Edition November 2017

Pfannenberg Case Studies

Customer Applications in Thermal Management, Process Cooling and Signaling Technology.

SHARING COMPETENCE

Pfannenberg
ELECTRO-TECHNOLOGY FOR INDUSTRY

COOLING UNITS

AIR/WATER HEAT EXCHANGERS

CHILLERS

SIGNALING TECHNOLOGY

SERVICE

CASE STUDY

Outdoor Cooling Unit in NARI Ultra High Voltage Converter Station

Pfannenberg provides thermal management solution for the new application of preset container in the converter station of the State Grid.

The preset container well solves the remote installation and commissioning issue for UHVDC converter station but brings a new challenge on the cooling and monitoring.

Pfannenberg offers an innovative solution with standard products to serve the container.

Ultra high voltage direct current (UHVDC) technology means equal or more than ±800kV direct current transmission technology. Comparing to traditional alternative current electricity transmission technology, the UHVDC could support a longer distance transmission with less power consumption on the way and less land occupied for infrastructure.

Taking the Lingzhou – Shaoxing UHVDC project in China as an example, it connects Lingzhou (Ningxia Province) and Shaoxing (Zhejiang Province) which has more than 1,600 km distance. The total project costs about 10 Billion Euros but gains 60% land saving and reduces 25%~40% power loss in transmission. In order to balance the energy generation and consumption situation, there will be another 52,300 km long UHVDC line construction in the national plan of China.

Pfannenberg's customer, NARI Technology Co., Ltd. (abbr. as NARI) is a leading supplier of solutions for power and automation technologies in China. It stands as top one Power SCADA (Supervisory Control and Data Acquisition) provider in China and also top one smart grid researcher for China State Grid. It supplies DC protection system, DC measurement system, safety and stability system and AC protection system in the UHVDC projects. In order to solve the unexpected assembly and commissioning problem in remote areas on site, NARI has developed the "preset container solution", in which all the necessary protection and controlling systems can be installed in the cabinet and put into a container in advance. So, all the installation and commissioning could be complete in NARI plant before ex-work. This can be recognized as the game changer in the grid industry.

UHVDC line under construction

Lingzhou – Shaoxing UHVDC line sketch map

The container which has electrical cabinets inside needs to be air conditioned as per NARI's request because the container is located outdoor and exposed to the sunshine, dusts and humid. The system protection needs to be IP55. Communication protocol of RS485 is also mandatory with the central control system to monitor the status of the air conditioner. The heat load of the container is about 10 to 15 kW, where the sunshine exposion contributes a certain part, which means 2 to 3 pcs of cooling units are needed by one container. The whole container needs to be ventilated with fresh air regularly since there is toxic gas generated inside.

It looks like a commercial application because the entire container room needs to be cooled down while the other requirements like communication protocol, high IP protection and fresh but filtered air ventilating are not popularly offered by commercial air conditioner as well as high reliability. Maintenance free is also highly needed since the units will be installed in remote area. This all brings the customer into a dilemma in selection (commercial A/C vs. industrial A/C).

Pfannenberg approached the customer, understood the application and prepared a customized solution for this application: outdoor cooling unit DTI 8561 plus 4th generation IP55 outdoor filterfans. The cooling unit has RS485 communication protocol, robust components for industrial use and can be easily handled for any kind of service (installation, maintenance and repair). The filterfan will be controlled by the timer of the customer to pump fresh and clean air to the container regularly. The integrated condensate management system inside the cooling unit handles the condensation well during operation. The long service interval of the filterfans also reduces the service cost in the future. All of the above contribute to a unique solution to this application.

Pfannenberg identified, innovatively and successfully solved the thermal management issue of the preset container of NARI. It also creates good reference for the preset container thermal management when it is popularized in more industries in the future.

For the UHVDC line, normally there is one converter station in each the beginning point and the destination point. So roughly there are 100 converter stations, each of which needs about 10 to 15 pcs cooling units. Therefore the market potential in UHVDC in China is very huge. Pfannenberg has delivered 24 pcs cooling units for the two stations in Lingzhou – Shaoxing Line.

Preset container

Facts at a glance

Task	Develop an industrial solution – outdoor cooling units and filterfans for the preset container in UHVDC converter station
Challenges	High ambient temperature, big cooling capacity, digital communication, maintenance free
Products used	DTI 8561, PF 32.000/65.000, PFA 30.000/60.000
Success factors	• Sharp finding and full investigation in new application. • Innovative solution with existing standard products.

Summary

UHVDC is a newly-developing market with big potential demand in China, where the preset container comes up and well fits for locating protection equipment. The container can be pre-assembled and commissioned so that a lot of work on site will be eliminated.

The new application requires new solution for thermal management with highly reliability, digital communication, and robustness. Pfannenberg innovatively offers a solution with outdoor cooling units and filterfans.

CASE STUDY

KUADROTEK - Control cabinets cooling in the biggest solar plant of the world

Pfannenberg DTT units for the Noor solar plant

„Our participation in a project of such importance and size was made possibleby the quality and reliability of the technical solution offered, but it was also definitely facilitated by the positive feedback received during the Spanish leg of our traderunner tour Pfannenberg on wheels "

Xavier Pedescoll
Area Sales Manager Iberia
Pfannenberg Italia srl

Application

Morocco switched on the first phase of a concentrated solar power plant that will become the world's largest when completed. The $9bn power station on the edge of the Saharan desert will be the size of the country's capital city by the time it is finished in 2018, and provide electricity for 1.1 million people.

Noor 1, the first section at the town of Ouarzazate, provides 160 megawatts (MW) of the ultimate 580MW capacity, helping Morocco to save hundreds of thousands of tonnes of carbon emissions per year. It was connected to the Moroccan power grid on 5 February 2016.

Noor II and Noor III are scheduled to start commercial operations in 2017 and 2018, respectively.

The customer

Kuadrotek, from Tarragona, is part of the Spanish Elektra Group. It specialises in the design, development and implementation of electric switchboards and control panels for the automation of installations and industrial processes in the automotive and energy industries.
The engineering, procurement and construction (EPC) contractor for phase one is the consortium of TSK Electrónica y Electicidad, Acciona Infrastructuras, Acciona Ingeniería, and Sener Ingeniería y Sistemas, whereas the EPC contractor for Phase Two is a consortium led by Sener and Sepco III.The technical advisory services for Phase Two were rendered by Lahmeyer International. The specific environmental and social impact assessment (SESIA) for Phase Two was prepared by 5 Capitals Environmental and Management Consulting (5 Capitals).

The solution

Being the activities related to this kind of massive projects typically fragmented into numerous subsupplies, Kuadrotek was involved in the design and development of 20 control cabinets, for which – after considering competition – it has identified the **top-mounted cooling units DTT 6201** as the best solution for the type of application.

Aerial view of the Noor 1 plant in Ouarzazate, Morocco

The DTT 6201 cooling unit - 1.000W - and its100% patented condensate-free design

The chosen product

The DTT 6xxx cooling units are designed to be placed on top of the enclosure when there is a space shortage or aisles need to be kept clear.

Main feature of the DTT's innovative condensate management is the repositioning of the cooling circuits. Moving the cold area up prevents the cold bridge to the electrical enclosure and also enables a problemfree drainage of condensate. A widespread airflow in the evaporator stops the formation of condensate buildup. And finally, the integrated air outlet nozzles make the use of conventional air hoses unnecessary; these are at risk of condensation.

>> Zero sweat guarantee.

Condensate will not form in the cabinet where the cooling unit meets the enclosure.

>> Managed water droplet control.

As the airflow passes through the evaporator, any condensate generated on the evaporator will not be carried into the enclosure.

>> Eliminate the need for duct work.

Return air channels are engineered to increase the speed of the air leaving the cooling unit, ensuring cool air is effectively distributed moisture-free within the enclosure.

>> One piece leak-proof molded tub.

Industry's only seamless molded condensate tray located at the top of the unit eliminates the ability for water to drip into the cabinet.

Satellite view of the Noor 1 plant in Ouarzazate, Morocco

Facts at a glance

Task	Control cabinet cooling in Southern Morocco
Application	Noor, the biggest solar power plant in the world.
Solution	n.20 DTT 6201 cooling units
Success factors	• high quality products with the highest level of protection for extreme conditions • optimal MTBS (Mean Time Between Stopages) • long term agreement with Pfannenberg regarding warranty and worldwide support.

CASE STUDY

PROinSENER ENERGIA - Cooling the control cabinets for a 50 MW photovoltaic plant in the Philippines

Pfannenberg filterfans for the second Leyte's pv plant

„The Philippines are carrying out several projects for the production of clean energy and our experience in the thermal management of control panels - with a wide offer of products ranging from heaters to air conditioners, from filterfans to chillers - will provide valuable support for future projects, where we hope to be involved again."

