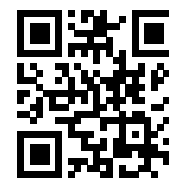


Holistic and sustainable productivity.



Building today the plant of tomorrow.

In good economic times, the domestic economy is booming again and leading industrial customers from Europe and overseas are entrusting the Pörner Group with large-scale and technically complex investment projects.

Obviously, our customers appreciate the right mix of experience and innovation, flexibility and precision of our engineers who, embedded in an entirely functional project organization, implement their projects in a resources- and cost-saving manner.

The Pörner Group has exactly the right capacity for larger projects and yet has lean organizational structures. And we are in-

dependent from any third-party interests, solely committed to our clients and the tasks.

It is our goal to engineer as quickly and efficiently as possible the better, longer-lasting and sustainably productive plant aligned with our "ANLAGENBAU 4.0" concept. In this process we focus on two levels of optimization:

1. Plant Engineering: Fast, precise and efficient

Our efficiency is based on a targeted integration of all engineering disciplines from a single source under our management.

Building a profound concep-

tual design, we manage the plant engineering step-by-step almost completely digitally using advanced software tools. All project activities including procurement are therefore controlled in a precise and transparent manner so that the task can be realized on budget and on schedule.

Closely linked with leading licensors and component suppliers, we create sustainable plant configurations "from a single source". Being active in more than 50 countries, we are competent when it comes to local procurement and contracting with suppliers.

Delivery logistics, construction and installation are planned

and coordinated by us for a reliable building of the plant within the shortest time (e.g. during plant shutdowns for a few weeks).

2. The optimal Plant 4.0

From the very start we assist our customers in process selection or upscaling of processes, from pilot- to large-scale implementation.

Holistic planning and an intelligent use of the world's best components bring about a custom-tailored, fully equipped process plant.

Complex instrumentation and automation facilitate a digital monitoring during operation. From the "big data" of the plant it is possible to constantly determine in higher-level systems the most efficient, energy-saving and environmentally compatible modes of operation.

Digital and networked

The engineering is done by use of database-centric 2D and 3D systems with digital virtualizations linked with an ERP system with integrated project and documentation management. Thus, the plant is entirely digitally documented. The network between all our engineering offices and with the customer enables us to provide the full

capacity of the Group, and the entire pool of specialists is available for special tasks.

People in the fore

Advanced digitization, networking and the best discipline-specific software provide more time and room for creativity for our committed engineers to develop very innovative solutions that make the difference for many years when it comes to the productivity of the Plant 4.0.

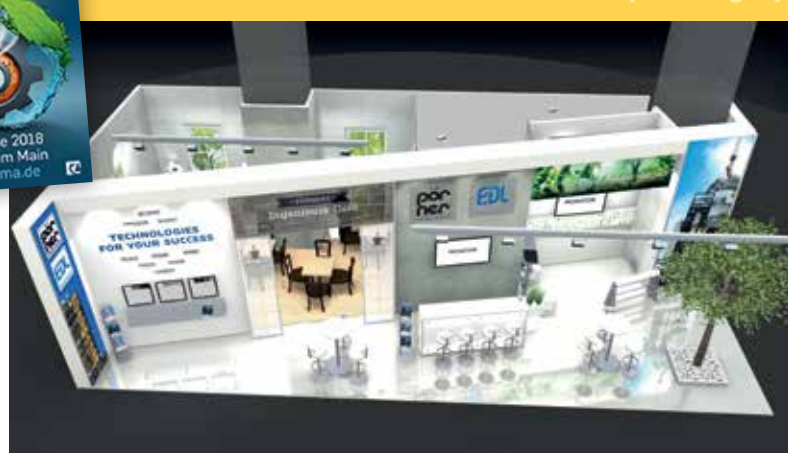
Good ideas and first-class quality always pay off in the end. This is what we at Pörner as creative and reliable engineers work for with "Anlagenbau 4.0".

Yours sincerely,



Andreas Pörner

PÖRNER AT ACHEMA 2018 | HALL 9.1 | BOOTH D23



Welcome to Achema 2018, where we present to you the latest technologies and plant engineering competences of the Pörner Group. Visit our Engineering Café and experience "Anlagenbau 4.0" live with a virtual walk-around in a digital refinery! We look forward to interesting dialogues with you!
HALL 9.1 | BOOTH D23

Welcome to AICHEMA 2018 – Welcome to “Anlagenbau 4.0”

Reality & Future. Digitization in Plant Engineering.

BY ANDREAS PÖRNER

FRANKFURT. Digitization of industrial processes and operations is no trend any longer but reality. Men, machines and industrial processes are intelligently linked where it makes sense.



The Pörner Group embarked on the path of digital transformation at the turn of the millennium already. “Anlagenbau 4.0” is a protected trademark, motivation and reality. The Pörner engineers can access their projects from any part of the world (see article below); workflows are digitized completely and in a comprehensible manner; besides the conventional engineering services it is possible to provide



Safety first! Practicing fire fighting in the simulation saves lives.

dynamic simulations and smart 3D plant models with VR connectivity.

At the AICHEMA stand of the Group visitors can see for themselves and have a walk through a

refinery plant.

Together with AVEVA providing the relevant software and closely working with EDL for years a virtual reality area has been set up. VR glasses take visitors on a trip through a virtual atmospheric distillation unit – but not without putting on proper safety clothes. Safety first!

Discover the unit first-hand ...

The dynamic simulation of a distillation unit runs in the background also available as a smart 3D model. Wearing full protective clothing the visitor may now control the unit by means of a controller, open and close slide valves, press pushbuttons etc. Because of the absolutely reality conform impact on the plant he may experience the intervention into the refinery operation first hand and live either positively or ending up in an explosion. But don't be afraid: even fire fighting can be practiced with the simulator.

Gimmick or added benefit?

As a future-oriented engineering partner the Pörner Group advocates the use of virtual models – where it makes sense for the customer. It is a fact, however, that the additional investment in a virtual plant model beyond the conventional engineering services brings with it various benefits for the plant operator:



Discover live at the AICHEMA - Virtual Reality in plant engineering brings essential advantages.

1 A dynamic simulation makes it possible to provide efficient and close to reality training to operating staff independently and without the existence of a real plant („Dry training“);

► **The owner's personnel is trained and familiar with the local conditions before the plant is commissioned.**

2 The operating staff can be sensitized to critical situations and trained with a practical orientation. What to do upon start-up and shutdown of a plant or in case of fire? How do the plant operator's activities influence the plant processes? What to do in order to keep the burdens on critical plant components, such as compressors or pumps, as low as possible during start-up and

shutdown and thus maintain the service life and availability? When a slide valve is turned in the simulator, the dynamic simulation will respond and the filling level and/or temperature etc. rise as it would also happen in reality;

► **Less incidents resp. accidents, greater safety, no unscheduled shutdowns, lower maintenance and repair costs.**

3 An efficient and optimal plant operation is supported. The adjustment of values in the process control system and its consequences can be visualized already by the virtual system – the simulator will then show the values that can be obtained in reality, three-dimensionally visualized by VR glasses;

► **Higher yield by optimal plant**

operation, higher plant availability and longer service life.

4 All details of the equipment are smartly stored. Datasheets, test reports, maintenance records etc. can be viewed with just one click on the equipment with no need to be at site;

► **Maintenance costs can be reduced and downtimes minimized.**

5 The plant safety can be checked and used for HAZOP analyses.

6 Simulations with modified feedstock and/or products can be done before the plant is actually converted as can be done for the conversion proper;

► **Higher flexibility in production to respond to changed market processes, shorter changeover times, lesser non-conforming products.**

SUMMARY

The VR-assisted 3D plant model brings essential advantages for the customer in terms of costs and benefit. It applies in particular to plant owners requiring a high flexibility of production (e.g. frequent change of feedstock and product specification) who gain a major competitive advantage: higher plant safety, maximum availability and service life, faster conversion, lower maintenance costs. ■

More efficient planning

Software advancement. Smart workflows across different locations.

BY THOMAS HERMANN

VIENNA. Out of over one thousand completed plant engineering projects Pörner can draw on a wealth of over 870 pipe classes for a multitude of industrial applications.



As part of the “Anlagenbau 4.0” concept a centralized pipe class and specification management based on the SmartPlant® products by Hexagon PPM was successfully introduced by the Pörner Group at the turn of the year 2017/18.

Thus, Pörner fills the gap between the component and pipe class specification and engineering connecting the engineering and procurement processes in an efficient manner.

„The engineering across different locations with its smart workflows and interfaces sub-

stantially improves efficiency and quality in project execution in line with Pörner's Anlagenbau 4.0.“ says Head of piping Thomas Hermann.

All selected pipe classes kept at the new SPRD system are now stored and maintained in a central database for all subsidiaries. The pipe classes for the INTERGRAPH 3D engineering systems such as PDS, Smart 3D, SmartPlant Isometrics and AVEVA PDMS are made available from a central Citrix server. Pipe classes can thus be generated automatically.

