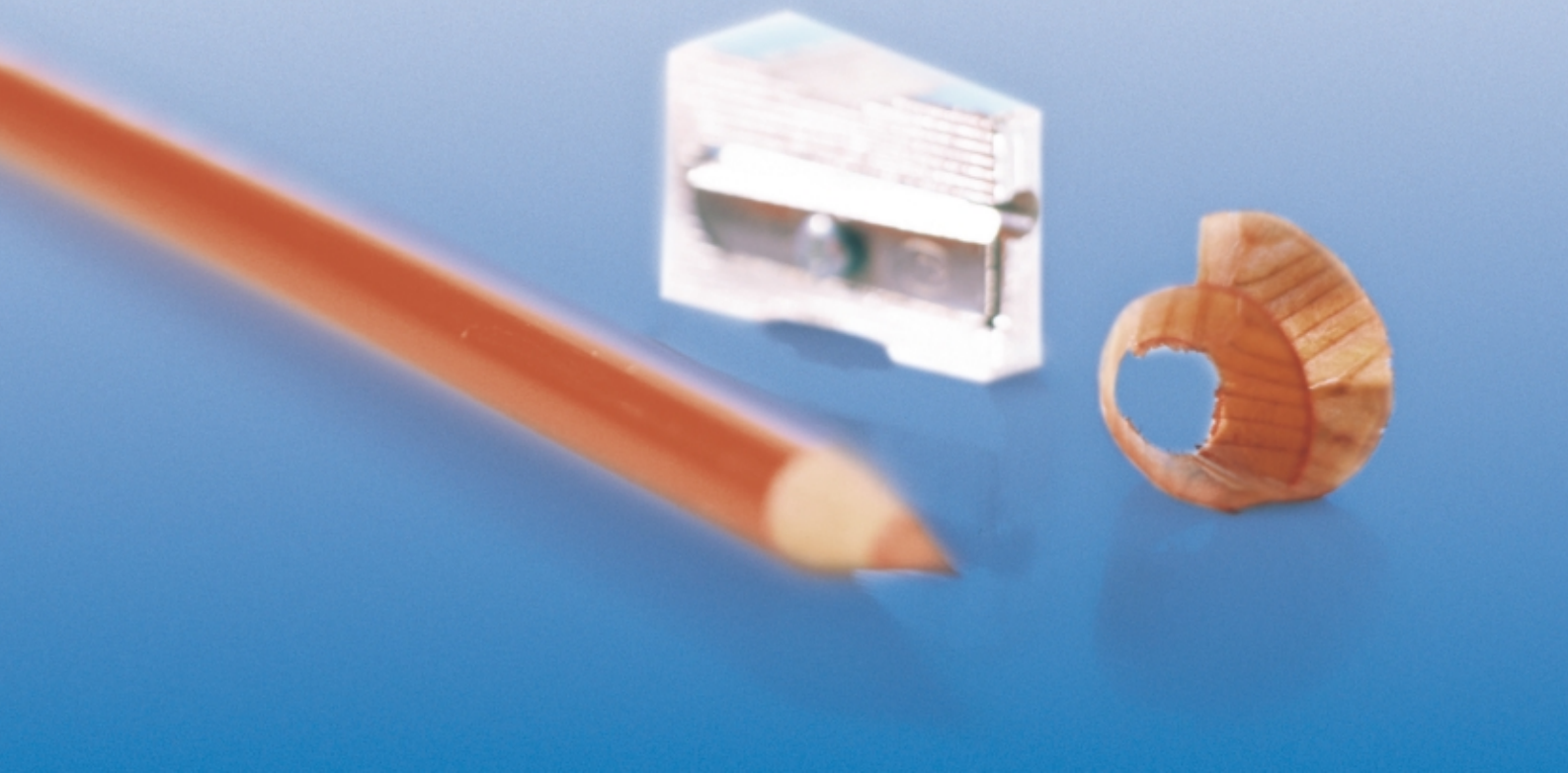


- **Optimization by Condenser Monitoring System (CMS)**

An Investment into the Future: Modernization with IN-TA-S®.