Xavier Pedescoll
Area Sales Manager Iberia
Pfannenberg Italia srl

Application

A 50-megawatt solar power plant was built in Palo, Leyte Island, and linked to the power grid of the National Grid Corporation of the Philippines in March 2016.

It is the second solar farm built in Eastern Visayas after the one in Ormoc City. Now, with three power sources of NGCP in Leyte, together with the geothermal plant at Tongonan in Kananga town of Leyte, there is enough providers for the energy needs of Leyte and Cebu.

The new solar plant consists of 188,000 solar panels built on a 70-hectar property located about eight kilometers inward from the main highway.

The customer

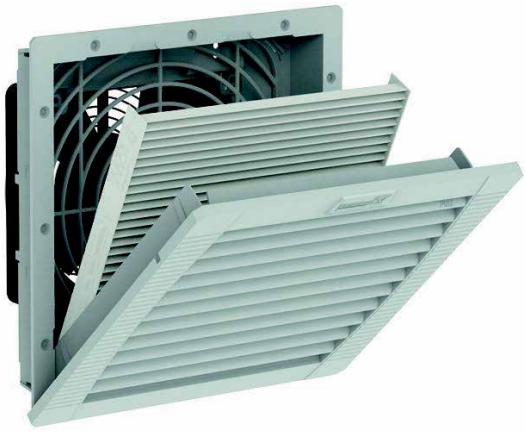
PROinSENER ENERGÍA is a Spanish provider for containerized solutions. They design and manufacture transformer stations, solar inverter stations, electrical rooms, electrical panels and other containerized solutions for different applications: renewable energy, mining, water pumping stations, emergency units, etc.

Proinsener has more than 400 MW installed world-wide, from the Philippines to Chile, with projects in Jordan, Morocco,Brazil, etc.

The solution

PROinSENER has supplied 15 inverter stations in 40'HC containers. Each of them generates 2.8MW for the 50MW PV plant in Leyte Island, Philippines.
Each control cabinet in these stations is provided with Pfannenberg's bespoken 4th Generations filterfans. application.
After evaluating different options on the market, PROinSENER's choice fell on the Original filterfans. When it comes to safe and costeffective cooling of control cabinets with filtered ambient air, our filterfans are the first choice. Since Otto Pfannenberg invented it in 1958, they have held a leading position in the market.
The latest generation is even expanding this lead – with no fewer than 11 well-thought out and patentprotected details. One example worth mentioning here is the closed housing, which reaches guaranteed high system of protection IP 54 and IP 55, or the fluted filter mat which, in the IP 55 model, keeps the volume flow constantly high but increases the service life (time between 2 mat changes) by 300 %.

Our $\mathcal{E}$COOL series sets standards in terms of capacity,- cost-efficiency and maintenance friendliness.



PF 65.000 - 505 m3/h
Outdoor filterfans IP 55 for demanding indoor and outdoor applications. UV protected.

Facts at a glance

Task	Control cabinet cooling in solar inverter containers
Application	Photovoltaic plant in Leyte Island , Philippines.
Solution	n.30 PF 22.000 IP 54 + n.30 PF 65.000 IP 55
Success factors	• high quality products with the highest level of protection for extreme conditions • IP 55 • long term agreement with Pfannenberg regarding warranty and worldwide support.

CASE STUDY

The “Pfannenberg Advantage” – Perfect Solution for a Large Commercial Bakery

Pfannenberg provided a complete turnkey solution for a well-known supermarket’s bakery manufacturing.

“(Since the installation) we have had no issues and the installation is working perfectly. This is quite an upgrade from Air Conditioning units that were not keeping the drives cool and causing shut downs on the line. We have not had any issues with our drives tripping as we did with the (previous) Air Conditioning units.” -

Commercial Bakery - Maintenance Manager

Pfannenberg was asked to provide a thermal management solution for one of the largest supermarket commercial bakeries. This bakery which supplies 19 various states across the US and parts of Canada was facing downtime due to failing drives. They needed a reliable solution that would work well in hot and dusty environments.

Challenges:

Supermarket's across the country are striving to have their own brands and fresh baked products available throughout their stores. To keep up with the customer demand, downtime is not an option. Pfannenberg was brought in to look at why this bakery's enclosure air conditioners throughout the plant were failing and what could be done to create a reliable thermal management solution.

Pfannenberg conducted a plant survey at the manufacturing location and found that their problem was that many of their A/C units were undersized for the ambient air temperature and heat loads generated for the enclosure. The increased temperature during the summer months in the electrical cabinet caused reduced component life and overheating of the electrical enclosure.

The plant survey was the first step as part of the Pfannenberg Advantage. The Pfannenberg Advantage (**pfadvantage.com**) is a four step process that begins and ends with the end user. It's a value proposition in which provides solutions to problems encountered by the plant. This four step process was used in this bakery to fully provide them a complete solution to their thermal management problems.

In most cases, the A/C units on the electrical cabinets were part of the OEM equipment and not sized properly for the plant ambient conditions or the enclosures. The bakery was looking for a cost effective solution to reduce downtime and save on energy costs. The recommended solution – Pfannenberg PWS Series Air-Water Heat Exchanger.

Fig. 1: Enclosure Target Internal Temperature

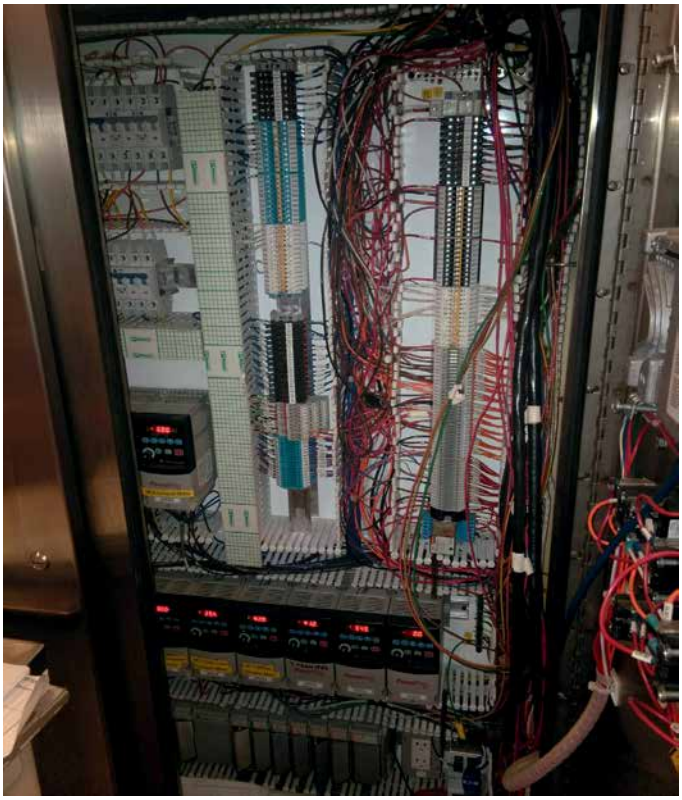


Fig. 2: Inside of Electrical Enclosure

How the Pfannenberg Advantage Helped:

Pfannenberg recommended that this bakery implement (18) PWS Series Air-Water Heat exchangers for various electrical enclosures throughout their facility. The Pfannenberg PWS Series Air-Water Heat Exchangers are effective at providing cooling in harsh environments. They work by drawing hot air from the enclosure into the top of the unit, then passing the air across the unit's coil. The heat is drawn out of the coil, cooling the air. Then the cool air continues its path out of the bottom of the unit.

The unit has no refrigeration system, which meant that no external condenser air circuit was required. This also meant that ambient conditions had no influence on how the air to water heat exchanger performed. With the availability of chilled water existing in the manufacturing plant, a Pfannenberg Air-Water Heat Exchanger solution provided energy savings and minimal maintenance. There were no filters that needed to be changed or cleaned.

Results, ROI, Future Plans::

From the analysis of the first plant survey, Pfannenberg discovered that several A/C units were undersized as much as 25%, based on the heat load. The total cost of ownership for commercial bakery's previous A/C units cost an estimated $21,526 annually (includes cost of down-time, annual maintenance and energy costs). Pfannenberg supplied the complete turnkey solution.

The return on investment (ROI) for the bakery was 1 year based on total cost of ownership (TCO). The manufacturing bakery was also able to apply for energy rebates from their local utility to offset the investment since the payback period was less than 5 years.

Fig. 3: Rows of Electrical Enclosures

The recommended solution provided:

- Total ROI was less than 1 year (including Operating Costs and Downtime).
- The PWS Air/Water unit was the perfect solution for them in their high ambient conditions since the heat is exchanged with the water and is not affected by the ambient temperature.
- Low maintenance was required due to few moving parts compared to their existing A/C units – resulting in longer life and less downtime.
- Few spare parts to stock.
- Completely enclosed system with no air exchange between inside and outside of electrical cabinet. Eliminating any contamination of cabinets or worries of overheating as ambient temperatures rise.
- NEMA 4/4X rating - Washdown safe.