This means that the entire materials management from procurement through to the delivery to the relevant site can now be controlled and handled centrally from one database.

A major step towards rigorously reducing data redundancies and standardizing components and making the piping components as a major part of a process plant available in a smooth and error-free manner. ■

First practical experience using CloudWorx with JetStream

Revamp. Efficient use of software tools.

BY ROMAN TATSCH

LEIPZIG. Based on the laser scan of a crude oil plant at a German refinery EDL used for the first time CloudWorx (software application in Smart 3D) together with JetStream in Smart 3D and Smart Plant Review (viewer software). The point cloud created by laser scanning was referenced in the 3D plant model to define interfering edges.

JetStream is an additional program for CloudWorx enabling a rapid data access and the visualization of point clouds and a central data storage. The advantages are:

- Ultra-fast data access by gaming technology
- Direct display of all data upon start and immediate loading of point cloud
- Data management of huge amount of data
- Central data storage within a network
- Simultaneous access to data record by several users
- Data record up to 10 times

smaller than with Cyclone IMP.

Positive cost-benefit analysis

A cost-benefit analysis illustrates that the high costs due to the laser scan, purchase of the software and use of partially new hardware are compensated by significant advantages, such as:

- Less personnel for on-site measurement
- Higher plant safety for plant owner since almost no external personnel needs to be employed
- Permanently retrievable information on interfering edges
- Almost no business trips for the purpose of checking the on-site situation
- Less time for planning.

At various conferences, such as the recent cegug in Darmstadt, representatives of well-known companies, such as Evonik, Bayer, Linde, OMV, InfraServ, IPRO, Hexagon PPM were very interested in the practical experience of EDL.



Point cloud of a plant unit, the little section shows the scan points in yellow

SUMMARY

What we learn from the use of CloudWorx with JetStream:

- It is especially useful for complex revamps but cannot fully replace the work at site.
- An early integration of the engineering office to define the scan locations can help prevent remeasurements. ■

Borealis opted for Pörner Group as exclusive engineering partner for Central Europe

Trusting partnership. Common goals are efficiency and safety.



BY PETER SCHLOSSNIKEL

VIENNA. In 2017 Borealis took the strategic decision to ensure in the long run safety, quality and efficiency of projects for the European sites by cooperating with four renowned framework contract partners.



For Central Europe the Pörner Group was chosen as exclusive engineering partner and commissioned to work with the sites in Austria, Germany and Italy.

Long-years' cooperation

In Austria the focus is on the Borealis sites at Schwechat and Linz for whom engineering services have been provided for many years. Professional support at sites directly and the capacity to execute medium-sized projects both in the area of plastics and synthetic fertilizers were major criteria.

In Germany it concerns the sites of Burghausen and Piesteritz and some minor production centres in the east of the country.

The above sites receive support from Pörner Grimma and EDL Leipzig in close cooperation

with the parent company. When it comes to larger projects task forces are formed with employees from several offices.

Great expectations as to efficiency and professional engineering services: Safety is of utmost priority

Out of conviction the Pörner Group commits to the goal of Borealis: SAFETY - GOAL ZERO - Zero Accidents and Incidents.

Building on experience, knowledge of the plant engineering procedures and all norms and the harmonization of the engineering standards Pörner has the capability to provide Borealis with excel-

„We are proud to be the preferred partner of Borealis.“

Peter Schlossnikel

lent engineering services.

To be able to draw on reliable partners even in times of robust



The team in Burghausen around location manager Claus Roiger (r.) - fully motivated for the tasks ahead.

economy, framework contracts have proved successful:

„Borealis is currently on an unparalleled growth course. We chose Pörner to have a reliable and professional partner who works together with us towards utmost performance and competitiveness. On this road we see major success factors in leadership and competence. Continuous improvement of engineering processes, competent and committed engineers and project staff in integrated teams open up the op-

portunity to set new benchmarks in terms of safety, quality and efficiency in successful projects“, says Bernhard Oberbauer (OPEX Manager Engineering with Borealis).

Success factor: stable and strong teams at site

In order to continue to fulfil all tasks entrusted in a reliable, flexible and accurate manner, a new site was officially opened in Burghausen as a field office of Pörner Germany (refer to page 8).

A strong team of local staff reinforced by specialists from Vienna, Linz, Kundl and Grimma headed by Claus Roiger provides engineering services of different disciplines for Borealis.

„We gladly take up the huge challenges and consider them an opportunity for improvement“, states Peter Schlossnikel, Managing Director of the Pörner Group. *„We are proud to provide services as an exclusive partner of Borealis that have to stand up to international benchmarks.“* ■

Grand opening of pilot plant at Trinseo's

Implementation of customer technology. EDL as engineering partner for rubber producer.

BY DANIEL MOHR

SCHKOPAU. At a formal ceremony on 28 February 2018 in the presence of numerous guests from the worlds of politics and business the S-SBR pilot plant was put into operation in Schkopau. S-SBR stands for Solution-Styrene-Butadiene Rubber and is



its contribution. The plant is designed to develop new rubber materials for high-performance tires in shorter test procedures and bring them to market maturity. The ultimate goal is the production of modified rubber products for tires of low rolling resistance. The lower the rolling resistance the lower the fuel consumption and thus the CO₂ emission.

The pilot plant substantially cuts the time for the production of



Grand opening of plant by Minister-President of Saxony-Anhalt R. Haseloff (third from right), Senior Vice President H. Yarkadas (third from left) and Managing Director of Trinseo Deutschland GmbH R. Irmert (back row, third from right).

a synthetic rubber that is highly interesting for the tire industry in particular.

The research at Trinseo is raised to world-class standard by the pilot plant. And EDL has made

rubber test samples. The products developed by research can now be used within a shorter time for the production of samples with no need to shut off production facilities to run tests as it was practice



S-SBR pilot plant for the production of new rubber materials for high-performance tires

beforehand. It means significant savings of resources, less waste products and less consumption of primary energy.

Due to the fact that new products can be brought to technical maturity and used commercially in a faster way, Trinseo's innovative capabilities increase and provide a competitive advantage.

Project history

In summer 2014 EDL was commissioned by Trinseo with the basic engineering including cost calcula-

tion for the pilot plant. At this stage all specialist departments had worked closely with the customer as process owner. The process steps and equipment did not constitute new territory for the EDL engineers but the impressive scale of the pilot plant featuring a huge degree of automation - complex requirements in the most confined space - had been a new experience. The next project step was the implementation of the early-work program with input to the permitting which EDL was entrusted with in July 2015. In autumn 2015 EDL

was then awarded the main contract - the detail engineering of the plant. In addition to that EDL provided services for the procurement, site supervision and commissioning support.

In good cooperation with the customer the mechanical completion was reached on schedule in September 2017. Research can now be further enhanced by Trinseo and all car drivers have reason to hope for low rolling resistance tires in the near future. It is also a valuable contribution to environmental protection. ■

Proprietary technologies for more efficiency

Technology development. EDL offers efficient processes for „special products“.

BY DR. MICHAEL HAID

LEIPZIG. Stricter environmental regulations, dwindling resources and changing market conditions force plant owners to look for new ways to keep their products competitive and come with new, first-class products respectively.

EDL faces these challenges, too, and offers innovative and



custom-tailored technological solutions.

For several years EDL has been continuously extending its business unit of process engineering & technology and invests in the development of the technological know-how and its own technologies.

In this context EDL focuses on an improved and in particular sustainable processing of heavy refinery residues and used oils. The manufacture of climate-neutral fuels and chemical base materials in combination with resourcesaving processes, lower energy

consumption and a process design that meets all environmental standards are also in the center of attention.

By own test facilities, process simulations and associated planning, procurement and supervision services EDL provides complex solutions for optimized process plants.

As a trusting consultant in matters of concept development, selection of own and third-party technologies to fulfil the requirements and goals EDL provides advice and assistance to customers.

New technology logos

In future the technologies will be marketed with own logos. The technology logos are word marks and consist of an English logogram for the relevant technology. The following technologies will come with these word marks:

1. Solvent Deasphalting
2. Solvent Extraction
3. Dewaxing
4. Deoiling
5. Spray micronization
6. BTX aromatics extraction

Compared with other tech-

nologies they provide a number of advantages, such as lower investment and operating costs, lower energy consumption and a valuable contribution to a responsible use of raw materials.

The most important characteristics of the technologies are listed below. ■



1. SOLVENT DEASPHALTING

Feedstock:

Residues from crude oil processing such as vacuum residue or hydrocracker residue (unconverted oil).

Final products:

Deasphalted Oil (DAO, bright stock) and residue (pitch) consisting of resins and asphalt. DAO is further processed in a hydrocracker (HC, RHC) or Fluid Catalytic Cracker (FCC) to fuels or in lube refineries it is used as bright stock for further processing to base oils. The residue is used for the production of bitumen.

Technology:

Innovative technology for solvent deasphalting (SDA) with most different solvents (C_3 to C_6) as single- and two-stage plant for residue processing.