The markets of the future call for flexible capacities. Very often, however, production capacities cannot be extended simply by new constructions. In such cases a capacity extension by the prolongation of the system life has been accepted as a proven alternative. Above all in Europe this market demands special retrofit solutions that are governed by the existing system arrangements.

A similar task results from the technical progress and the life expectancy of today's systems that amounts to 30 to 50 years. In this regard the life prolongation is often economically interesting as well. The solutions developed by TAPROGGE offer valuable cost advantages to the operator without the necessity of a completely new investment.



System Upgrade and Life Prolonging Measures

• Automatization of Systems

Unlike the earlier years the operators of today generally demand automatic systems. The advantages offered by the automatization of formerly manually operated TAPROGGE Systems are apparent:

- Reliable operational safety
- Easy system control (also from the control room)
- Reduced expense in terms of personnel
- Possibility of integration into the entire system visualisation and control

It is also for those reasons that TAPROGGE has provided numerous systems with retrofit automatization in recent years.

• Modification of Controls

Modern controls based on PLC technology have become the international standard. TAPROGGE therefore offers its customers the modification of older controls from relay into programmable PLC technology.
Beneficial features:

- Space-saving and compact control
- Lower susceptibility to failures and easier elimination of errors by a reduction of the electrical contacts
- Essentially simplified change of programming
- Higher reliability by timers adjustable by way of programme technology, etc.
- Possible integration of system control into a central plant control room by data transfer
- Clear visualisation of system conditions, and programme changes via operator display
- Changes of preset procedures possible by authorized personnel without large-scale reprogramming

- **Strainer Modification Type HE/MF**

Since the invention of TAPROGGE tube cleaning systems in the early 50s TAPROGGE has installed thousands of strainer sections of the original HE type in nominal diameters from DN 100 to DN 4,200 in more than 80 countries of the world.

The strainer section has been subject to continuous development. Task was to reduce its complexity in terms of apparatus engineering, at the same time rendering it less sensitive to macro fouling in the cooling water. This resulted in the establishment of the today's state of the art of strainer sections the world over: the type D2.

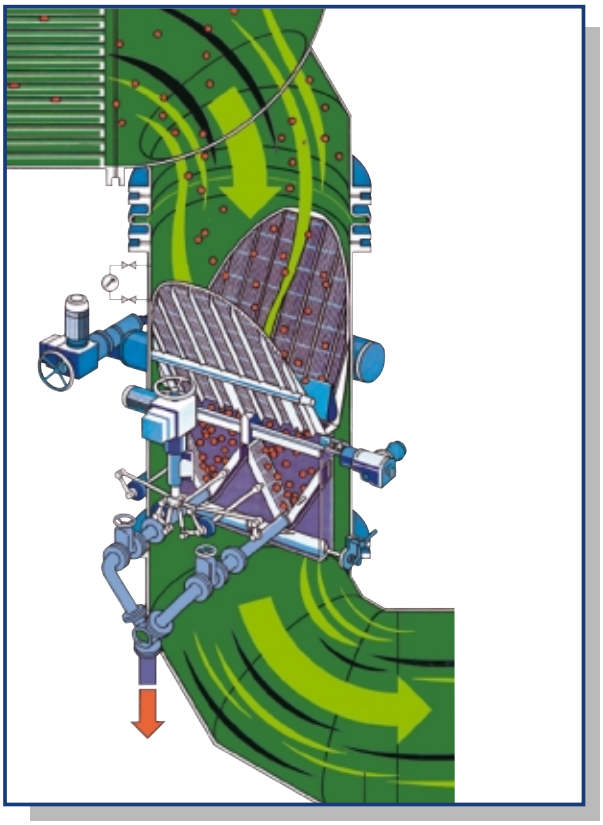
To place operators in a position to change from the original type to the more beneficial, new technical D2 level TAPROGGE developed the HE/MF modification by which many of the movable internal parts of the HE screens were eliminated and replaced by a simple, fixed, and hydrodynamically optimized device for the separation of cleaning balls. This modification does not require any increase of pump head or flow rate.