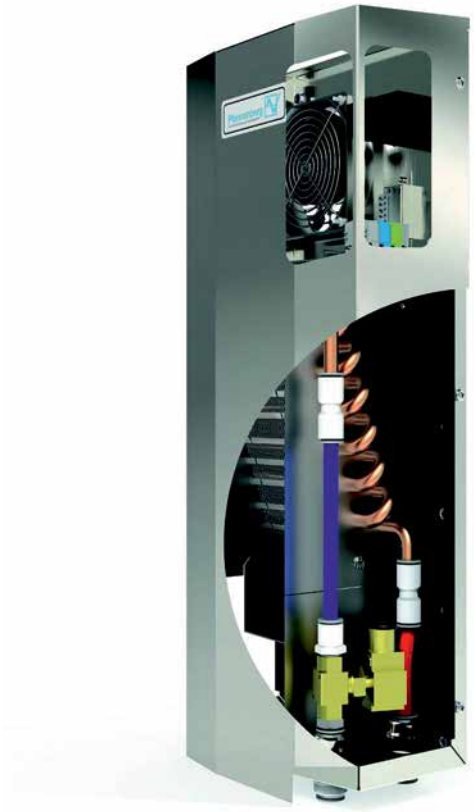


Fig. 4: Pfannenberg's Stainless Steel PWS Unit

Summary

Pfannenberg's PWS Series Air/Water Heat Exchangers were the precise solution for the problems our customer experienced. Incorporating Air/Water Heat Exchangers improved performance, reduced maintenance, was energy efficient, and prevented unplanned repairs.

CASE STUDY

A perfect package

Chillers cool down injection moulding machines at competence center PolymerEngineering

Injection moulding requires very high temperatures, and the workpieces must be cooled down immediately after moulding. Chillers tailored to the needs of specific applications are particularly suitable for the demanding task of cooling injection moulding machines. Chiller configuration precisely matched to the required cooling capacity is necessary to avoid underdimensioning or overdimensioning of the chiller. A good example of what a tailored package solution looks like is the Pfannenberg chiller installed in the test lab of PolymerEngineering in Hamburg (Germany).

The competence centre PolymerEngineering belongs to TU Tech Innovation GmbH which deals with the continued development of thermoplastic polymers. The PolymerEngineering team develops application-specific solutions, for example they optimized the heat management of high-capacity LED components through direct back-moulding of heat conductive synthetic resins.

Wanted: a package provider

For the construction of a competence centre for polymer research in Hamburg-Wilhelmsburg, PolymerEngineering was looking for a regional partner for the effective cooling of injection moulding machines and tools used. Along with supplying the necessary equipment, their ideal partner would also be able to handle maintenance and installation. They found what they were looking for in Hamburg-based Pfannenberg, a specialist in cooling solutions.

The first phase of the project involved water cooling of three injection moulding machines. Despite different basic conditions, the objective was to cool all three machines with a single chiller. In order to determine the right chiller for the job, Pfannenberg's experts first analysed the local conditions and calculated the actual cooling demand as well as the required supply temperature. If it is only when the capacity of the chiller is optimally adjusted to the application, that is the only way to ensure smooth operation of injection moulding machines. Otherwise, with overdimensioning, there is the risk of higher electricity costs and reduced lifetime of the chiller, or of outages and costly downtime of the injection moulding machine(s) with underdimensioning.

A type EB 130 WT CE STD chiller cools the injection moulding process of three injection moulding machines

One of the three cooled injection moulding machines in the PolymerEngineering test lab

Systematic water cooling

Now an EB 130 WT CE STD chiller with a cooling capacity of 12 kW at a maximum ambient temperature of 35 degrees is cooling the injection moulding processes of three injection moulding machines from various manufacturers, including Battenfeld and Arburg. The volumetric flow rate is 10 litres of water per minute, with the supply temperature held to a fixed value of 20°C. Configured specifically for this application, the chiller is additionally equipped with a hydraulic bypass.

Pfannenberg provided the full scope of services, from design and on-time delivery to commissioning, including three-phase power measurements, functional testing and assistance in piping installation. After-sales maintenance is also part of the package.

Everything from the same source

"Without the cooling provided by the Pfannenberg chillers, it basically would not be possible to operate the injection moulding machines", says Sven Polatzek, project manager at PolymerEngineering. "We are pleased that in Pfannenberg we have found a regional partner

which is not only able to deliver quickly, but also provides all necessary services from a single source."

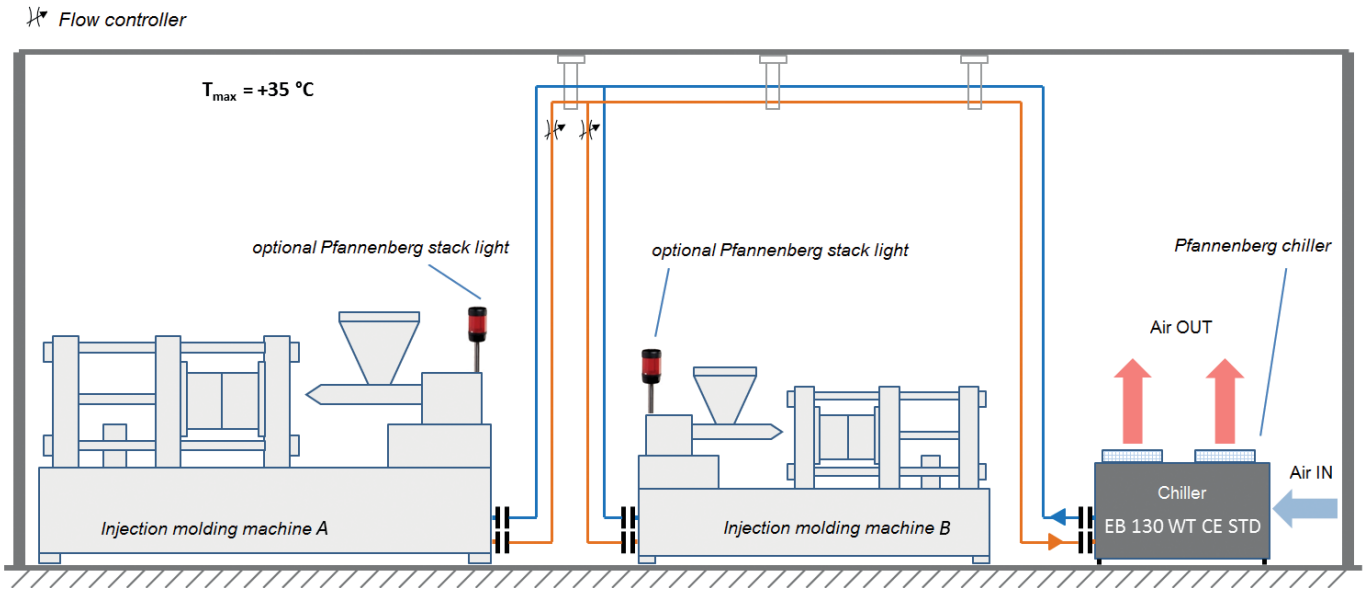
The synergies go even further. Firstly, Pfannenberg ensures the required process reliability for injection moulding. In exchange, PolymerEngineering can provide advice on injection moulding to companies which use injection moulding machines in their production facilities for filter fans and signaling devices.

PolymerEngineering also presents seminars on injection moulding. Seminar participants can learn how process cooling works, based on actual systems as examples. Along with the chiller, as a technology partner Pfannenberg also provides filter fans and signaling devices to indicate the operating status of the machines.

Celebrating a good relationship on the occasion of chiller handover (from left to right): Jan-Hendrik Keller (University of Bayreuth), Sven Polatzek (PolymerEngineering), Vincent von Wieding and Andreas Berberich (both Pfannenberg)

Cooling of injection molding machines

Application example: TU Tech with a Pfannenberg Water Cooling Solution



Block diagram of the Pfannenberg cooling system for PolymerEngineering

Facts at a glance

Task	• Efficient cooling of several different injection moulding machines, which need to be coincide perfectly with each other • Regional partner with full-service competence
Challenges	• Dimensioning together with customer • Full support from dimensioning to installation of piping system • Commissioning incl. functional testing, check of rotary field, etc. • Service and maintenance (even of third-party devices)
Technique applied	• Chiller EB 130 WT CE STD with 12 kW cooling capacity • Signal tower BR 50 (XENON)
Success factors	• Service: everything from a single source – from dimensioning to installation/maintenance • Local support by local supplier • Prompt delivery

Summary

Pfannenberg is the only manufacturer to offer a “Total Worry-free Package” for process cooling which along with supplying a range of different cooling devices includes advice, application-specific configuration, installation and maintenance. One important point is the close collaboration with the customer (preferably, right from the planning process), to meet the customer’s specifications, in that case to provide one single chiller to cool down three different kind of injection moulding machines. The first innovation center for polymer engineering in the north of Germany can now count on Pfannenberg as a local and competent partner, experienced in liquid cooling solutions.

