

● editorial

What, exactly, is sustainable production? *Page 2*

■ case

Societally useful recycling

Swedish Steel AB in Finspång puts waste heat into the municipality's district heating network. *Page 5*

▲ innovation & research

Peter Almström, researcher at Chalmers University of Technology

Efficiency improvements have positive ecological, economic and social effects. *Page 8*



Meet Karl-Gustav
Ramström

Prevas' new CEO. *page 3*

Arla's new packaging requires less raw material and less energy. *page 4*

ENERGY-EFFICIENT GAS TURBINES

Siemens Industrial Turbomachinery AB gets power from PIMS

page 6-7

What, exactly, is sustainable production and why is it important to industry? To answer that question we must take in the wider picture and view sustainability as bigger subject than merely environment protection.

WHAT, EXACTLY, IS SUSTAINABLE PRODUCTION

EDITORIAL

IN THIS ISSUE OF TECH TRENDS we have interviewed Peter Almström, Senior Fellow at the Institute for Materials and Production Technology at Chalmers University of Technology in Gothenburg. He is involved in a major research project, focusing on sustainable production. Almström argues that it is important to differentiate between ecological, economic and social sustainability. His main point is that increased productivity saves energy, which contributes to better ecological sustainability

and to improved profitability. The latter creates a margin for strategic investments, which is economically sustainable. This in turn leads to long-term success and thereby to employment security and higher salaries which are socially sustainable.

I can only agree. There is considerable scope for more efficient production in the engineering industry. But first, one must get a good picture of the current situation by starting to measure key variables throughout operations. Almström argues that the productivity improvement potential in the engineering industry is as high as 50 per cent and generally achievable with modest investments.

A good example of a company striving for ever more sustainable production is Siemens Industrial Turbomachinery, which has developed a range of very energy-efficient gas turbines. An important component of these turbines is a data acquisition subsystem which forms part of every delivery. That system enables Siemens to monitor i.a. the energy efficiency of every delivered turbine. Prevas contributes to this by supplying that very data acquisition system which Siemens has incorporated into its turbine control system. Previously, the users had to shut down their turbines regularly to carry out preventive maintenance. Now they can monitor key variables in real time, identify trends and signs of future problems before they get serious. The economic benefits of this improvement in functional supervision are great. Personally, I am convinced that improvements in maintenance strategies will contribute greatly to higher productivity in the future. In preparation for this development, Prevas has recently acquired Psiam, which is a company that exclusively deals with maintenance management systems or Enterprise Asset Management Systems (EAMS) as they are also called. The interaction between Maintenance and Production is becoming an ever more important factor in the quest for higher industrial efficiency. Read more about this acquisition at top right.

Swedish municipalities also take the sustainability argument seriously, e.g. by reducing the consumption of heating oil in favor of other energy sources, e.g. waste heat from industrial plants. Read more on p 8 about the exciting project run by Swedish Steel AB and the



Finspång Municipality, having resulted in lots of previously wasted heat now being put to good use in the municipality's district heating network, a solution in which a control system from Prevas plays an important part.

That is a good example of how to turn a not very environment-friendly industry into a recycler, benefiting an entire community. Have a pleasant read!

CHRISTER RAMEBÄCK

*Senior Vice President
Industrial Systems, , Prevas AB*

IT Solutions for Maintenance Management

By having acquired the Psiam Group of Companies and thereby having got access to that group's expertise in computer-based maintenance management systems, Prevas is now in a strongly improved position to assist European industry in improving its production efficiency. Psiam is an integrator of so-called Enterprise Asset Management Systems (EAMS). Customers include Coca Cola, GE Healthcare, NIBE, Norway's Postal Service and Tecnip.

– Thanks to Prevas' good reputation in its field, and its strong sales organization, we will be able better to reach customers in the whole of Scandinavia. Prevas' expertise in industrial IT is very high and we have cooperated before. For instance, Prevas has developed a smartphone application for the reporting of maintenance data into our EAMS, says Tord Svanqvist, CEO of Psiam.

New order from Arla Foods

Arla Food's facility in Vimmerby, Sweden, is about to be equipped with another production line. Prevas was commissioned to develop parts of the control system and to manage the entire control system installation and commissioning project. The delivery also includes the control of a recycling system intended better to recover byproducts.

In this way, Arla will reach a higher production capacity and a smaller impact on the environment. The new installation will become the most advanced feed system of its kind in the world.

– As a prioritized supplier to us, Prevas has good knowledge of our Vimmerby facility. After having completed an upgrade of the control system on what we call 'the dry side', Prevas is a natural partner for us in IT and automation in our ongoing expansion process, says Tom Andersen of Arla Foods.