System Upgrade and Life Prolonging Measures

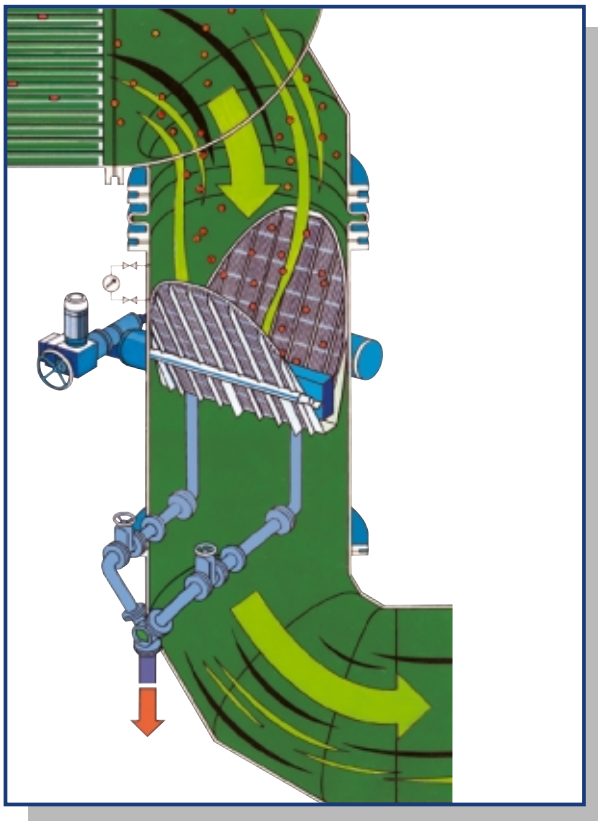
By the special solution HE/MF the operator obtains the benefits of the modern D2 technology yet at essentially lower investment budget.
Further advantages:

- Essentially reduced susceptibility of failures of the screens in the case of macro fouling
- Increased operational benefits by optimized ball circulation and further elimination of causes for ball losses
- Lower maintenance expenditure
- Essential reduction of spare parts by renunciation on numerous components formerly movable and located in the cooling water

strainer section type HE



modified strainer section type HE/MF

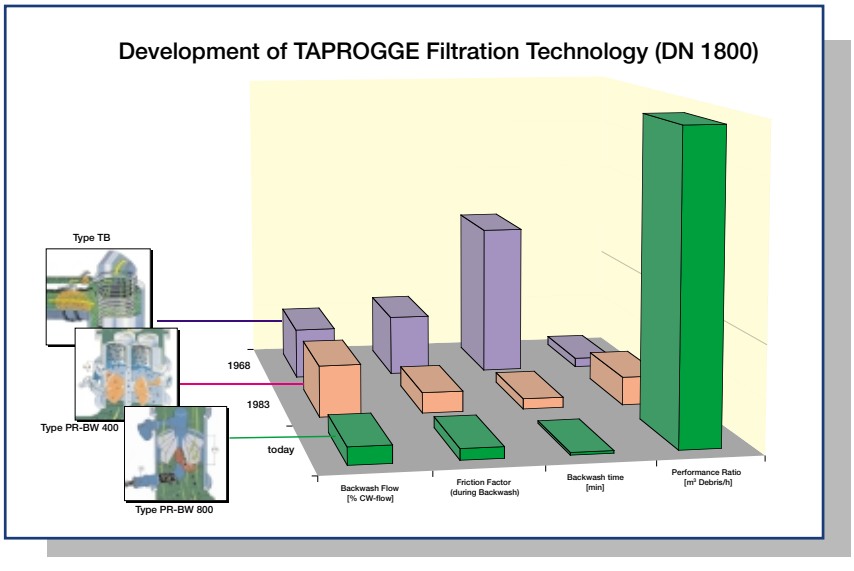


- **Strainer Modification Type TB/MF**

In the year 1967 TAPROGGE developed, for the first time, a solution for the automatic filtration of coarse debris (macro fouling) in cooling water circuits of power stations: the turbulence filter type TB. This filter was welcomed by the market and became a great success. More than 700 filters of the basic TB type were installed by TAPROGGE the world over.