CASE STUDY

High Temperature Chiller for Foundry Crane

Survival in extreme industrial conditions

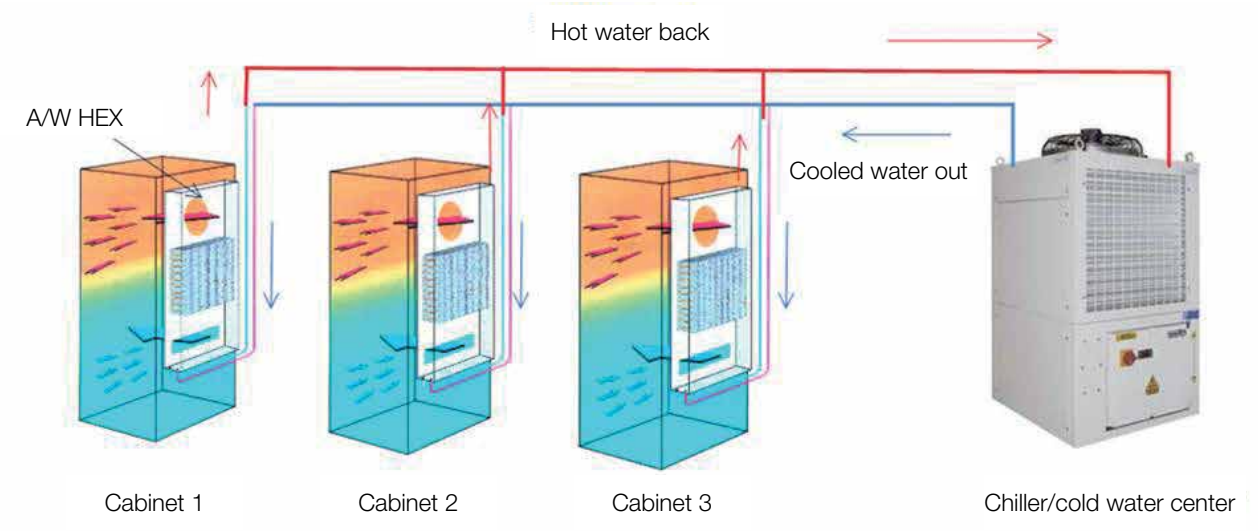
A multifunction crane is the key equipment of the foundry plant. Its productivity normally affects the whole production line productivity a lot. However, very often it breaks down because of the failure of cabinet air conditioner as the working environment is extremely harsh. There has been no mature solution for this application.

Multifunction crane is one of the most important equipment in foundry plants. Taking the electrolytic aluminum plant for instance, the crane is responsible for moving the positive pole, refilling alumina powders, clearing the electrolyte shell on the oven, transporting the liquid aluminum and etc. which means once the crane breaks down, the whole plant production stops.

According to the 2015 China domestic electrolytic aluminum production capacity of 40 million tons, the usage number of cranes in China is as follow:

- Electrolysis multifunction crane: 1,600 units (8 units/200,000 tons)
- Roasting multifunction crane: 400 units (2 units/200,000 tons)
- General bridge crane: 1,200 units (6 units/200,000 tons)

There are a big number of cranes in foundry plants. However, the ambient condition in the foundry plant is very challenging. There are full of dirt/metal powders, high ambient temperature, which is up to 70°C in summer time, corrosive gas, and even strong electro-magnetic field in electrolytic plants. So the lifecycle of the cooling units for the control panel of the crane is very short, which is normally less than three years during when sometimes service technicians have to do some repairing, which means climbing onto and working on the crane bridge at about 20 meters high. Only famous European brand cooling units are accepted in this industry, like Rittal. But still the plant has to afford the occasional shutdown.

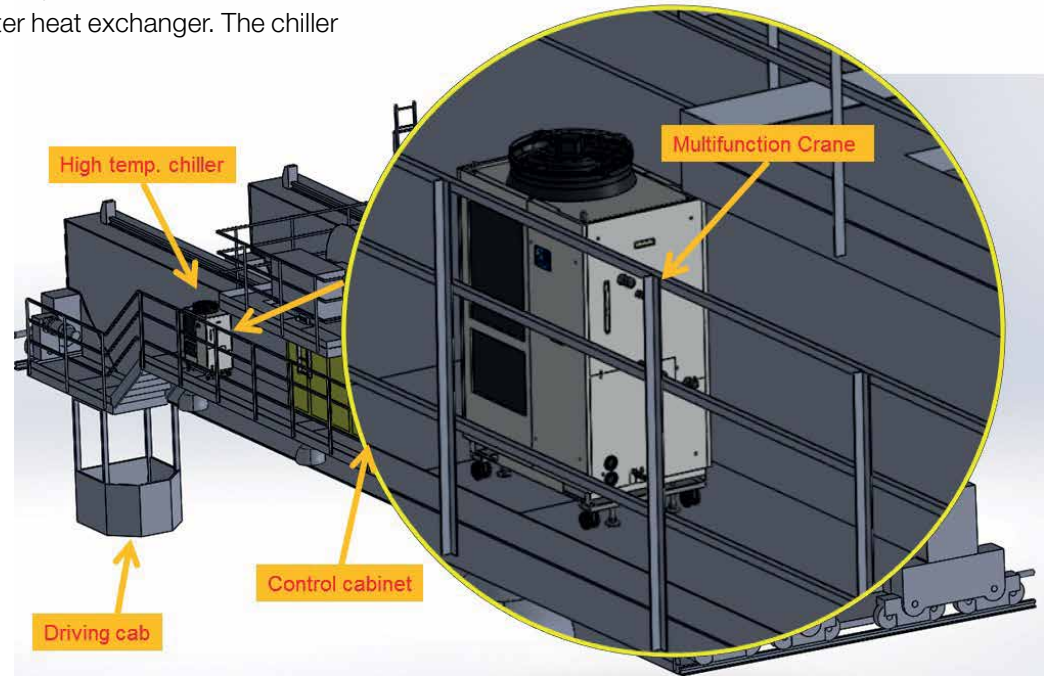


Knowing the pain point of the customer, Pfannenberg does a full investigation on the application:

- High ambient temperature: 60 ~ 70 ˚C in summer time, open heat load in the workshop
- Vibration: installed on the moving bridge
- Dust: mainly aluminum powder, which may bring short circuits on electronic contacts
- Corrosion environment: the mixture of hydrogen fluoride gas and condensate generated by the cooling units ends in hydrofluoric acid to corrode of pipelines, fins of the equipment
- Strong electromagnetic field: damage the controller without suitable shielding

Then Pfannenberg developed a particular solution for this industry as chiller plus air/water heat exchanger. The chiller is designed for high ambient temperature with R142b refrigerant which is suitable for high condensing temperature. Flexible metal piping is used for hydraulic connection. Air/water heat exchanger offers IP55 system protection to the control cabinet. An accurate water temperature control on the chiller side as ±1 ˚C and set up by the environmental temperature extremely eliminate the possibility of condensate on the piping and fins so that the hydrofluoric acid is totally prevented. Last but not least, the controller needs to be shielded and protected from magnetic field.

Until the end of the year 2016, the first set of high temperature chiller and PWS have been installed and commissioned in Qinghai Aluminum Plant. After solving a few slight issues on site, the products have been running well so far.



Facts at a glance

Task	Develop an industrial solution – high temperature chiller and air/water heat exchanger for foundry crane
Challenges	High ambient temperature, heavy dirt, vibration, corrosive gas, electromagnetic field
Products used	VLV 6 CE CUS, PWS 8302 230V 7035 HT
Success factors	• Full investigation in the special application. • Cooperate with local OEM supplier.

Summary

The foundry crane is a very challenging application for thermal management products to survive from high ambient temperature, vibration, dust, corrosive gas and strong magnetic field. Pfannenberg did a complete investigation on the application and analyze the common failure mode of current products. Based on the result, Pfannenberg cooperated with a local OEM supplier to co-develop the high temperature chiller and PWS solution, which is expected to solve the problem completely and promoted to the industry.

CASE STUDY

HPP - Liquid cooling solution for High Pressure Processing

Pfannenberg EB 400 WT units to cool process fluids

„The HPP project has proved to be very attractive due to the specificity and the innovativity of the application. It required a detailed planning while setting up a testing ground for the development of our skills in new application fields.“

Andrea Pavarani
Industry Group Specialist - Food & Beverage
Pfannenberg Italia srl

Application

HPP Italia is the first Italian company dedicated to offer the food processing industry the HPP method - High Pressure Processing.