SDA PLUS
EDL•TECHNOLOGY



2. SOLVENT EXTRACTION

Feedstock:

Vacuum distillate (lube cuts) and deasphalted oils from SDA.

Final products:

Base oils with reduced aromatics content to produce lube oils as well as process and tender oils resp. for the production of tires, such as high-aromatic extracts (DAE and RAE) as well as treated high-aromatic extracts (TDAE and TRAE) with reduced content of polycyclic aromatics (PCA).

Technology:

Innovative extraction technology based on agitated extraction columns using furfural and NMP as solvents including co-solvents.

EXTRACTION
EDL•TECHNOLOGY



3. DEWAXING

Feedstock:

Base oils as well as deasphalted oil (bright stock) from SDA for further processing to lube oils.

Final products:

Dewaxed base oils with defined pour points for industrial use as lube oils as well as slack wax for the production of waxes.

Technology:

Innovative solvent dewaxing technology using scraped surface exchangers and rotary vacuum filters.

DEWAXING
EDL•TECHNOLOGY



4. DEOILING

Feedstock:

Micro- and macrocrystalline slack wax from dewaxing with oil contents from 3 to 10 %.

Final products:

Micro- and macrocrystalline hard waxes with an oil content below 0.5 % (1.0 %).

Technology:

Innovative technology for deoiling of macrocrystalline waxes (sweating process by SULZER) and microcrystalline waxes (solvent deoiling by EDL) as well as a combination of both processes to reduce the investments.

DEOILING
EDL•TECHNOLOGY



5. SPRAY MICRONIZATION

Feedstock:

Liquid feedstock with pour points ranging from 65 to 120 °C, mainly natural and synthetic waxes.

Final products:

Spray micronisates composed of uniform, round particles with a grain spectrum ranging from 10 to 100 µm.

Technology:

Innovative cocurrent flow spray micronization to process waxes and similar substances, using a two-fluid nozzle and hot nitrogen to produce uniform, round micronisates.

MICRONIZATION
EDL•TECHNOLOGY



6. BTX AROMATICS EXTRACTION

Feedstock:

Fractions with a high content of BTX aromatics from reformer or FCC plant.

Final products:

High-purity BTX aromatics such as benzene for synthesis, toluene with TDI purity or m-, p- or o-xylenes for chemical synthesis.

Technology:

Innovative technology for extractive distillation using glycol in form of DEG, TEG or TTEG and mixtures with NMP as solvent to get high-purity BTX aromatics. Economic alternative to the sulfolan process with optimized energy integration and low investment costs.

AROMEX
EDL•TECHNOLOGY

e-crude: climate-neutral crude oil substitute from CO₂, water and eco-power

Revolution. First commercial power-to-liquids plant worldwide.



BY DR. MICHAEL HAID

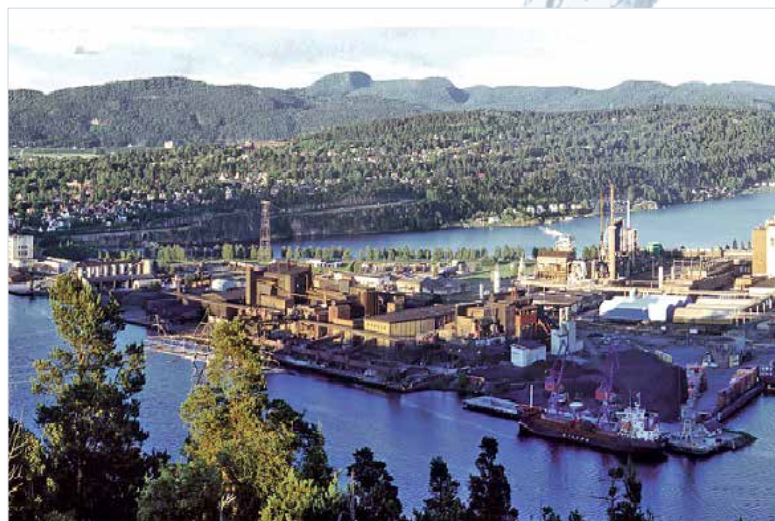
LEIPZIG. It sounds spectacular, but it has already become feasible: the production of chemical base materials and fuel components from CO₂ and water by means of eco-power (Power-to-Liquids (PtL)). And Nordic Blue (NBC, Norway) have committed themselves to exactly this goal. At present EDL and Sunfire (Germany) are performing engineering services for this project.



electrochemical transformation by co-electrolysis. In a Fischer-Tropsch synthesis the syngas is then converted into hydrocarbons, the e-crude. The e-crude can then be further processed to high-valuable fuel components (e-fuels) and chemical base materials (e-chemicals). The existing gas station infrastructure and fuel logistics can be used further and these e-fuels can directly be applied in the existing combustion engines. I.e. vehicles of today are de facto CO₂ neutral – a huge advantage compared to classic electromobility since purely electric powertrains will not be available on a commercial basis for heavy-duty and air traffic in the medium run!

The PtL process

The first step of the PtL process is the renewable generation of syngas (CO to H₂). This gas originates either from a steam electrolysis and CO₂ conversion by RWGS (Reverse Water Gas Shift) or from a direct



The first PtL plant for e-crude will be built at Heroya industrial park in Norway.

southeast of Oslo. The plant is to produce 8,000 t of e-crude annually using 20 MW of power generated from hydropower.

As planned the SOEC (Solid Oxide Electrolysis Cell) technology by Sunfire will be applied for steam electrolysis in the plant in Norway.

Mostly CO₂ industrially produced as by-product at the neighboring site shall serve as carbon source. In addition to this CO₂ from the air shall be captured using the DAC (Direct Air Capture) technology by Climeworks. For the RWGS stage as well as for the Fischer-Tropsch synthesis the use of commercially available catalysts is envisaged. In a downstream fractionation unit the separation into e-waxes and e-fuels takes place.

Engineering has started

Since summer 2017 the technological terms of reference have been implemented. A team of process engineers prepares balances and overall concepts. EDL investigates the technical feasibility of the in-

dividual process stages prior to selecting the suitable/optimal individual process technology. In the future engineering services related to equipment, piping, layout as well as a cost-benefit analysis will also be included in EDL's scope of work.

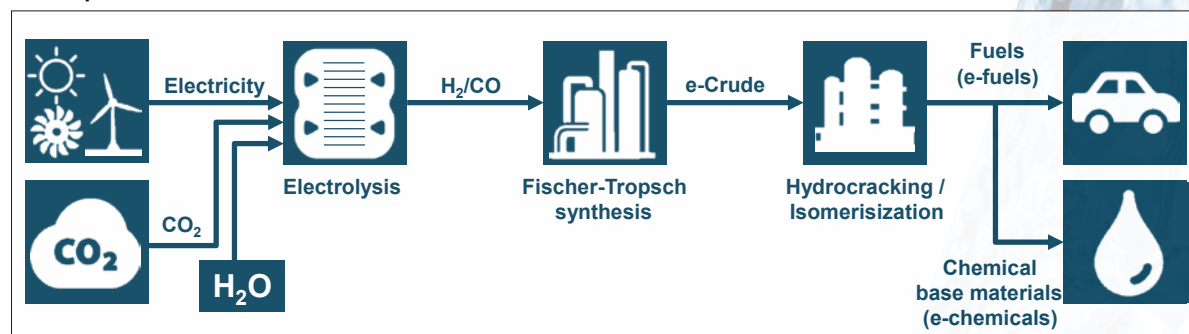
Dr. Michael Haid, EDL's CEO: „The combination of plant engineering know-how available at EDL, the creative search for the best possible technical and economic solutions and this innovative technology suit us excellently. Sunfire is deemed the pioneer in the field of SOEC technology which is being further developed to a co-electrolysis to produce syngas in one step without RWGS.“

Innovative technologies for refineries

Classic refineries can improve their CO₂ footprint by using the PtL technology to produce CO₂-neutral Fischer-Tropsch hydrocarbons or methanol. In addition the hydrogen generation by electrolysis is also attractive.

Dr. Haid: „Using these technologies for new plants or switching existing plants to this technology the percentage of ‚green‘ refinery products can be increased – a crucial added value for the refinery. To a certain extent this may be the first step, but at least a pre-stage of the non-fossil crude era.“

The PtL process



Solving the benzene issue

Refinery. AROMEX provides an overall solution to the benzene issue.

BY DR. ROLF GAMBERT

LEIPZIG. Since the regulation of the benzene content of fuels (gasoline) to max. 1 vol% the refineries make great efforts to limit benzene in the reformed gasoline.



The catalytic reformer where about 4 to 9 vol% are produced is the main source of benzene. Other sources of benzene are the steam cracker, FCC, hydro-dealkylation and the coker.

Benzene an important base material for chemistry

On the other hand, benzene is one of the most important chemical base materials for the synthesis of ethylbenzene, styrene, phenol, cumene, cyclohexane, chlorobenzene and aniline just to mention only a few target products.