The Arla Foods project is a turn-key one where Prevas provides both project management and implementation services. The time schedule is very tight, which necessitated the setting up of rather a large project organization at short notice, a team which is scheduled to complete the development work in the spring of 2013.

Innovation for Growth

Prevas employs 600 people, together serving as main supplier and development partner to leading companies in fields such as energy, automotive, defense, life science, telecom and engineering.

www.prevas.com

Prevas

CONGRATS AND WELCOME KARL-GUSTAV RAMSTRÖM AS OUR NEW CEO AS OF APRIL 1

Where do you think Prevas' strength lies?

The people of Prevas with their deep knowledge and visionary solutions, combined with solid experience, tried and tested platforms. And Prevas' slogan: "Innovation for growth" means that we are more than an IT systems supplier. We are always striving to help our customers do better in their fields through our expertise and solutions. Our role is to contribute with competence, enabling our customers to take maximum advantage of all the new technologies available, regardless of the markets they operate on.

For a consulting company like Prevas, it is vital that we understand our customers' businesses and respond to their needs, hand in glove. I, like Prevas, has always worked in technology-intensive fields where the provision of value to the customer is the overarching goal.

However, historically, Prevas has not always excelled at telling the world about its impressive competence and that we are able to undertake quite big development projects, even operate as our customers' outsourced development departments. In addition, Prevas has, over the last few years, made a number of strategic acquisitions which nicely widens and strengthens our services offering.

Which weaknesses or development needs of Prevas do you see?

Engineers, of which there are quite a few at Prevas, are usually not the kind of people who are prone to bragging, but I think we have every reason to brag a bit more. It is important that we tell our customers what we know and are capable of so they can see the whole picture.

I hope I will be able to contribute toward that.

Our tradition is to talk to our customers' development, IT and technology people. Now we also want to talk to top management since the ultimate purpose of our technology-related solutions is to contribute to their business development.

What have you been doing before you joined us?

My latest job, prior to this one, was as Executive Vice President and Chief Technical Officer at Swedish Steel AB. Before that I had a couple of managerial positions in the ABB Group. Two years ago I was appointed member of Prevas' board of directors, which has enabled me to get to know Prevas better.

Who are you?

Those who know me usually call me 'K-G', an address I respond to best. I am 58 years old, and live in Västerås, Sweden, where Prevas' main offices are situated. I have three grown-up children. My spare time I like to spend on skis, skates, playing golf or at the gym. I also like picking mushrooms in the woods and reading books, although the latter happens far too seldom these days.*

THE COMPETENCE IS THERE. NOW WE WILL DO BETTER AT TELLING CUSTOMERS HOW WE ARE ABLE TO PARTNER WITH THEM.

What is your favorite food?

Italian but also traditional Swedish food.

Favorite travel destinations?

Southern France.

Latest book you have read?

"Thinking, Fast and Slow" by Daniel Kahneman.

Latest movie you have seen?

"An unexpected friendship" (I recommend it).

What do you do on Fridays at 09:00 p.m.?

If I haven't fallen asleep by then I look at Skavlan's talk show on TV and drink a glass of wine.

What are you most proud of (professionally)?

Having been part of developing the world's best industrial robots (at least at that time).

What would you like to say to Tech Trend's readers?

That I am quite fired up by having started to work for Prevas and that I am very impressed by all the ongoing projects and the sum total of competence this company possesses. We have underutilized potential, almost like a hidden talent, which we must now put on display.

THE WHITE GOLD

is now getting "Closer2Nature"

The dairy group, Arla Foods is work hard on sustainability in a project they call "Closer2Nature", among other things involving the development of new packaging materials that require less input of raw materials and energy for finishing. Central and local development resources are taking part.

Arla IT is a central support department of the group, which has three sections, one handling administrative systems, such as SAP, another networking, i.a. ensuring that all the different offices and facilities in 30 countries are interconnected, and a third, Production IT, data acquisition from Production. Structurally, Production IT's system can be viewed as middleware between the admin system and the production control systems.

Arne Svendsen is manager of the Production IT section which operates out of Århus, Denmark.

– Arla Foods is Scandinavia's largest dairy group and on its way to become even more of a global player. Focus is shifting from our traditional markets,



Sweden and Denmark, toward Britain and Germany. For this reason, the IT department has started to utilize synergies from integration of the processing facilities in the "new" countries in the form of intensive migration projects. In addition, work is under way to provide a single unified interface to all customers, i.e. food retailers. Arla Foods wants to influence the market by developing new products rather than passively adapting to trends established by others.