This innovative technology is already widespread in the US while in Europe, Asia Pacific and Latin America there has been a growth in the supply and demand, due to a growing awareness among food business operators regarding the benefits of using high pressure technology instead of traditional pasteurization techniques.

High Pressure Processing brings the advantage of providing food products that maintain unaltered their organoleptic characteristics in terms of aroma, color, texture, flavor and nutritional properties. At the same time it ensures the maximum in terms of food safety and allows a significantly longer shelf life.

The customer

HPP Italy is a company founded in 2014 to provide the Italian Food & Beverage companies strongly committed to internationalization with the ideal service to solve the problem of health rigid constraints imposed by some countries on the export of food products: think, for example, to issues related to listeria and salmonella.

HPP Italy offers the innovative HPP treatment service on several foods, both solid and liquid: meats, dairy products, fish, food products readyto-eat, juice and fruit pulp, tomato sauce, sauces and other.

HPP Italy has signed an exclusive agreement with Avure Technologies, which holds the global leadership in the technology of high pressures applied to food and has installed more than 1,700 high pressure systems in the world.

This has led to the installation in the plant of Traversetolo of a high-end machine, which required worth a an investment of more than two million euros.

Chilller EB 400 WT

Application requirements

The HPP is a hydrostatic transformation treatment where prepackaged food product is subjected to high pressures with a fluid (about 6,000 atmospheres), without the need for special thermal alterations.

All with an accurate measurement of three elements: pressure, duration of treatment and temperature (< 40°C). The customer asked for two different chillers to be installed in a separate area, serving two different needs:

- the first one cooling the process fluid which is a 30% glycol/water mixture to be brought from +4°C to -1°C with a flow rate of 4,500 l/h;

- the second one is a refrigeration system aimed to cool down the filling pump and high pressure pump during exercise.

Moreover, the customer required them to be both as big as the first one

- even if this leads to an oversizing - so that the second one can be used as a replacement of the main one in case of need.

The solution

After a site inspection and an accurate sizing of the project, Pfannenberg has proposed the installation of two EB 400 WT chillers, having a cooling capacity of 40 kW and a flow rate of 4,800 l / h each.

They both measure 1680 x 790 x 1410 mm.

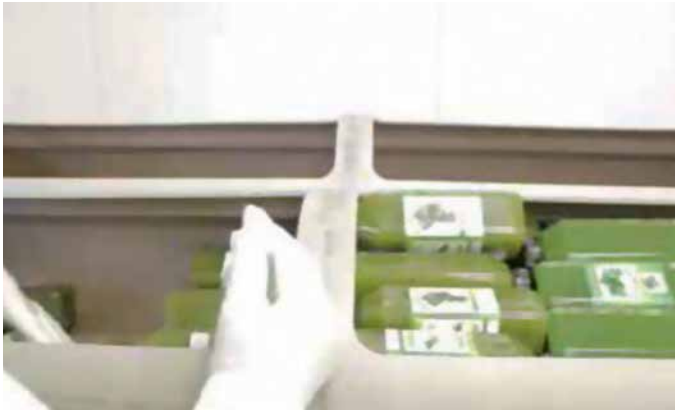
In order to fulfill the application specifics we also provided both the units with three optionals:

- low temperature kit;

- hydraulic bypass;

- digital alarm panel.



Sample food treated in an Avure High Pressure Processing machine.

Facts at a glance

Task	Cool both process fluid and pumps for a high pressure processing machine.
Application	Food and beverage latest processing technology for safety without heat and preservatives.
Solution	n.2 EB 400 WT chillers
Success factors	• high quality products • detailed sizing support • service and technical support

CASE STUDY

Nidec Minster Corporation Implements Pfannenberg's Chillers as a Standard for Their Press Machines

Nidec Minster Turned to Pfannenberg for Assistance with Complex Chiller Applications

The Nidec Minster Corporation orginally started as a blacksmith shop and since then, has developed into be one of the world's premier manufacturer of precise, productive, and dependable equipment.

Nidec Minster was searching for a dependable and affordable way to chill and cool their mechanical press machines. These machines generate a large amount of heat and require cooling - this was a complex application for manufacturers, so Nidec Minster turned to Pfannenberg to solve one of their toughest problems.

Nidec Minster Corporation is a international supplier of various equipment and services for the material forming industry. Nidec Minster provides the industry with a single source for buyers. **Machines and services include: mechanical power presses, feeds, straighteners, reels, coil cars, die transfer tables, press controls, training programs, production monitoring systems, inspection services, preventative maintenance services, remanufacturing services, technical consulting services, press relocation services and a host of other products and programs designed specifically for the material forming market.**

Enthusiastic and committed employees stand behind the same foundation that has guided Nidec Minster for more than 100 years - "A commitment to delivering integrity, quality and value to the customer". Today, Nidec Minster's machines are located in more than 87 countries around the world. Nidec Minster is known for their reputation as having great quality and rugged dependability on all of their machines throughout the world.

Fig. 1: Pfannenberg‘s EB 150 Series Chiller

Challenges:

Nidec Minster came to Pfannenberg at the end of 2013 looking for assistance. They needed a solution to cool their servo motors and air to water heat exchangers related with their press equipment. The servo motor is a large motor that drives the press up and down. The press can deliver pressures from 60 up to 1600 tons. This motor is extremely large and generates lots of heat just by nature of its size and the use of electrical current.

Solution:

It was decided that a Pfannenberg EB series chiller would be implemented. Pfannenberg's chiller was utilized to keep this motor cool and in a workable temperature range. Pfannenberg chillers feature a stainless steel pump and evaporators, nonferrous water circuits, and a polyester-epoxy blend powdercoat finish. Due to the complexity of the machine there is a large electrical enclosure to house the many components that manage the press. As we know, those components can get hot enough to cause failure. The use of air to water heat exchangers, create a workable climate for the components to function within the enclosure. Pfannenberg chillers provided chilled fluid to complete the process of enclosure cooling.

Aftermath:

Nidec Minster Corporation's first unit purchased from Pfannenberg was in 2013 - an EB 550 chiller to cool their FX-600 Press. The EB chiller allowed for maximum cooling capacity in the smallest possible footprint. The second round of units purchased was in 2015 - an EB 150 chiller to cool their P2H-100X machine. This machine is design for universal stamping applications. It is large in size and very durable to withstand the process. They have since settled on and purchased the EB 150, EB 550 and EB 700 chillers as standard product to mate with their various press machines.

Reasons For Switching:

Nidec Minster had been previously using a Pfannenberg competitor chiller. A Rep from Nidec states why they decided to switched to Pfannenberg for several reasons:

- **Product offering** – When Nidec Minster started building larger servo presses (>300 Tons) Rittal did not offer a standard product that could provide the cooling capacity we wanted with a single chiller unit.
- **Footprint** - Nidec Minster researched several companies and Pfannenberg offered a single chiller with the smallest footprint.
- **Lead Time** – Pfannenbergs 2 to 4 week lead time offering was the best available.
- **Engineering Support** – Nidec Minster received timely responses to questions during the circuit design process.

Summary

Pfannenberg is no stranger when it comes to complex and demanding applications. Pfanneberg's chillers are build to last, require less maintence, and improve the energy effeciency. Nidec Minster knew that Pfannenberg's chillers were the perfect solution to their problems. Implementing various sized EB chillers into their press machines has been proving to be the best choice for them. Pfanneberg has then since become the standard chiller used on their future presses.

CASE STUDY

A new liquid cooling solution for machine tools in the rail industry

Pfannenberg EB 30 OIL to replace competitors‘ units

„It is important to cultivate the relationship with the customer, be present and capillar in the area. Knowing your customer and its future projects is the key if you want to offer a prompt advice identifying the best solutions to meet all the technical requirements of the application.“

Riccardo Vistarini
IG Specialist - Manufacturing
Pfannenberg Italia srl

Application

SAFOP’s lathes, used for the maintenance of rolling stock for railways and urban systems by Trenitalia, the primary train operator in Italy.

Challenges

The challenge was first resume relations with an old client someow lost fifteen years ago in the transition from the former Eros Dassi to the Pfannenberg Group.
After this, something easier: replacing the competition by providing better performances.

The customer

Founded in 1923 to build small machine tools, Safop SpA produces large horizontal lathes, machines for ball valves, cylinder boring machines, products for rail systems and special machines, with annual sales of about 20 million Euros (these numbers of 2013), for 95 percent abroad.

The acquisition of Safop by Jingcheng, Chinese colossus for over 20,000 employees worldwide, including about 4,200 in the machine tool sector, represented the piece of a Group strategy that, starting from Beijing, was determined to go with a leading role in the global market, particularly in the European market.