A further milestone of technical performance gain in the field of TAPROGGE cooling water filtration was set by our company with the development of the PR-BW technology (Pressure-Relieved BackWash). Today this technology is regarded as world standard.

Comparison of performance of TAPROGGE filters



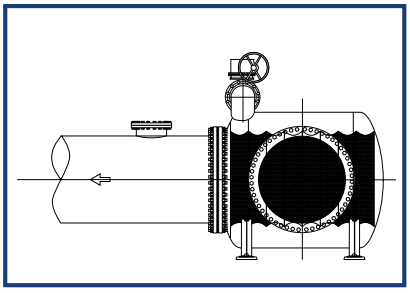
System Upgrade and Life Prolonging Measures

To place the users of TAPROGGE TB filters in a position to change to this higher performance level, taking the existing installation conditions into account, TAPROGGE has developed the TB/MF filter modification. Today it can be realized as a standardized procedure in 6 simple steps.

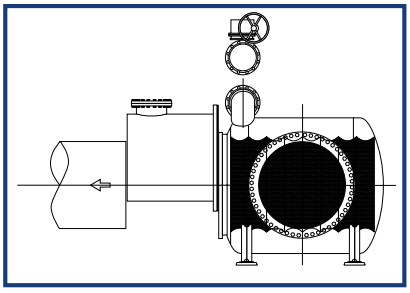
The essential benefits of this modification are:

- Reduced investment budget through installation of the TB/MF modification kit into an already existing TB filter housing
- Enhanced performance (debris discharge capacity per time by factors up to 30 higher)
- Increased safety margin of the filter for a worst case scenario, sudden ingress of debris in certain seasons, storms, flooding, etc.
- Optimization of the entire cleaning process from the prescreening to the heat exchanger to be protected within the scope of IN-TA-CT®

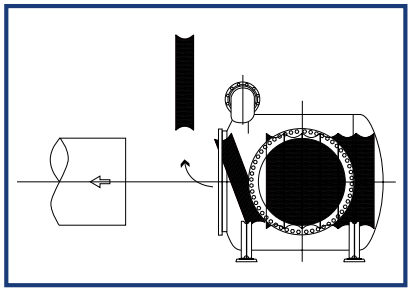
1 installed TB filter



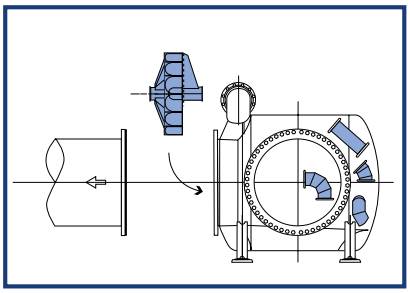
2 disassembly of pipe section



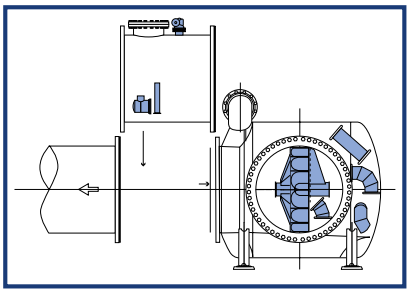
3 removal of filter elements



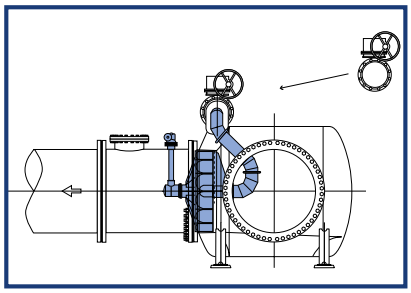
4 putting modification kit in place



5 re-installation of pipe section



6 mounting of modification kit final condition



We offer many Services but only one Goal: more Efficiency.