We at Arla Foods are working hard on sustainability in a project called "Closer2Nature". Many central development teams are involved in the project, as are all our dairies. A part of this project is the development of new packaging materials that require less input of raw materials and energy to the production process.

Further, we try to avoid waste but if that proves impossible we at least want to recycle the waste in some way. The long-term goal is zero waste. To reach that goal we have defined three intermediate ones:

By 2020 all our packages shall be 100 per cent recyclable. This calls for cooperation with suppliers, researchers and key customers. It further calls for us to evaluate and choose the most appropriate packaging designs and materials.

We want to help customers reduce food waste by 50 per cent, partly by helping them plan their purchases better and partly by encouraging them to utilize our products to the full. We will publish tips on the Internet for how to utilize leftovers, to prepare weekly menus and to prepare climate-friendly meals. In addition, we will try to find

the right packages, in terms of both sizes and the ability to empty them fully.

We want to eliminate all waste going straight from production to the waste dump by utilizing surplus products as animal feed or for biogas production and by cooperating with manufacturers and suppliers of systems for waste handling for the purpose of re-using or recycling solid waste.

Another project aims at optimizing the energy consumption at the supplier side. This work is supposed to result in Arla Foods in time being able to specify its carbon footprint, i.e., declare its carbon dioxide emissions as an important key figure for future developments.

We in Arla IT are not directly working on this, if we ignore the classical method of saving energy by server virtualization. But we do involve ourselves and support top management in their efforts to find the most appropriate IT solutions, which are often a prerequisite for the launching of new initiatives. Examples of this are energy conservation systems and advanced process optimization systems. The development of new solutions for knowledge distribution encourages new initiatives not only in sustainability but generally throughout the group, says Svendsen.

Standardized module platforms simplify

Arla uses a highly standardized module platform for its IT systems in its dairies. The existing software toolbox is brimming with solutions to data acquisition, product tracing, recipe handling, analysis, optimization and energy control.

The modules are called ‘templates’ and may be likened to LEGO blocks in that they may be combined in many different ways. These ‘templates’ may also be provided to suppliers.

During the past year, Prevas has been involved in a big project involving four dairies in Sweden where the goal is to replace the existing admin systems by SAP. This means that eventually, all Swedish dairies will be using the same admin system and the same distribution logistics. Swapping admin systems

also means that the connections to the production systems must be reviewed and modified. When a customer order arrives, the system plans its execution and forwards the result to the most appropriate dairy. There, the required milk is produced, whereafter production data is collected and returned to the SAP system. This adaptation work is what Prevas has been doing at the dairies in Jönköping, Gothenburg, Stockholm and Sundsvall.

– Our cooperation with Prevas has worked as we expected, says Svendsen. “They have worked with our templates alongside our project managers. We have had good and clear communication with Prevas, right through. I consider Prevas being one of our most important partners since they by now have quite a few staff members who

have assisted us in the development of our solutions. That knowledge build-up we intend to make use of in future projects in Sweden. Prevas also has offices in Denmark and the resources required to take on assignments also in Britain and Germany, should we so wish in the future. In the future we will set up facilities of our own in Russia. Prevas has already been involved in a project in Finland and we might well ask Prevas to join us in our trip further east. Prevas is one of the most important system integrators in Scandinavia.”

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If you would like to know more about this project, please contact Lars Sandberg, phone: +46 31 725 1820 or email: lars.sandberg@prevas.se



EFFICIENCY IMPROVEMENTS YIELDS SUSTAINABLE PRODUCTION IN THE BARGAIN

Fix the time losses in the factory and get sustainable production in the bargain. That is a piece of advice Senior Fellow Peter Almström at the Institute of Materials and Production Technology at the Chalmers University of Technology, Gothenburg gives, showing how such measures can have positive effects on both ecological, economic and social sustainability.

Sustainable production is a growing trend in the engineering industry.

– Customers put demands on the products and systems they use, e.g. in energy usage. The most obvious example is perhaps our cars and in Sweden the automotive industry is a forerunner in most production-related things in the engineering industry.

So says Peter Almström, from Chalmers University of Technology who is involved in a big research project in sustainable production, appropriately called Chalmers Sustainable Production Initiative.

He differentiates between global, national, company-specific and facility-specific sustainability issues.

– Currently, global sustainability goals are primarily discussed, e.g. environmental goals for carbon dioxide emissions and those goals are incorporated into individual operations. But the sustainability issues that are more relevant at the corporate or facility levels are discussed more seldom.