The full sales value chain involved

Despite being SAFOP an old customer of Dassi, the relationship has been successfully revitalized indirectly, by one of our distribution partners in conjuction with SAFOP's system integrator.

Pfannenberg entered the discussion in order to deliver a proper solution sizing, considering all application specifics. We also knew, since the beginning, the final application user: Trenitalia spa.The transparency of the project and the openess of everyone involved is undoubtedly a good starting point, which allowed to achieve an efficient and satisfactory solution for all.

The solution

Given the customer's requiments, the result of our technical analisys led to the installation of an EB 30 OIL unit on a new machine tool ordered by Trenitalia where the chiller cools the oil lubricant used in the hydraulic power unit to cool the tool head during the grinding job.

SAFOP
MACCHINE UTENSILI

www.safop.com

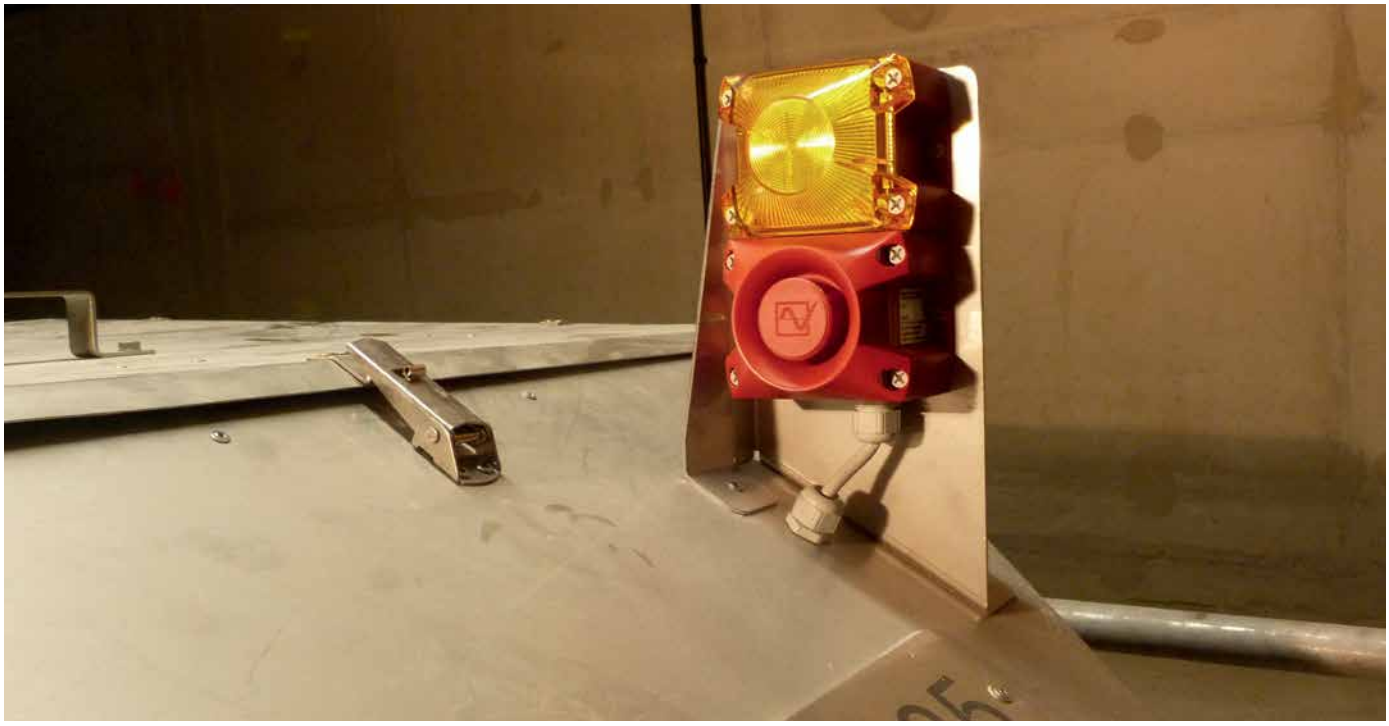
CASE STUDY

Reliable alerting in the Gleinalm Tunnel

Fire protection has top priority in tunnel construction

Fire protection is given the highest priority in tunnel construction. Should a fire break out and produce smoke, the fire alerting system must function reliably so that countermeasures can be put in place as quickly as possible to protect human lives. As part of a comprehensive modernization and reconstruction project, Sirocco Luft- und Umwelttechnik GmbH has been commissioned by ASFINAG, the operator of the Gleinalm Tunnel in Austria, to install ventilation dampers to ventilate the tunnel and extract smoke gases. Each damper is fitted with a sounder/flashing light combination from Pfannenberg which will provide an alert in the event of fire.

The Gleinalm Tunnel is a very busy tunnel on the A9 Pyrhn highway in Austria. It is 8,320 meters long and connects Leoben with the outskirts of Graz in Styria and is used by approximately 21,000 vehicles every day. It currently consists of one tunnel for traffic with an exhaust duct immediately above it which is also used to extract smoke in a controlled fashion should there be a fire. There is a ventilation damper fitted every 100 meters along the whole length of the tunnel. A new tunnel is currently being built and is expected to be opened for traffic in summer 2017 after which the existing tunnel will be renovated with completion of the whole project planned for 2019. According to ASFINAG, total investment in the new construction work and the renovation of the existing tunnel is approximately €260 million. As part of the project, Sirocco is replacing the ventilation dampers in the duct for the existing tunnel as well as installing new dampers in the duct for the new tunnel.



Once construction and renovations are complete at the Gleinalm Tunnel, 160 PA X 1-05 sounder/flashing light combination devices from Pfannenberg's PATROL series will provide a reliable fire alerting system in the air extraction ducts.

80 sounder/flashing light combination devices per exhaust duct

Each of the two exhaust ducts has around 80 ventilation dampers which are distributed along the length of the tunnel. They are all fitted with a PA X 1-05 sounder/flashing light combination from Pfannenberg's PATROL range. Each signaling device can produce sound at 100 dB(A) and a light intensity of 5 J when flashing. Normally, the exhaust duct would be empty of people and air extraction would start automatically. However, when maintenance work becomes necessary, the staff responsible need to enter the duct. Should the fire alarm be triggered, they all need to exit the duct as quickly as possible. The visual and audible alert is conveyed via the signaling devices. Smoke extraction cannot start until confirmation has been received that the evacuation is complete.

Full compliance with all the tender specifications

Pfannenberg was able to meet all the specifications in the tender issued by ASFINAG with its PA X 1-05 sounder/flashing light combination device. The tunnel operator had asked for visual and audible signaling devices compliant with protection class IP66 with yellow covers and a nominal voltage of 24 V DC in an aerodynamic design that would occupy little space in the ventilation duct but nevertheless be widely seen and heard. ASFINAG had a special requirement concerning the flashing light: this was to offer a frequency of 3 Hz and light intensity of 3 J. Both criteria were easily fulfilled by the PA X signaling devices as was the requirement for a two-tone sound issued at intervals of at least 0.3 seconds. The PA X 1-05 guarantees norm-compliant fire alerting and also allows projects to be planned with certainty.

Maintenance personnel can gain access to the two extraction ducts. Should a fire alarm sound, it is essential that the air extraction duct in question is evacuated as quickly as possible.

Precise calculation of the required sound volume

Pfannenberg 3D-Coverage is a new practical and systematic way to plan the effective performance of audible and visual signaling devices in a given space. Even in the initial stages of a project of this kind it can make a reliable statement about the size of the area actually covered by the signaling devices. By taking the environmental situation into account, the experts at Pfannenberg can use 3D-Coverage to determine how loud the signal needs to be. This prevents incorrect dimensioning and also ensures that compliance with all the industrial norms and regulations is achieved in a cost-effective and energy-efficient manner.

Simple installation

In selecting a sounder/flashing light combination, the industrial ventilation specialists at Sirocco were looking for simple, fast and safe installation as well as fulfillment of the tender criteria. PA X sounders and lights are pre-wired at the factory making them quicker to fit and install. An incorrect installation is practically impossible.

“Thanks to their well-thought-out design, we can simply pre-assemble the PA X sounder/flashing light devices which will allow us to configure them under optimum conditions in the workshop,” explains Reinhard Kripsch, the project leader at Sirocco. “Then they just need to be secured with screws in the ventilation duct. There will be no need to open up the devices at the building site, saving time and cutting the amount of work. Where performance is concerned, the sounder/flashing light combinations from Pfannenberg meet all the requirements imposed by ASFINAG. We are completely satisfied.”

Open ventilation damper in the Gleinalm Tunnel showing the traffic tunnel below. There are around 80 dampers installed in each of the two ventilation ducts which will also act as controlled smoke extractors in the event of a fire.