Various studies have been a major part of TAPROGGE's activities for decades. But no matter if we check into the feasibility or the economy of a project: in the centre of our concerns there is always the customer's need to operate his system even more efficiently. Our lifelong experience in the most different operational and water-technological environments forms an excellent basis for particularly reliable evaluations.

Engineering Studies

We work out for you:

Feasibility Studies

- for the attainment of your functional goals
- for installation possibilities in existing space and time frames, particularly in cases of retrofit

Economical Appraisals

- for the calculation of thermodynamical efficiency upgrades by TAPROGGE technology
- for the calculation of added environmental benefits by TAPROGGE technology
- for the calculation of increased availability by TAPROGGE technology

- **Feasibility Studies**
- **Economical Appraisals**

Training

To make full use of all technical possibilities the TAPROGGE technology calls for well-trained operating staff. That is why TAPROGGE offers special training schemes that are concluded by final achievement tests.

	Training on Site	Seminars
Target group	Operating and maintenance staff	Operating and maintenance staff; efficiency and turbine engineers; water technology staff
Location	On site, by incorporation of the relevant conditions of the user's system	At the TAPROGGE premises making use of the facilities of the TAPROGGE Technological Centre
Core subjects	Knowledge of technical practice (maintenance and operation)	Efficiency and availability in the cooling water environment; water-technical problems of condenser operation and solutions; TAPROGGE system and process engineering technology with basics of the selection of the appropriate type of cleaning ball

The optimization of the efficiency of our systems in cooperation with our customer is our main concern and permanent task of IN-TA-S®. To reach this goal TAPROGGE has highly specialized staff who, of course, also master the relevant diagnostic instruments.

Diagnostics on site

TAPROGGE is the worldwide renowned specialist for condenser inspections. In power stations and industry the condenser inspection (the inspection of the evaporators in seawater desalination plants, resp.) is an indispensable means for the determination of possible failures and for the recognition of the optimization potential of the respective heat exchanger.

It furnishes information about:

- macro fouling on the tubesheet
- degree of fouling of the cooling tubes
- fouling and corrosion aspects
- ball distribution across the tubesheet
- dead spots

As far as necessary TAPROGGE uses for its inspections the technical possibilities of endoscopy and other measuring techniques for surface conditions. Tube samples are helpful for the subsequent diagnosis in the TAPROGGE technological centre.

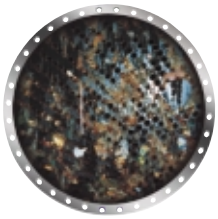
Ball distribution tests are always helpful when there are questions with regard to ball distribution, for instance due to hydraulic conditions. By means of special catching baskets that are temporarily fixed to the heat exchanger outlet tubesheet the actual distribution of balls can be determined and a clear statistic picture established. Optimizations - if necessary - can then be performed by the selection of adequate cleaning balls.

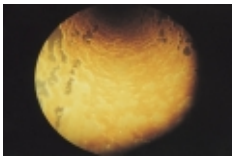
The exact measurement of water flows is a particular challenge among the installation conditions of operational practice. Measuring with high accuracy in terms of flow is required

- for the hydraulic layout of installations of cooling water technology
- for the determination of thermodynamic economical appraisals
- as a diagnostic instrument in cases of failure

Regular instruments are generally not appropriate for this task; highly accurate, complex techniques often too costly. To fulfill this goal TAPROGGE has focussed on ultrasonic measurement because for the multitude of cases this method has the necessary operational flexibility at acceptable cost and sufficient accuracy.