The need for benzene has constantly grown over the years despite seasonal fluctuations. The benzene price is mainly linked with the crude oil price and will be

rising by the increasingly restricted benzene market in particular.

From this perspective the extraction of benzene from reformed gasoline becomes an increasingly interesting solution the more so as two problems – on the one hand the limitation of the benzene content of the reformed gasoline and the rising demand for benzene on the other – are taken into account and solved.

Efficient solution to the benzene issue

The reduction of the benzene content of the reformed gasoline creates enormous difficulties for refinery operators. Many of them have already been running reformers in the „low servity mode“ to avoid a higher benzene content.

Others try by a suitable pre-distillation to separate the benzene precursors, such as cyclohexane, methyl cyclohexane and n-hexane, and thus keep the benzene formation as low as possible.

Whatever method is applied, it leads to an inefficient operation of the reformers since products of low octane rating and less hydro-

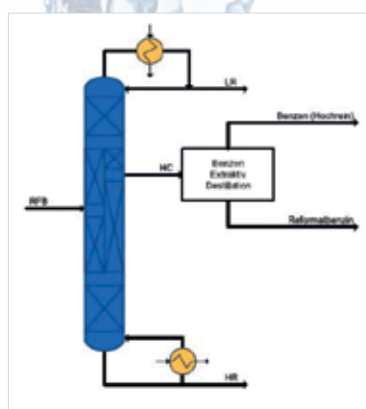


Fig. 1: Divided wall column with HC for extractive distillation of benzene

gen for other refining processes are produced.

Cost-efficient benzene production

This is where the EDL AROMEX technology comes in - providing an overall cost-efficient solution of the benzene issue to the refineries.

With AROMEX the separation of benzene from the reformed gasoline is done by a highly efficient divided wall column (Fig.1) instead the gasoline and naphtha reformate splitters. Besides the

low-benzene gasoline and naphtha a benzene-containing fraction is obtained in form of a heart cut (HC) containing benzene but also toluene and o-, m-, p-xylene as aromatics.

Further processing of the benzene-containing fraction as high-purity benzene for synthesis (> 99 vol%) takes place by a BTX extractive distillation (Fig. 2) offered by EDL together with its partner TTC Labs.

100% capacity increase at the same investment

The use of glycols makes the production of BTX aromatic compounds much more efficient compared to sulfolane. Therefore, only about 60 % of the investment costs of a sulfolane plant is expected for new plants. The conversion of an existing sulfolane plant will raise the throughput by 100 %.

New plant confirms high economic efficiency

The presentation of the commercial and technical benefits of a divided wall column for the pro-

duction of the benzene fraction by EDL convinced a large German refinery. The plant is running now and reaches the benzene purity of

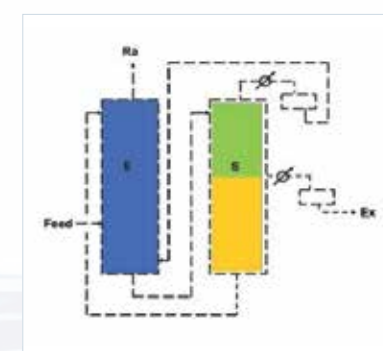


Fig. 2: BTX extractive distillation with glycol (DEG, TEG, TTEG)

< 65 vol% in heart cut as specified by EDL. It is carried to a neighboring chemical plant to produce high-purity benzene at a BTX unit for synthesis. The operators of the refinery and the chemical plant are highly satisfied. The refinery can now run the reformer in the „high servity mode“ cost-efficiently and thus improve both the octane rating and the hydrogen balance.

AROMEX provides a cost-efficient optimal overall solution both as revamp and new plant.

AROMEX
EDL • TECHNOLOGY

RENEWABLE ENERGY AND HIGH-TECH

Ready to conquer the world. PÖRNER

For many years, the Pörner Group has been researching the production of silicon products from renewable raw materials.

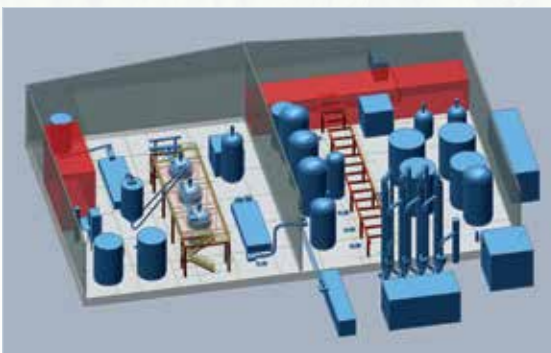
Now the Pörner engineers have succeeded in developing a robust technology for the production of high-quality sil-

icon products from the ash of rice hulls. Research is carried out on a separate, own pilot plant in Freiberg (Germany).

The new Pörner rice hull technology makes it possible to produce high-tech silicates more efficiently than before while at the same time pro-

tecting the environment in various and sustainable ways.

The new, patented process is ready for worldwide use. It opens up diverse, sustainable new applications around the world. Silicates are a key product on every continent.



Plans for the large-scale silicate plant are already well advanced



Different products to be produced out of rice hulls: from water glass to fertilizer



Paints & varnishes



Catalysts



Person



Soil stabilization



Laundry detergent



Plastic



Pulp / cardboard



Tires



Ceramics

NUMERO

THE PROCESS

Rice is the main food source for half of the world's population. Each grain of rice is surrounded by a hull, which accounts for about 20 % of the weight. During rice processing, these rice hulls are dismissed in large quantities as a waste product and rot only slowly. They contain huge energy potential though, which until now have largely remained unused.

Thanks to the innovative Pörner technology, the rice hulls are converted in modern biomass power plants into environmentally friendly, renewable „green energy“ instead of being

turned into waste. Burning the hulls creates in a CO₂-neutral cycle additionally to electrical and thermal energy also rice hull ash. This rice hull ash contains more than 90 % silica (SiO₂), which is now ready to get converted into cost-effective and high-quality water glass in the Pörner silicate plant.

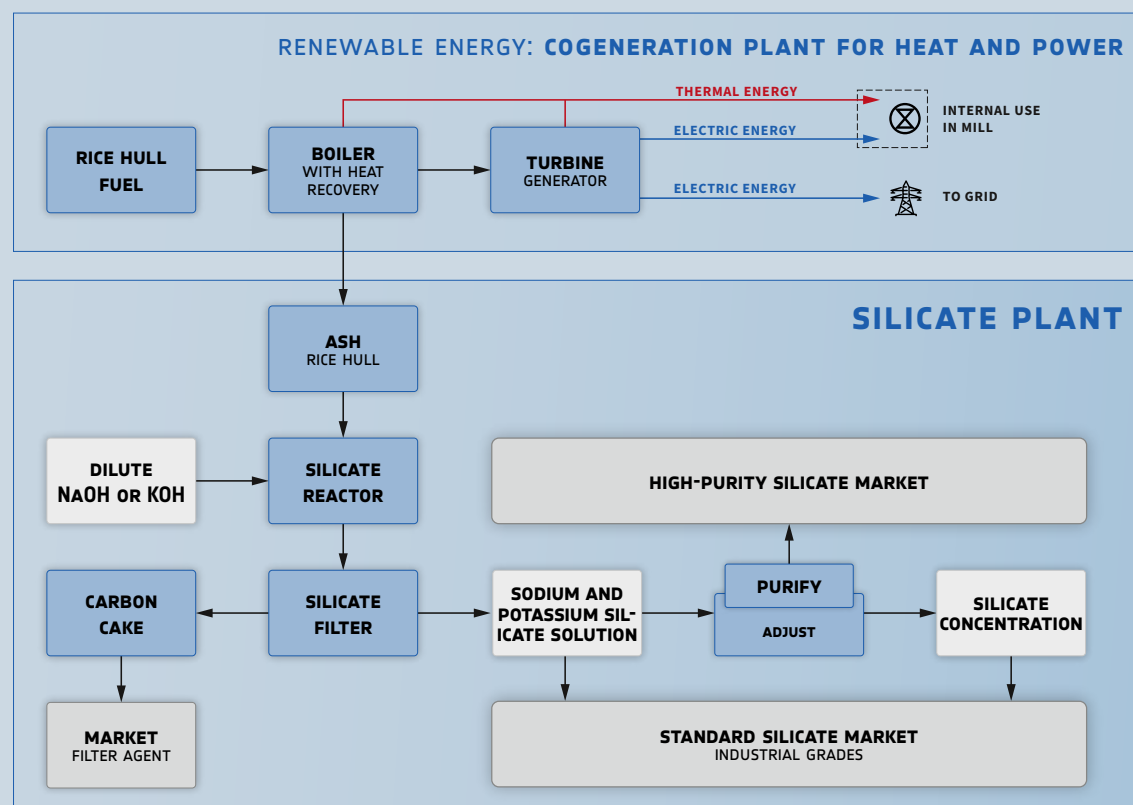
Depending on the desired product, caustic soda or potassium hydroxide solution is processed together with the ash. Moderate dwell times, pressures and temperatures are sufficient to achieve high yields. The result is a suspension of

high-purity sodium or potassium silicate and the remaining carbon of the rice hull ash.