There is a ventilation damper installed every 100 meters in the two ducts along the length of the tunnel. If fire breaks out, the Pfannenberg signaling devices will issue a visual and audible alert. Smoke extraction cannot start until confirmation has been received that evacuation is complete.

Facts at a glance

Task	• Visual and acoustic fire alarm in a tunnel • Fulfillment of all conditions of the ASFINAG tender with regard to hood color, nominal voltage, flash frequency, tone • Easy and fast mounting of the signaling devices
Challenges	• Dimensioning of signaling devices using the Pfannenberg planning method 3D-Coverage • Fulfillment of all tendering requirements of ASFINAG
Technique applied	• 160 Flashing Sounders PA X 1-05
Success factors	• Reliable, prior planning with 3D coverage together with the customer • Pfannenberg is the only supplier of signaling devices that meet all of the requirements • Uncomplicated installation and maintenance of the signaling devices due to the pre-wiring

Summary

The flashing frequency of 3 Hz requested by the tunnel operator ASFINAG was modified to 1 Hz as the project developed. This did not present a problem for the PA X 1-05. From 2017, a total of 160 sounder/flashing light combinations from Pfannenberg will therefore provide safe fire alerting in the air extraction ducts of the newly built tunnel and its modernized counterpart in the Gleinalm Tunnel in Austria.

CASE STUDY

TRENITALIA - Fire fighting system adjustment in compliance with EN 54-3 and EN 54-23

Patrol sounders and Pyra beacons for the rail industry

„It was very interesting to observe the virtuous cycle triggered by word of mouth for the adoption of our solutions in different Trenitalia's warehouses, workshops and deposits, in places sometimes very distant from each other."

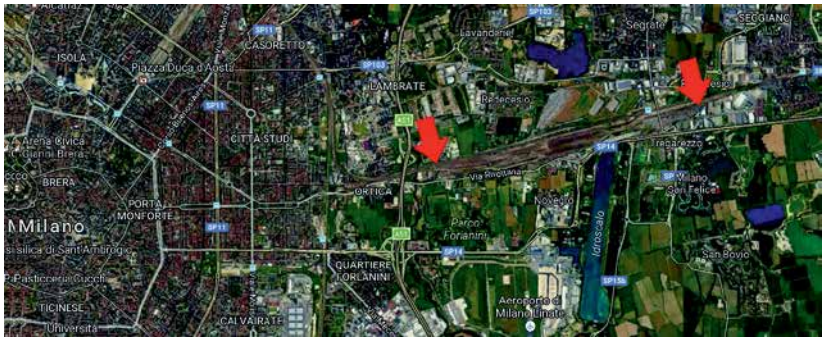
Luigi D'Onofrio
Industry Group Manager - Infrastructure
Pfannenberg Italia srl

Application

Pfannenberg Italy has been involved in the fire fighting system djustment plan for Trenitalia's workshops, in compliance with EN 54-3 and EN 54-23.

These adjustments were necessary for the construction activities of some new rail-road intermodal terminals, through upgrading and extending the existing terminals.

The rail-road intermodal terminal between Milan and Segrate alone occupies an area of approximately 240,000 m² (including workshops, warehouses, offices, yards, internal roads and railway area).



Trenitalia's workshops in Milan and Segrate, Italy

Trenitalia's workshops in Mestre, near Venice, Italy

The customer

Trenitalia is the primary train operator in Italy, owned by the Italian Government. Trenitalia offers national rail transport in Italy and international connections to Austria, France, Germany, and Switzerland. The company operates both regional and long-distance trains.

Every day around 69 thousand people manage over 8 thousand trains and 250 thousand bus-km,carrying around 830 million passengers and 50 million tons of freight a year on a network of over 16,700 km of railway lines, around 1,000 of which specifically for High Speed services.

Application requirements

Since **fire-fighting systems** are so critical, the designs and arrangements of such systems have been carefully evaluated for **compliance with the EN 54-3 and EN 54-23 requirements** by the engineering and designing firm Corbellini srl. They were not only needing conform products to apply but also a professional support in the proper dimensioning of visual and acoustic fire alarms. This is why they have turned to Pfannenberg.

PY X-M-10

PA 20

Our fire consultancy always includes an inspection, the analysis of the DVG plan, and the collection of the environmental characteristics and use of the room. It also includes the detection of ambient noise of each different process, the assessment of the wrking mode of employees and the analysis of the evacuation plan.

Our methodology has been listed among the guidelines for the application of EN 54 in Italy, developed in the UNI (Italian Organization for Standardiziation) board to which Pfannenberg belongs.

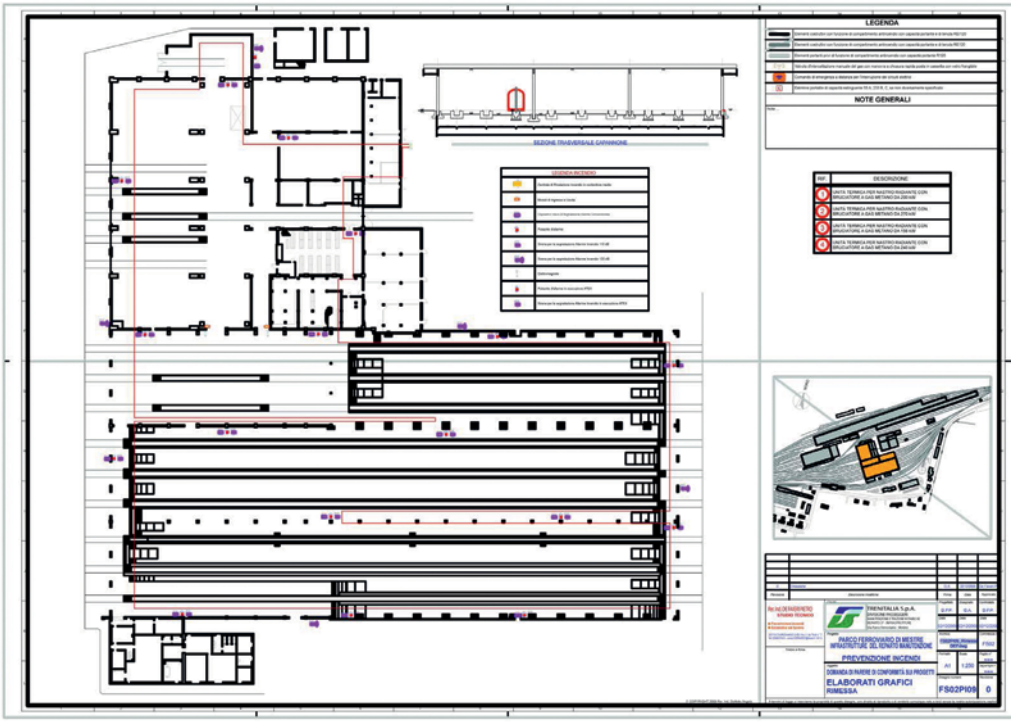
The solution

After considering the specific environmental requirements, a set of different Pfannenberg sounders and beacons have been selected for the first 4 workshop buildings:

* n.14 **PY X-M-10** (10 J flash beacon)
* n. 8 **PY X-M-05** (5 J flash beacon)
* n.7 **PA 1** (100 dB sounder)
* n.14 **PA 20** (120 dB sounder)

where **beacons are EN 54-23 certified** in Open category (therefore freely available for installation both on walls and ceiling) and sounders are **EN 54-3 certified**. Being the system integrator, deeply satisfied with the quality of the products and their simplicity of installation, it has chosen **118 Pfannenberg sounders and beacons for the 7 workshop buildings of the High-Speed Rail Terminal in Mestre (VE).**
Through an increasing word of mouth, we have **since then been involved in several other projects** by different engineering or system integration firms, including the terminal in Orbassano (TO) and the bus deposit of Padua, both belonging to the Trenitalia Group.

1:250



Sample DWG file from the **High-Speed Rail Terminal in Mestre (VE)**.

Facts at a glance

Task	Fire fighting system adjustment in compliance with EN 54-3 and EN 54-23.
Application	Rail workshop facilities for the main Italian train operator.
Solution	~ 250 PYRA beacons and PATROL sounders
Success factors	• detailed sizing support • high quality products • quick and easy installation

CASE STUDY

Evacuation Alarm System Improves Personnel and Community Safety at Wastewater Treatment Facility

Application Specific Alarm Sizing and Coverage Leads to a More Effective, Economical Warning System.

Loudness of audible alarms and brightness of visual alarms, as well as effective coverage area satisfied by the devices, are the measures to which safety of personnel should be gauged

Chlorine is the lowest cost and most widely used oxidizing disinfectant in the treatment of wastewater. It serves to neutralize infectious agents such as bacteria, protozoa, parasitic worms, and viruses in the wastewater treatment plant's effluent stream prior to its discharge to the environment. Chlorine is also a highly corrosive and toxic chemical. Although there is some debate about the health impact of ingesting chlorine, it is certainly not as dangerous as ingesting the infectious agents that it destroys.