- **Inspections of Heat Exchangers**





- **Ball Distribution Tests**

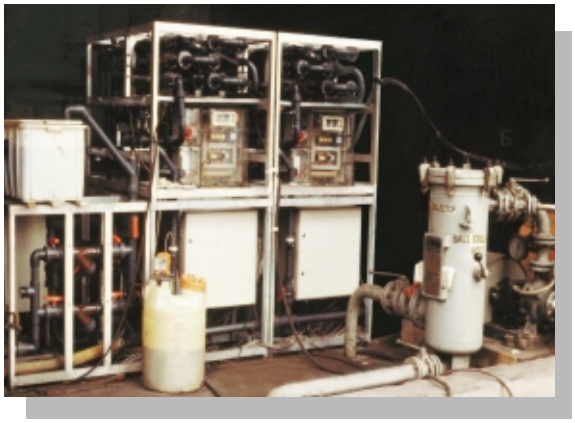
- **Flow Measurement**

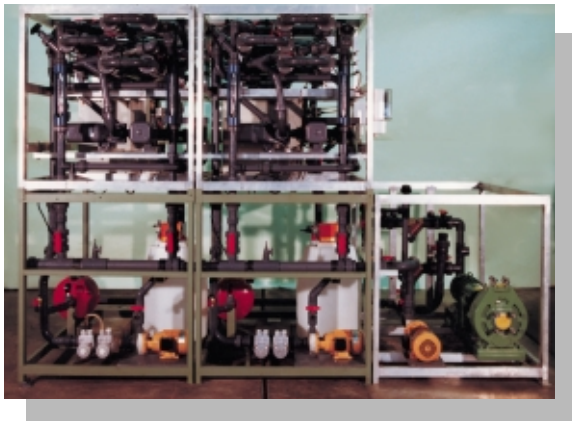
- **Ultrasonic Measurement**

- **Tests for optimized Heat Exchanger Operation**

Tasks of process technology are sometimes quite complex, above all when choosing the appropriate tube material, but also in the interaction of water quality, water chemistry, cooling tube material and cleaning balls. They often call for the situation-related test for mastering or optimizing a special problem.

In this field as well TAPROGGE is technically leading. Numerous operators were provided by us with tester plants designed for their special applications, and with process-technological advice.





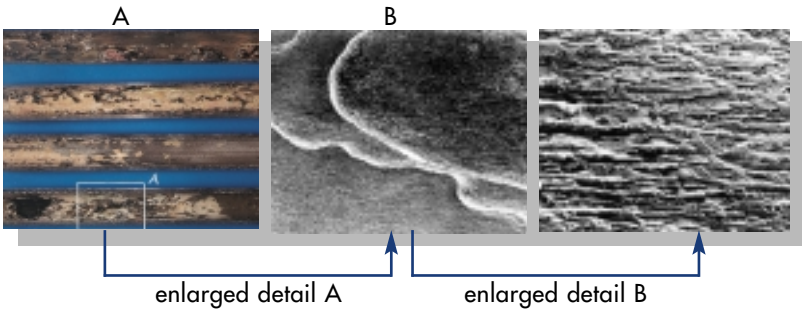
Diagnostics in TAPROGGE's Technological Centre

In addition to the diagnosis on site TAPROGGE also safeguards its consultancy in system technology by its own technological centre. These laboratory facilities are equipped with a major technical cooling water circuit for the simulation of technical and hydraulic conditions, and a further water circuit for the simulation of flow patterns. Numerous different test racks, especially for examinations of cleaning procedures and cooling tubes, have made this technological centre a world-wide renowned place for all tasks in the field of cooling water technology.

The examination of cooling tubes is part of our current business. Our experience and the collection of several hundreds of cooling tubes that is unparalleled the world over form an invaluable basic knowledge for the technically outstanding evaluation of tube conditions. By means of tube samples we determine the optimum cleaning ball type and the best possible mode of operation of TAPROGGE Systems.