For this reason, Almström's research effort focuses on the development of measurements that may be relevant at the facility level from the three perspectives ecological, economic and social sustainability.

– What we see is that measures taken to improve productivity results in improvements in all three perspectives,

he says.

Increased productivity leads to improved energy usage (ecological sustainability) and improved profitability, yielding a margin for strategic investments (economic sustainability). At best, this kind of step-up leads to long-term success and to higher employment security and higher wages (social sustainability)

What can be done?

An important question is how much more efficient Swedish factories can become?

– It is possible to do a lot. Many are not aware of the extent to which productivity can be enhanced, says Almström.

Previous studies conducted at Chalmers has shown that the potential for productivity enhancements in Swedish engineering facilities is great, approximately a 50 per cent improvement across the board, without major investments.

An important measure of sustainability is Overall Equipment Effectiveness (OEE), indicating the time-related usage of any piece of equipment, i.e. the extent to which waiting time, interruptions, etc., slows production down.

In addition to the OEE measure, the method of productivity enhancement should be analyzed as the best method is likely to vary widely from facility to facility.

– The choice of method may well revolutionize production compared to manual work on automation, but here the mode of production planning, the material flow, the distances between processing stations, etc. should also be studied.

Small measures can have big effects, e.g. the ability to use the

same tool for the fine tuning of different machines, fastening components by snap-in action instead of turning bolts, etc.

Manual work

A third area which Almström and his colleagues measure is performance, i.e. how fast the different operations are carried out in relation to the ideal time where 100 per cent represents normal time. This time is measured for both human beings and machines.

He encourages plant managers to start studying the manual work being carried out in their factories.

– There is much to be done.

Company managers have long held the view that the machines are the most important thing, that getting the machines up and running solves the method-related issues of the associated operations. This is often not the case.

These measurements can offer valuable insights. Much idle production time may be due to operators' being busy elsewhere.

Start by measuring

Almström says that the analysis methods Chalmers has developed have been tried in practice with very good results.

– For instance, in one factory we managed, in cooperation with the employees, to raise productivity by 50 per cent merely by re-arranging things on the floor to obtain a more streamlined flow and shorten distances between operations.

Almström's best advice to interested production managers is to start measuring operations to find out which actions will yield the best results.

– Much of the uncertainty falls away once you start measuring, Almström says.

Read about a seminar on sustainable production on p 7.



Strategic partnership for less energy consumption

As energy prices rise the incentives on production managers to find ways to reduce energy consumption get stronger. The making of steel products requires much energy. The material is heated and cooled in cycles to get the desired properties. Efficient utilization of furnaces calls for optimization of productivity, quality and energy consumption. To bolster, streamline and optimize production, Outokumpu in Avesta, Sweden, and Prevas have entered into a partnership project to reduce the energy consumption of Outokumpu's operations and the CO2 emissions from them. – We have chosen to enter into an agreement with Prevas since we want to work on improving the furnace operation over the long term. That is important to both parties. I think this is possible if you chose a partner who is quite familiar with the installation. To achieve lasting improvements, long-term cooperation is essential, which we feel certain that we will get from Prevas, says Claes Nilsson, General Manager of Outokumpu..

If you would like to know more about this project or find out what Prevas can do for you, please contact Johan Bäckman, phone: +46 21 360 19 35 or email: johan.backman@prevas.se

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PLANNING AND SCHEDULING

Prevas has signed a partnership contract with Quintiq. The deal gives Prevas' customers in Scandinavia access to one of the most Advanced Planning and Scheduling (APS) services available on the market. Quintiq is an internationally leading company that, with its APS software, gives companies the ability to visualize and optimize their operations and thereby achieve the highest possible efficiency and profitability.

Quintiq's solutions have been implemented in a large number of companies in field such as manufacturing, metals, logistics and transportation, both in Europe and in the rest of the world.

SEMINAR ON SUSTAINABLE PRODUCTION

On January 31, SESAM arranged a seminar at Skånemejerier in Malmö in which Björn Magnusson, Marcus Remmerfors and Tommy Andersson from Prevas delivered a lecture on energy management and energy measuring. Some fifty people attended the seminar, representing industrial companies, system integrators, suppliers of related products and systems, as well as people from universities and colleges in southern Sweden. Peter Almström from Chalmers University of Technology spoke about the bigger picture of sustainable production and how society's and companies' interests in the subject overlap and differ respectively. Read more about this on p. 6.

Marcus Remmerfors explained how Prevas can contribute with both services and software to systematic energy optimization for the purpose of identifying areas for improvements and measuring the effect of investments made.