Exposure to chlorine produces tissue damage. A burning sensation is the result of contact with chlorine and the severity of this is proportional to its concentration and the duration of exposure.

At wastewater treatment plants, chlorine is typically injected as a gas into the water to be treated. Bulk chlorine is stored as a liquefied compressed gas or as an unpressurized liquid consisting of sodium hypochlorite dissolved in water (also known as bleach). Liquid chlorine is evaporated into a gas prior to its use in wastewater treatment.

The concentration of chlorine used varies on the application from low for drinking water (< 3 ppm), to medium for a swimming pool, to high for waste-water treatment (5 – 20 ppm). Exposure time and other chemical characteristics have an influence on the effectiveness of chlorine disinfection. Since chlorine can also negatively impact fish and wildlife, there are limits as to how much can be present in the discharge stream. To bring effluent streams within discharge limits (<0.02 ppm), de-chlorination is commonly achieved after the disinfection has taken place by injecting sulphur dioxide gas into the water.

The density of chlorine gas is approximately 2.5 times greater than air – meaning that it will remain near the ground in areas with little air movement and pose a significant inhalation risk. **A chlorine gas leak within the confines of a building in a water or wastewater treatment facility represents a safety hazard that can quickly lead to injury or death.**

The safety manager of a wastewater treatment facility identified the need for an improved chlorine gas leak detection evacuation notification system to ensure the safety of both onsite personnel and the community. While already considering a prototype device that was essentially a mechanical vibrating horn and a strobe light – both mounted to a small enclosure, they discussed their need with one of their electrical service contractors. This contractor was also a signaling distributor for Pfannenberg's Signaling Products and recommend our complete line of signaling products for the notification application of their project. The distributor took photographs of the prototype device and determined that the PATROL series of flashing sounders would be a superior product designed to accomplish what they were trying to achieve. Demo units were brought to the facility and tested, the safety manager was impressed with the quality of construction, superior sound output level, and multiple tone capability.

After initially considering the purchase of 50 of the prototype units, **discussion turned to coverage area capability and sizing of the PATROL units to meet the needs of the facility. Since the treatment plant is a combination of various buildings and walled spaces, determination of the proper sound output levels and number of PATROL units was not an easy task to accomplish on paper. It was decided that the best technique for sizing units would be through actual testing.**

Pfannenberg PATROL Flashing Sounder Installed In Water Wastewater Treatment Facility

Pre-wired, AC-powered PATROL demo units of all four ranges were subsequently brought to the facility for testing. Facility managers then powered up units at the desired installation locations and walked or drove away to a distance that was deemed to be the limit of notification for the particular unit. By communicating back to the units' location by cell phone or two-way radio, the alarm effectiveness was either accepted or rejected and adjustments could be made to try stronger or weaker units in order to achieve effective alarm notification. After evaluating the entire facilityAla, it was determined that just 25 PATROL units of varying output sound levels would be needed to provide sufficient evacuation notification.

Pfannenberg subsequently received the order for the 25 PATROL units. After their installation, the safety manager noted that they were very satisfied with the alarm notification coverage area capability of the units. In addition they were pleased with the overall cost savings achieved since fewer units were needed to be installed and wired up - a savings in both labor and materials.



Pfannenberg Signaling Products Installed throughout Wastewater Treatment Plant for Gas Detection Application

Summary

In summary, an effective evacuation alarm notification system should start with an assessment of the notification appliances' ability to provide adequate warning to personnel, rather than a pursuit for the lowest cost devices. Loudness of audible alarms and brightness of visual alarms, as well as effective coverage area satisfied by the devices, are the measures to which safety of personnel should be gauged. Once this is understood, an economical valuation that includes equipment cost as well as installation cost will reveal the true price of the notification system. As encountered with this application, the more efficient system may prove to be the least costly.

Photo: HHLA / Thies Rätzke

CASE STUDY

Served on ice – modernization of the refrigeration systems at the Hamburg fruit port

The HHLA Frucht- und Kühl-Zentrum GmbH has more than 18 refrigerated areas with a total capacity for just under 13,000 pallets.

Over 500,000 tonnes of tropical fruit are handled at O'Swaldkai at the fruit port in Hamburg, making it the largest of its kind in Germany. Ensuring that end consumers receive bananas and kiwis (to name but two varieties) that have been kept fresh and cool makes particular demands of the refrigeration systems: they should run without any problems, consume little energy and also be easy to maintain. To achieve this, Pfannenberg developed a concept that provides for full modernization of the refrigeration systems, some of which were installed in the 1970s, by 2020.

Hamburger Hafen und Logistik AG (HHLA) manages a fruit and refrigeration center that covers over 166,000 square meters. Shed 46 alone contains 6 modular systems with a refrigeration capacity of more than 2 megawatts, which cools approximately 60,000 cubic meters down to -2 degrees Celsius.

A centralized system controls the refrigeration, heating and ventilation processes in a total of 14 refrigerated areas offering different storage conditions at different temperatures. One of the challenges was to integrate a new system to control the whole chilling process in the central control system. Pfannenberg focused the modernization concept mainly on operational safety, efficiency and economy. This involved repairing the piping and cabling of the existing system and replacing the refrigerant with a new one which is complying with new legal requirements.

The first stage was to modify system 8 in Shed 46.

Modernization of the different storage conditions and temperatures in the various refrigerated areas with a total of eight modular refrigeration systems posed a considerable challenge. Photo by Pfannenberg

Change to new refrigerant

Partly built in the 1970s, the refrigeration system was originally designed to use R22 refrigerant which was then banned and replaced by the drop-in refrigerant R422D. In accordance with the new EU directive 517/2014 (F-gas directive 2014), the system now contains the modern refrigerant XP40. In order to optimize the performance of the system, Pfannenberg installed three new main modules, 26 controllers and 10 electronic injection valves and laid five kilometers of new cable. The system can now achieve a 600 kW cooling capacity.

A serious problem with the oil solved

Despite a good piping network, serious problems with the oil occurred frequently in the multicompressor refrigeration system. To avoid damaging the compressor, it was necessary to refill with oil at regular intervals and readjust the setting screws. The modernization is intended to solve this this serious problem completely in the long term. To achieve this, Pfannenberg installed new equipment in the form of four fully automatic oil level regulators, two hot-gas/liquid separators and an oil tank. The pipe diameters in the assembly were changed to 76 mm and the pipe cross-sections were readjusted. When operations recommenced, the system was working as required. After 50 operating hours, it had already discharged more than 100 liters of excess oil.

Automatic exchange of data allows remote maintenance

An important part of the modernization is the remote transmission of data which makes it easier to maintain the system. With updated measurement, adjustment and control equipment, the refrigerated units can communicate with each other and transmit the data to the multi-compressor refrigeration system which uses it to calculate the optimum suction pressure in order to slow the timing of the compressors and improve performance as a result. The modular cooling system can be monitored remotely together with an HACCP 24-hour monitoring system in compliance with veterinary inspection office regulations. It is now no longer necessary to carry out daily inspections of the machine room as the status of the machines can always be monitored from anywhere using the remote maintenance system.

Modernized in only four weeks

The modernized system has been in operation at O'Swaldkai since January 2017. Project planning, including coordination of various subcontractors, was very time-consuming. Nevertheless, a strict schedule was adhered to and the modular refrigeration system was modernized in just four weeks. It is planned to have updated four of the eight modular systems by 2020. With the efficiencies thus achieved, it will be possible to take the other three systems, with almost a tonne of refrigerant and a cooling capacity of 656,000 watts, out of operation without affecting performance overall. This not only saves on operational and repair costs, but also means less maintenance work. The modernization will allow up to 12 leak tests fewer to be made every year.

Objective achieved

Automation makes it possible: HHLA now operates a modernized modular refrigeration system which is not permanently working at its limits but which is running efficiently with coordinated parameters. This is an important objective of the modernization which has already been achieved.

"The modernization has resulted in an improvement to operating safety and energy efficiency," says Martin Bartsch, Head of Operating Technology at HHLA. "Immediately after putting the system into operation, we were saving 50% on energy and the oil problem had been dealt with. The proficient service we have received from Pfannenberg has helped us to meet our objective fully."

Detailed project planning and coordination of each individual task presented a considerable challenge in updating a modular refrigeration system of this size. With their many years of experience and core expertise in thermal management, Pfannenberg was able to automate the refrigeration systems in the Hamburg fruit port in just four weeks.

Pfannenberg re-equipped the old VS1000 with a modern control system to allow automatic data transmission and to reduce maintenance work in the future. Photo by Pfannenberg

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