In the subsequent filtration step, a filter cake, which consists of almost pure carbon and thus represents another usable by-product, is obtained. The filtrate already has a high product purity and can already be used as water glass in industrial quality after decolorization of the product subsequently.

Producing water glass for the high purity silicate market is associated with relatively little effort, since the rice hull ash is already at very high quality. ■

The Pörner rice hull technology is divided into two sub-processes: generation of environmentally friendly energy and high-tech silicates.



Pilot plant in Freiberg

Our process engineers and chemists have succeeded in developing a robust technology for the economic and ecological production of silicate. To showcase the process and to provide an open venue for client testing, Pörner Group built a dedicated pilot plant in Freiberg/Germany. The facility is specifically designed to optimize key process parameters and is capable of producing a wide range of high-quality silicate products within strict specification limits.

Depending on the customer's request, it is possible to supply high-quality silicate products in liquid form in any desired specifications. Clients may ship quantities of ash for testing or Pörner Group can provide a standardized ash under signed agreements for testing and limited production of pure liquid silicates.

Additional laboratory and prototype equipment are located within the building for a timely analytical support. ■

Peter Schlossnikel (Managing Director Pörner Group) and Gerhard Bacher (Managing Director Pörner Grimma) at the pilot plant.



TECH SILICATES OUT OF RICE HULLS

R RICE HULL TECHNOLOGY



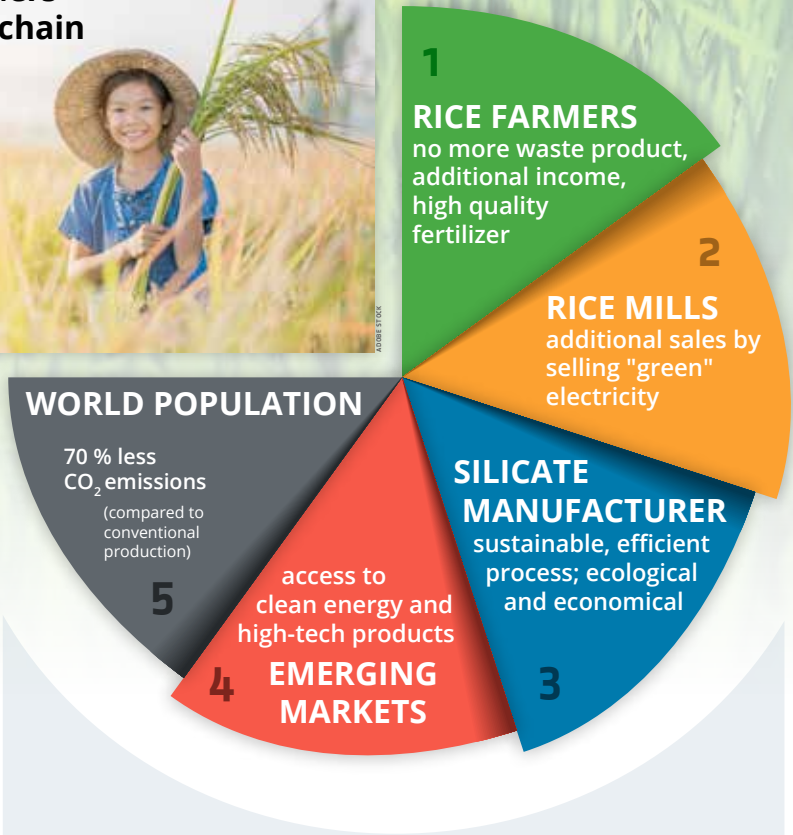
Silicate is a valuable base material used in countless applications. Applications span from bleaching agents in the paper industry, over detergents additives, paints, building materials, cosmetics, to the tire industry and construction chemicals. Sodium and potassium silicates are a key product on every continent.

As an environmentally friend-

ly fertilizer silicon has decisive advantages. It improves plant growth and increases harvest yield and quality by up to 25 %. Overall, the world market for silicates is growing rapidly. It is forecasted to reach approximately six billion US dollars by 2020, with detergents accounting for around a quarter of the market, and precipitated water glass for car tire production the fastest-growing market ("green tires").



All stakeholders of the value chain profit from Pörner technology.



ADVANTAGES

The Pörner rice hull technology can be used at any time along the value chain from rice plant to high-tech silicate. It offers every user far-reaching advantages and high flexibility, since only parts of the overall process can also be implemented. Depending on requirements, the biomass power plant or the silicate plant alone or both can be realized or expanded together by Pörner as an overall concept.

- The rice farmer can use the once worthless waste product rice hulls and use the product - an organic fertilizer - in his fields.
- The rice mills achieve improved efficiency of their plant through expansion with a biomass power plant. Electricity needs can be covered locally or surplus electricity sold.
- The silicate manufacturer benefits from a proven process that allows him to economically produce 20,000 to 50,000 mt/year of high-quality, high-purity water glass from renewable raw materials.
- Far-reaching environmental and economic benefits for entire economies: stabilizing energy supplies in emerging economies such as India, giving many families access to clean energy and high-tech products.
- Solving a serious ecological problem: rice hulls are currently rotting in wild landfills or being incinerated in open fires resulting in damage to air, soil and groundwater.
- The world population benefits from a much better environmental balance. CO₂ emissions alone are reduced by up to 70 % compared to conventional production.

PÖRNER TECHNOLOGY FROM RICE HULLS	CONVENTIONAL MANUFACTURE OUT OF QUARTZ SAND
rice hulls are a renewable raw material, available at low cost as a waste product	limited availability of highly pure quartz sand
moderate reaction conditions (T < 150 °C), energy requirement can be covered by combustion of the hulls themselves	Very energy-consuming to produce (T > 1,300 °C)
hardly any impurities in the final product, higher purity	ionic impurities, thus high cleaning costs
directly from rice hull ash to water glass in just one process step	two sub-processes necessary
CO ₂ neutral	Reaction by forming CO ₂



Pörner at Burghausen

Opening. New Pörner office founded in Germany.

BY GERHARD BACHER

BURGHAUSEN. At the beginning of the year, the new office of Pörner Ingenieurgesellschaft Germany was opened at the refinery site Burghausen. By this, the Pörner Group is now also available as an engineering partner to industry locally in Bavaria.



Claus Roiger, Location Manager of Pörner Burghausen: „We are pleased to support long-term business partners like Borealis and OMV in their future-oriented projects in Burghausen locally.

Thanks to modern networking, the Pörner Group has a large capacity of experienced engineers at disposal. Together with the Pörner offices in Vienna and Grimma as well as with EDL in Leipzig, the upcoming projects will be handled reliably, quickly and precisely.”

At a meeting with Burghausen's mayor Hans Steindl, Gerhard Bacher, Managing Director of Pörner Grimma, and Claus Roiger, presented the goals of the newly founded Pörner office.



The mayor was pleased about the investment taken in an engineering office at Burghausen and expects a positive impact on the industrial development of the region.

We wish Claus Roiger and his team every success! ■

Meeting in February 2018, Burghausen's mayor Hans Steindl with Gerhard Bacher, Managing Director Pörner Grimma (l.), and Claus Roiger, Location Manager, Pörner Burghausen (r.)



The Burghausen team: sitting to the right: Andreas Zärmer, Alexander Kerns, Dirk Fliegner, Robert Diersche; standing: David Massong, Harald Engl, Christian Lingslebe, Claus Roiger (Location Manager Burghausen), Tanja Edenhofer

Advanced energies

Energy. Pörner Linz with new departement.

BY PETER SCHLOSSNIKE

LINZ. A new specialist department for ADVANCED ENERGIES was opened by Pörner Linz. „We want to keep pace with the time and develop new tasks and areas for Pörner“, says Christian Geyrhofer, head of the new department.



Energy has become a top issue



Eugen Gotter, Location Manager Linz (r.) with head of department „Advanced Energies“ Christian Geyrhofer (l.)

in Europe and the requirements for operators are huge. It is to be environmentally friendly, innovative and green at minimal costs. Nuclear power stations have lost their charm because they are considered hazardous and unsafe. Consequently, decisions have to be taken and considerable thought be given on how to dismantle them. The big question is how to meet the energy demand of the future and what alternatives are tolerated by a country?

Together with experienced engineers of Pörner Linz a small group of specialists will explore new horizons. „An excellent extension of our portfolio“, says Eugen Gotter – Location Manager of Pörner Linz. „Especially in times of a robust economy it is necessary to open up and develop new prospects“, agrees Geyrhofer. Energy issues will keep us busy to a large extent in future.

To become independent of combustion processes and CO₂ emissions – new developments are to be dealt with in this direction. Initial tasks are in the pipeline already. Anyway, Pörner Linz is up front. ■

TAF: Special solutions where others back off



Cooperation. Rapid development of special solutions.