- **Tube Examinations**

Examination by electron microscope: erosion corrosion at CuNi tubes



To find out about the filtering abilities for certain types of fouling, and to recommend optimal filter surfaces, we offer users and architect engineers to have debris samples tested in our technological centre. For difficult types of debris and also for applications with high safety standards (nuclear power plants) this is the least expensive method of getting a secure proof of a recommendation in system technology. The debris filtering ability is documented on video.

- **Debris Test**

Flow tests complement the diagnostic possibilities of our company. For extreme installation situations they are absolutely required as a proof of a feasibility study.

- **Flow Test**

Application Consultancy

Application consultancy is a core competence of IN-TA-S®. It makes use of the diagnostic methods on site and in the TAPROGGE Technological Centre. Based on these examinations, the application-technological know-how of our service engineers, and TAPROGGE's data bank of more than 5,000 applications we give operational recommendations that are ultimately aimed at obtaining the maximum possible efficiency for the user. The importance of supposedly smallest efficiency advantages is demonstrated by the following calculation:

If starting from an electricity price of € 0.03/kWh and a number of operating hours of 6,000 per year, an easily realized upgrade of turbine capacity by 0.1%, merely by good consultancy and optimized operation of the TAPROGGE System, translates into an annual performance gain of € 18,000 per 100 MW installed capacity.

TAPROGGE offers its application consultancy in the following service packages:

- **Determination and Optimization of Operating Modes**

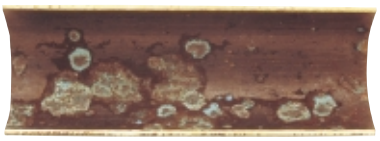
  - For the optimization of the mode of operation of TAPROGGE Systems, TAPROGGE offers special optimization procedures to operators. Based on existing operational data from site, and by complying with the relevant parameters, modifications in the method of operation are generated that translate into better operational results.

- **Solutions to special Problems of Fouling, Scaling, and Corrosion**

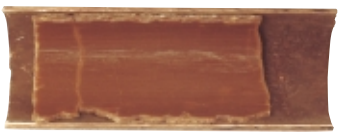
  - Solutions to special problems of fouling, scaling and corrosion in cooling water circuits are regularly complemented by corresponding diagnostic methods. Among them is our CMS Condenser Monitoring System.

fouling

corrosion



scaling



Application Engineering

TAPROGGE stands by its recommendations and executes them accordingly. The monitoring of tube conditions serves above all for the observation and control of changes over a certain period. TAPROGGE accompanies those changes in cooperation with the operating staff.

- **Monitoring of Tube Conditions**

condition as supplied

condition after 2,000 ball passages

condition after 5,000 ball passages

To guarantee a uniform protective layer on the tube surfaces, cleaning by means of abrasive balls calls for consultancy by TAPROGGE, in particular with cooling tubes of copper alloys.

- **Abrasive Ball Cleaning**

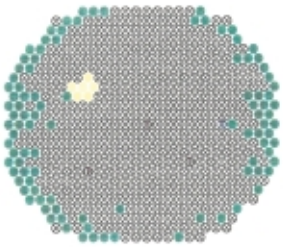
To TAPROGGE's application experience the dosing of ferrous sulfate and other corrosion inhibitors has become necessary for the orderly establishment of an appropriate protective layer and for balancing the benefits from thermal economies and corrosion avoidance.

- **Dosing of Ferrous Sulfate / Corrosion Inhibitors**

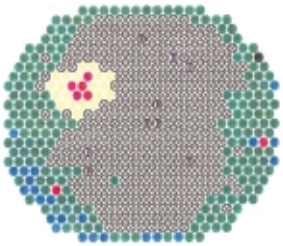
Eddy current testing serves for the control of cooling tube conditions and, especially when comparing several years, provides evidence to support the preventive exchange or plugging of cooling tubes, thus for the avoidance of unscheduled outages due to tube leakages.

- **Eddy Current Testing**

Changed conditions of heat exchanger tubing in time comparison



year 1



year 2

Reduction of wall thickness

yellow/green	>20% (inside/outside)
blue	>50%
red	>70%
⊗	plugged tube

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