BY ANDREAS PÖRNER

Freiberg. „Special solutions precisely fulfilling their purpose are our speciality. We are creative, flexible and fast“, says Jonas Kappeler, Managing Director of TAF, a company founded by him in 1997



TAF founder Jonas Kappeler

in Freiberg, the mining-oriented university town. Its customers are primarily ones with extraordinary jobs. Products are delivered globally.

Cooperation creates many advantages for customers

Pörner and TAF have been cooperating in the fields of offgas treatment (e.g. offgas from Biturox® oxidation), special-purpose equipment and pilot plants for research projects and initial plants.

Industrial customers benefit from this cooperation in many ways:

- Trusting partnership since 2004 leading to rapid development of special solutions
- Practical experience in building and operating of special equipment is incorporated in planning and design
- Expeditious order processing when it comes to urgently needed components: Working in shifts if needed to cut delivery times
- Cooperation with universities and research institutes gives access to the latest scientific findings
- Fast adaptation of pilot plants in accordance with the state of research and knowledge.

TAF cooperates with several universities and renowned research institutes in Germany – and is often engaged by them directly. If a university conducts fundamental research, TAF is an active partner when it comes to transferring findings from lab scale to pilot plant. It combines scientific thinking and industrial practice – for the benefit of customers.

In the Saxon town of Freiberg TAF has a production hall of 1,900 sqm and a staff of 30 employees. With special equipment and complete package units for special process tasks, TAF has managed to built up a reputation in Germany and overseas - beyond the traditional fabrication of large burners and pressure vessels - in the last few years. ■

Three tanks shortly before their completion in the 1,900 sqm large production hall of TAF in Freiberg



INTERNAL MATTERS

BY MARGOT SIMONIS

Safety first

Advanced training. SCC training in Vienna



VIENNA. The certification system SCC (Safety Certificate Contractor) is an international safety standard to harmonize the requirements to be met by contractors of work and services, such as maintenance, installations, crane, cleaning and insulation works at client's production sites.

Besides his operative activities at the C/S/A department Thomas Eckl also holds the functions of the works council chairman and safety officer for Pörner Vienna. We talked to him:

Ed.: Another SCC training course was held for Pörner employees in March 2018.

Eckl: Yes, it is right. We hold such training courses every year to reach as many employees as possible. This time we had 16 attendants.

This training is particularly important for those working at clients' industrial plants, such as OMV, Borealis, Agrana, Sandoz.

You brush up knowledge and learn new facts, such as current statutory provisions on employee protection. Such courses are especially indispensable for newcomers. What to do in the event of an emergency? What can I do to avoid such events from the outset?

What kind of protective equipment do I need in hazardous areas?

Ed.: Talking about safety – what about the accident statistics for Pörner in the last few years?

Eckl: In the last six years there were only two accidents with days lost. We are working on zero days lost. ■

Pörner Linz received order from the USA

Recycling. EI&C engineering for 100 % recycled cardboard packaging.

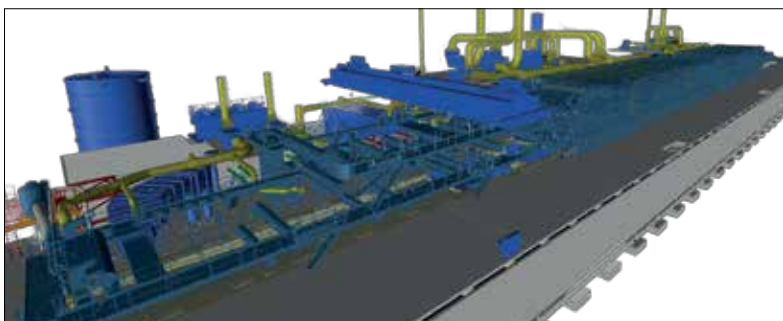
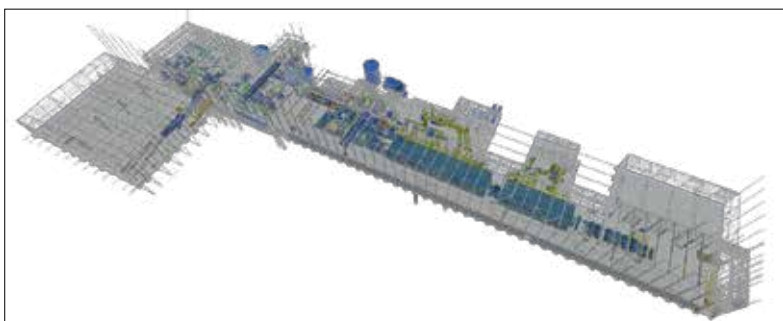
BY MARIO SLESKA

WAPAKONETA. Just before the end of 2017 Pörner Linz was awarded a contract by the paper industry. To-



Pörner is in charge of the basic and detail engineering for electrical, automation and control which includes instrumentation, setup and software specifications.

Pratt Paper is the world's largest manufacturer of paper and packaging material made of 100 % recycled material. By this Pratt



Entire plant (top) and paper machine (below) - PDMS model (Carantec)

gether with Carantec (Klagenfurt) the factory for the production of cardboard packages of Pratt Paper in Wapakoneta, Ohio, USA is being extended. The project shall be completed in October 2018 with the aim to increase the capacity by 1,060 ODSTPD (Oven Dry Short Tons Per Day).

makes an important contribution to environmental protection and sustainability. At the factory in Ohio cardboard packages are made of waste paper and water.

Working across locations in Linz and Vienna, Pörner will hand over the project in the usual high quality and on schedule. ■

Good lubricants for Nigeria

Petrochemistry. New just-in-time lubricant mixing plant.



BY EUGEN GOTTER

LAGOS. Pörner in Linz together with the lubricant expert LOBP-Consulting planned a new lubricant mixing and grease plant in Lagos / Nigeria. The operator, MRS Oil Nigeria PLC, is one of Nigeria's leading petrochemical companies and national market leader in high quality lubricant brands.



The first delivery with 120 containers reaches Lagos and is unloaded in front of the production hall.

Pörner plans and delivers

Pörner Linz, in close cooperation with the customer's technology provider and project coordinator, LOBP-Consulting from Ahrensburg/Germany, made the detailed engineering in PDMS 3D, including piping layout, materials management and isometries for the blending unit including the tank farm.

The cooperation with LOBP Consulting in the engineering phase was very constructive so that Pörner subsequently was commissioned with the supply of bulk material (piping, valves, field devices, accompanying heating), the pumps, storage tanks and auxiliary equipment (compressor station, refrigeration and thermal oil plant).

At the end of June 2017, the entire Pörner package was loaded in 24 containers and three flat racks in Hamburg. At the beginning of August, the ship reached the destination of Lagos, together with the first machine delivery consisting of

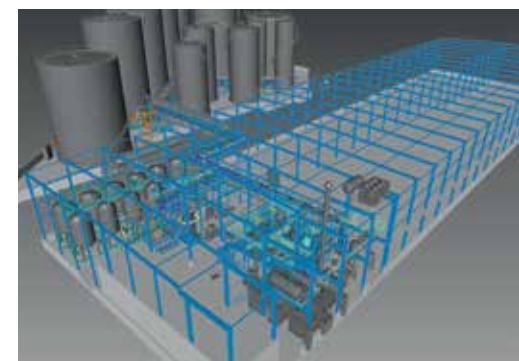
120 containers. Currently, the construction of the hall is largely completed and assembly can begin.

Diversity and "Lean Production"

The plant for lubricant mixing, filling, storage and shipping will go into operation at the end of 2018. In the state-of-the-art plant, base oils and additives are mixed simultaneously and in small quantities (Simultaneous Metering Blender, SMB).

The pigging system, optimized for the plant, ensures sustained high production quality despite intensive product changes, thus enabling „lean production“. Both inline blending (patented LOBP) and batch blending result in high-quality lubricants for motor vehicles (engine oils) and greases for West Africa.

The cooperation between LOBP-Consulting and Pörner will be further expanded in future lubricant projects. ■



3D PDMS model of the new lubricant mixing plant and grease production, which will be integrated into a new multi purpose-production hall.

LNG terminal in the Aegean Sea

Gas. Gazintek has been involved in each expansion for 20 years.

BY CLAUDINE RIOU

REVITHOUSA. LNG (Liquefied Natural Gas) is one of the fastest growing markets worldwide. By 2020 an increase of LNG demand by 50 % is expected.



On the island of Revithoussa, west of Athens, there is Greece's only LNG terminal, which was put into operation in 1999. From there, all Southeast Europe is supplied with natural gas. The LNG terminal in Revithoussa is thus an important base for the stable energy supply of the EU.

Since its commissioning, in addition to the installation of a co-generation unit, the terminal has undergone two expansions, one in 2007 and one started in 2016.

Gazintek has been involved for 20 years

Gazintek, the Ukrainian subsidiary of the Pörner Group, is an engineering specialist in the gas

sector and has been involved in the terminal design from the beginning.

20 years ago Gazintek, provided the piping detail engineering of the basic terminal including 1,200 isometric drawings and the bill of

quantities (at that time, the design was performed in 2D).

Later, in 2006 – 2007, Gazintek was involved in the first expansion of the terminal. After a site survey, Gazintek engineers performed the detail piping engineering for an



General view of the LNG terminal with the third tank model implemented



Gazintek Engineer Lubomyr Valco at the LNG terminal

additional unloading arm, an unloading line, a cryogenic compressor, two high-pressure pumps, one ORV, two SCV, sea water pumps, one chlorination unit and related piping systems for process and utilities. That means that except for the storage tanks, Gazintek designed the extension of every main equipment of the terminal.

In 2016 started the second expansion. Once again Gazintek was involved in the project realization and provided a site survey and the detail piping engineering of mainly: one additional high pressure pump, one ORV, sea water pumps and related piping system for process and utility units. ■

BY ALBERT TRAXLER



New contracts for Pörner Russia

Since summer 2017, OOO Pörner Group Russia has signed several interesting contracts. For this purpose, the Russian Pörner office, founded in Moscow in 2016, hired additional employees.

The team is currently working on three projects for the long-term partner Metadynea Group, i.e. the engineering of a new resin and resin water tank farm, the modernization of existing tanks and formaldehyde metering station for resin production. In addition, the YaNPZ Mendeleev refinery (Yaroslavl) was won as a new customer. Pörner Russia prepared a technical-economic modernization study for the further development of the refinery. The study was received positively by the customer, currently the investment decision is to be reviewed.

Combined strength for our customers

The positive development of Pörner Russia is due to the fact that this office provides the entire scope of a "stage P" design documentation. This is interesting for Russian customers but also an important support for the Pörner Group itself in the implementation of its CIS projects. ■

Roof extension of Pörner headquarters completed

C/S/A. Pörner Vienna with greater comfort and more space.

BY ZOLTAN GERHAT

VIENNA. The last few years have repeatedly seen conversions of the Pörner headquarters in Vienna to adapt to the growing need for space because of the increasing number of employees.

The current roof extension was planned and executed by Pörner's C/S/A department. An additional



Meeting above the roofs of Vienna at the new premises of international sales

gross floor space of 750m² made it possible to sustainably restructure the office and create additional workplaces and meeting rooms.

For the planning team the conversion of the Wilhelminian-era building meant both an architectural and a static challenge. The existing roof was removed and three additional floors (about 3,000m³ volume) added as steel structure on newly placed load distribution beams of reinforced concrete. The architectural concept is based on the preservation of the historic façade from the 1870ies. The new part and its modern design and the material used stand out completely from the old building, structurally separated by the cornice that had to be removed during construction work and put in place again after the new formation of the knee wall by means of templates.

The 70 degrees inclination of the generously designed glass façade was adapted to the neighbouring buildings and the outer walls built of glass, timber and dry walls. A lift shaft was put up in the courtyard which houses all buildings services and due to the static incorporation in the new structure relieves the historic foundations. The entire job had to be executed, of course, while business continued.

Meanwhile all departments affected have moved into their new rooms. The employees can now enjoy a pleasanter working atmosphere, more space and more meeting rooms. ■



The Pörner headquarters in Vienna has three new floors now.

Win-Win-Situation for students and Pörner

Training. Pörner Grimma trains students from university of cooperative education.

BY LYDIA BRANDTNER

GRIMMA. Isabell Winkler is one of six students who studied at a university of cooperative education (Berufsakademie – BA) with support of Pörner Grimma by now. In autumn 2016 she completed her studies of energy and environmental engineering with specialization in energy engineering at BA Riesa. The diploma thesis of the straight „A“ student dealt with the optimal separation process of water glass from a carbon-water glass mixture, and



tionality. But finally, the technological orientation was the main criterion for my application at Pörner Grimma.

Ed.: Have your expectations been met?

I.W.: Yes, absolutely. During my study I had the opportunity to get an initial taste of every department. I could try out 3D drawing and calculate simulations or do my own tests at the lab of the pilot plant. After three months of practical work I returned to the university. For term papers I chose subjects that were of interest both for Pörner and me, such as steam and condensate systems. It fitted well together.



Isabell Winkler talking about her experience at the human resources fair of Berufsakademie in Riesa

thus took an active interest in the technological developments of the Pörner rice hull technology (see p. 6/7). The editors wanted to know more about her experiences.

Ed.: Ms. Winkler, the BA studies takes over three years. What criteria made you decide for Pörner?

I.W.: The BA keeps lists of companies with whom they have had good experience. Among them was Pörner as the only company from the chemical sector. I was also impressed by the company's size of projects and its interna-

Ed.: You were employed right after the successful completion of your study. What do you think why it was decided to do so?

I.W.: Students like me are attractive for companies because they learn the trade at site. The good combination of theory and practice made me a well trained and familiarized member of staff who knows exactly the way the company works and what is expected of her.

In a nutshell: a win-win situation for both sides! ■

ALL FROM A SINGLE SOURCE INCLUDING C/S/A

BY THOMAS OLBRICH

Industrial structures, building services & architecture from Pörner

The C/S/A department provides all related planning services for the regional and international plant engineering projects of the Pörner Group. Especially when it comes to large-

size projects, such as the PE4 plant of Borealis, the bioethanol plant of Agrana, all Biturox® projects or the construction of entire power stations the customers appreciate the expertise of the engineers.

In addition to that independent projects for municipal buildings (museums, hospitals), residential and other buildings as

well as infrastructure facilities (underground stations, petrol stations, radio masts) are part of the portfolio. But also extraordinary projects, such as the extensions of the heritage-protected Otto Wagner Hospital and even the construction of a church can be found on the list of projects executed by this department.

The civil design and quality assurance are carried out by Pörner ZT GmbH, accommodated in the same building with the combined power of civil engineering and architecture. Thus, all Pörner projects rest on solid foundations. ■



Office building of Agrana in Pischelsdorf / Austria, a reference of Pörner C/S/A department.

COMPANY EVENT

BY MARGOT SIMONIS

Ski team (building)

It has been a good tradition with Pörner to have a company outing. Last winter Pörner Austria invited its employees for an extended ski weekend to Troop-lach/Carinthia.

Despite foggy weather the atmosphere remained unclouded. Many withstood the forces of nature and climbed up the slopes while other relaxed in the wellness centre with a view to the ski slope. People got into conversation on the slope, at the swimming pool, at dinner or at the bar in the evening. Old acquaintances were renewed and new people met.

All participants enjoyed the outing. Many thanks go to the management and the works council who care for the wellbeing of our employees and make such corporate events possible that promote identification and team building!



The IMO regulations and their impact on the world of refineries

BITUROX®
BITUMEN OXIDATION TECHNOLOGY

Biturox® Technology. Pörner technology provides ultimate residue processing at lowest CAPEX.

BY VINCENT FRATE

VIENNA. The new IMO 2020 regulations require a deeper processing of refinery residues. The world of refineries is fully aware of it. Mainly discussed are solutions of high CAPEX (investment costs) without mentioning the technology with the highest yield at lowest CAPEX: the bitumen production by application of the Biturox® technology.



NEW REGULATION FOR BUNKER OILS (IMO 2020)

In 2020 the regulation of the International Marine Organisation (IMO) MARPOL 73/78 Annex IV – also called IMO 2020 – will be changing a lot for the refinery sector. The IMO defines a global limit for sulfur in bunker oils (marine fuel) of 0.5 % compared to 3.5 % as it is now.

So far refineries sold bunker oil – an unrefined mix of residues and heavy gas oil – as marine fuel at competitive prices, whereas bitumen – a product of higher quality requirements (about eight specification parameters) – often obtained lower resale prices.

From 2020 on the plain bunker oil can no longer be sold profitably. This is why specialized small refineries in particular should think about the bitumen production.

technology reduces the production of high-sulfur fuel oil (HSFO) to a minimum and supplies the market with a high-quality product for road construction: Bitumen.

Though this form of bitumen production cannot process all refinery residues like a DCU (delayed coker unit), but the Biturox® technology permits the processing of different refinery residues, such as vacuum residue, SDA pitch, hydrocracker residue, heavy VGO, HCO, etc. at different proportions and optimally supplements the complete residue processing at refineries. The Biturox® plant is designed according to customer requirements and feedstock, and the performance expected is guaranteed by lab tests using refinery product samples.

Another major factor: the flexibility in terms of feedstock boosts the economic efficiency of the refinery. In fact, the bitumen can be made of so-called non-bitumen feedstock by blowing a suitable feedstock mixture in a controlled manner under constant conditions in a continuous process.

One of many advantages: low OPEX

The low OPEX (operating expenses) of Biturox® plants is reached by an optimization of the plant configuration including heat recovery where economically feasible. The off-gas treatment system is state-of-the-art and meets all environmental requirements for off-gas (SO_x, NO_x, CO, PM).

In the last 35 years the time-proven technology has been used in over 40 refineries worldwide and produced bitumen with due regard to the applicable standards based on performance, such as SHRP (for example in USA, New Zealand, South Africa), viscosities



15 of the world's largest vessels emit more toxic sulfur oxides per year than all 760 million cars together. The IMO 2020 regulation is to regulate this condition.

(India, Australia) and traditional penetration/softening point system (Europe, Middle East, larger part of Africa).

Economic outlook

Due to the IMO regulation better

margins for bitumen can be expected. One reason of it is an increasing demand and another the scarcity in certain regions.

Even if the clock is ticking,

refineries have sufficient time by 2020 to think about the Biturox® option. Such plant can be designed, installed and commissioned within a period of 18 months. ■

BITUROX® IN PRACTICE

- Low investment costs
- High flexibility
- Complete residue processing
- Own pilot plant enables lab tests using refinery product samples
- Time-proven technology: 54 Biturox® licences has been granted since 1978
- In India the 11th Biturox® is being built. The designed production capacity of all 11 plants covers 80 % of the national production.

Five Biturox® plants are currently under construction.



Innovative SDA pilot plant opens up new possibilities

Technology & process engineering. Flexibly react to the market with EDL.

BY JAN SCHWARTZE

LEIPZIG. Due to stricter environmental regulations such as the IMO regulations refinery operators are permanently looking for new solutions to process heavy residues.



Since 2012 EDL has been operating an own pilot plant for the SDA technology (solvent deasphalting), which converts heavy refinery residues into value-added products. In the existing pilot plant the required process parameters as well as the optimal pro-

cess conditions of the SDA process plant are tailored to the customer's product requirements.

Now more and more focus is placed on new processing schemes. In order to respond flexibly to market demands and to continue providing customers with convincing concepts, e. g. to increase the yield of liquid target products, EDL started in early 2018 with the conversion of the pilot plant.

Wide range of tests for solvent deasphalting

As of June 2018 customers have access to a new SDA pilot that will test the full range of potential solvents (C₃ to C₆) for deasphalting. In

addition to propane, n-butane and i-butane, n-pentane and n-hexane

„The range of solvents we can test increased enormously: from propane via butane to pentane and hexane.“

Jan Schwartze

as well as solvent mixtures can now be investigated.

Specific process applications such as the two-stage deasphalting process to separate DAO, resins

and asphalt, the „solid fuel“ can be developed by means of investigations at the extended pilot plant.

Small batches for big benefits

The newly created pilot plant in conjunction with special analyses (SARA), forms the basis for the thermodynamic and hydraulic design of the SDA extraction column and the entire process plant.

EDL continues to rely on the innovative concept of defining all required process parameters of the SDA PLUS technology on the basis of small feedstock quantities (2 - 5 litres), saving customers both time and money compared to other concepts available on the market. ■

SDA PLUS
EDL•TECHNOLOGY



SDA pilot plant in Leipzig

Efficient processes and professional technological advice lead to higher productivity

The selection of the technology is decisive in the first project stage.

Everything starts with the idea to invest in a new plant or unit. Subsequently, essential questions have to be answered, such as: Which technology is the best? What is the project scope and how much will it cost? How long is the payback period? How long will it take before production can start?

All these questions can be answered through good conceptual design. The selection of the technology is decisive in the first project stage.

Selecting the right technology

For the Pörner Group and its proactive engineering offices a high process engineering competence is crucial. An above-average number of experienced process engineers

are committed to help and advice to assess the different technolo-

gies. At stake is sustainable productivity of the plant throughout

the entire lifecycle.

The objective is to flexibly produce optimally sellable products at minimal operating costs over many years at high safety and environmental standards.

From the initial feasibility study to commissioning it is the core task of the engineering partner to give advice and support to the client independent of third-party interests.

With own technologies, own pilot plants, extensive know-how of studies and conceptual designs and excellent relations with licensors and system providers, the Pörner Group meets the prerequisites for an all-round support of the investor.

1. Own processes for high-quality products

For many years, the Pörner Group has been focusing on the development of proprietary technologies to be able to offer individual, innovative process solutions. When it comes to special products of refineries, such as lubricants and bitumen, the processes for the entire process chain from distillation to the final product are made available.

The Pörner Group offers advanced processes as well as planning and construction of plants from a single source in the following areas:

- Bitumen (Biturox®)
- Solvent deasphalting (SDA)
- Solvent dewaxing/wax deoiling
- Hydrofinishing (base oils Groups II and III) and hydrotreating (waxes, petroleum jelly, white oils)
- Lube oil blending
- Spray micronization
- BTX aromatics extraction
- Formaldehyde and derivatives
- Silicates from rice hulls

Lab analyses and piloting at own pilot plants are used as the basis for the Pörner process design and give customers the security that optimal products of high yield are obtained from its raw material.

2. Technology development together with partners

The technology portfolio is being continuously extended, for example, together with

- Sulzer Chemtech
- AhmadullinS (Mercaptan scrubbing)

- TTC (aromatics extraction in refineries, novel fuel refining process)

3. Implementation of new customer technologies

Transferring new technologies from pilot scale to industrial scale is anything but trivial. Many parameters need to be taken into account and upgrading is complemented by practical knowledge because it is rarely the case that a projection to lot size 1 is constant. With complex projects, such as the catalyst plant in Qatar or the "Trinseo" project for rubber production (ref. p. 3) the Pörner Group and its large pool of specialists has more than proven that it measures up to such tasks.

4. Implementation of third-party technologies

For a long time the Pörner Group has been working with leading licensors and technology partners, such as UOP, KBC or Shell.

Based on numerous references the Pörner Group is capable of implementing the process design packages (PDP) of the licensors in accordance with the specific local requirements of the investors.

A case in point is the silver catalyst process for the production of formaldehyde that was further developed together with our long-standing licence partner Dynea AS to become the safest, most environmentally friendly and resource-saving of its kind.

Conclusion

The experience of both developing and globally making available own processes and efficiently implementing third-party technologies are a benefit for the customer in different respects. As a process engineering company providing services of all engineering disciplines from a single source, the Pörner Group offers competence not only in the conceptual phase but over the entire period of plant engineering from planning, construction through to successful commissioning.

This is the way how optimal, custom-tailored plant configurations with competitive productivity over decades are achieved in close cooperation with the future end-user. ■

[HTTP://WWW.POERNER.AT/SERVICES/PROCESS](http://www.poerner.at/services/process)

Installation of a pilot plant for polymeric fiber production for Fraunhofer Institute for Silicate Research in Würzburg / Germany



EXCLUSIVE TECHNOLOGY PARTNERSHIP

BY KONRAD HÖHLE

New catalyst for more efficient desulphurization

EDL and AhmadullinS sign cooperation agreement.

LEIPZIG/KAZAN. In times of increasing quality requirements for fuels, lube oils and other oil products as well as rules and regulations that are constantly being tightened, especially in the field of pollution control, it requires new, innovative and at the same time economically attractive solutions.

Innovation driver SME

In particular, medium-size companies are characterized by their high innovative strength and are therefore in the focus of EDL as potential technology partners.

EDL demonstrated that the technology of „AhmadullinS Science & Technology“ from Kasan/ RF, shows significant advantages compared to other providers of Merox treating processes.

In January 2017, the cooperation between EDL and AhmadullinS was further deepened and an exclusivity agreement was signed to provide customers with a more economical alternative compared to the well-known technologies and catalysts.

AhmadullinS is a descen-

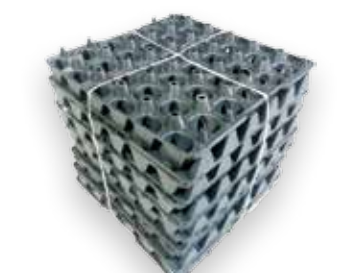
dant of VNIUS, a large Soviet research institute. Since 2004 AhmadullinS has been an independent company. Currently there are 10 employees, some of them having more than 45 years of professional experience.

Together with AhmadullinS, EDL offers the following desulphurization technologies:

- DEMERUS: mercaptan removal from natural gas, LPG and others
- DeCOS: carbonyl sulfide removal
- LOCOS: sulfide removal from industrial waste water, process condensate and produced water
- H₂S: removal of hydrogen sulfide from hydrocarbon gases

Proprietary development: eight years service life

For the above mentioned technologies AhmadullinS has developed the heterogeneous catalyst KSM-X. This catalyst offers a number of advantages. Thus, a service life of eight years is guaranteed if the required operating



Innovative desulphurization catalyst KSM-X lasts for eight years.

conditions are observed. Due to the fact that the catalytically active components firmly adhere to the polymer carrier, the catalyst shows an increased resistance to catalytic pollutants and to thermal impacts.

Numerous references testify the successful application of the technologies and the catalyst. Satisfied customers include e.g. ROSNEFT, Gazpromneft, LUKOIL, TAIF, Orlen Lietuva, just to name a few.

Visit us at ACHEMA and we will explain the desulphurization technologies and the way the catalyst works. A representative of AhmadullinS will also be available for further explanation. ■

[WWW.AHMADULLINS.COM](http://www.ahmadullins.com)



AhmadullinS
SCIENCE & TECHNOLOGY