Tommy Andersson from Prevas spoke about how to find 'energy thieves' in production processes using intelligent measuring tools and methods.

By achieving good cooperation between energy management and energy measuring, good results can be achieved in a short time. SESAM operates as a knowledge center and network for exchange of experience in industrial automation. SESAM can be found in Sweden and Denmark and arranges meetings where trends, problems and new technologies relating to the field are presented and discussed. Björn Magnusson of Prevas is a member of the board of directors of SESAM Sweden. All the material from the seminar can be found on SESAM's website at www.sesamsverige.se. The site also contains information about other seminars and their times.

WASTE HEAT FROM PAINT HEATS FINSPÅNG

Sometimes, all it takes for an environmental scoundrel to become a community-friendly recycler is a bit of willpower and a control system from Prevas. This is a story about how Swedish Steel AB (SSAB) in Finspång, Sweden, stopped blowing 10 MW of heat out to air and instead started injecting it into the municipality's district heating network.



Unfortunately, spray painting results in a fair amount of spillage. Paint that doesn't end up on the item being painted must be taken care of. The standard method is to burn the surplus paint and since it contains solvents it burns well, giving off lots of heat as a byproduct. The only snag remaining is to harness that heat. Up to the end of 2012, SSAB Sheet Steel in Finspång was wasting that heat, but as a result of cooperation between SSAB and the municipality's Technical Services Department, most of that energy is now made use of.

Anders Kvist, Business Area Manager for energy in the department says: "We have 'always' known that the heat has been there with SSAB and the idea of taking care of it has been with us, semi-consciously, for quite some time. There is a similar facility in Borlänge and we know, of course, how they recover the heat there."

The new facility is estimated to contribute with approximately 20 GWh to Technical Services' annual production of approximately 135 GWh of heat and hence reduce the need to burn oil and wood chips, thereby contributing to savings to the tune of

approximately SEK 5 million a year. The reduction in fuel consumption represents approximately 15 GWh of biofuel and 5 GWh of oil. Oil is used during the cold season while biofuel is used in the spring and fall, yielding more energy.

Prevas was perceived of as a natural partner for the programming of the new heat harnessing facility since the company acted as consultants for the programming of SSAB's other facilities. We actually instructed the main contractor, YIT to use Prevas.

The next project will be run in the same spirit. We are going to build an accumulator tank for hot water, a large 'thermos flask' to store energy and so cut production peaks. The intention is to store all excess energy produced during day time by the company's waste-burning plant in the accumulator and then pump it out at night when the demand for heat rises.

In good business times, SSAB paints sheet steel round the clock, seven days a week. A long-term goal of Finspång's Technical Services Dept. is to be totally oil-free by the year 2020 and this heat capping facility is an important step in that direction, says Kvist.

Anders Birgersson is a programmer and systems integrator at Prevas and has participated in the design of the heat recovery system. He says: "The hot flue gases from the combustion furnace ends up on the roof and it was easiest to build the facility above the in-loading bay of the paint store and put the gas-cooling heat exchanger, the control equipment and the hot-water pumps there. The temperature of the flue gases, as they reach the cooler is approximately 700°C, which is perfectly adequate for raising the heating water temperature to 95°C without further measures. In this way some 600°C are removed from the flue gases. For obvious reasons, the need for heating in Finspång varies widely with the time of day and the season but here is an important resource that can be switched into the network when it is needed. And when it isn't needed a damper is opened, letting the hot gases out into the air, as before.

Not only the Finspång community derives benefits from the new facility, even SSAB's own premises are hooked onto the network and kept habitable in part thanks to the new heat recovery installation. A number



Landshövding Elisabeth Nilsson
invigde anläggningen.

of process baths are also heated by it. And the oil- and gas-fired heating furnaces SSAB, used previously for premises heating, do not have to be used any more.

The sheet steel to be painted is intended for use as roofing, in cars, etc. It arrives as meter-wide coils, is then uncoiled, painted and then run through a furnace for paint hardening. Thereafter, the steel strip is coiled again at the exit end of the furnace. New sheet steel is joined onto the section being wound up "in flight", so the entire process runs continuously.

Prevas has delivered a control system (ABB 800M, PM861 CPU with S800 I/O) with built-in control concepts and an operating panel (ABB PP865) for local attendance. The main contractor was YIT, who selected hardware, regulatory control components and designed the overall installation. In addition to programming, Prevas also performed configuration, commissioning and tuning.

The work was begun in the spring of 2012 and the hardware installed after the summer holiday. Operations were commenced in October 2012.

The system controls 11 regulatory devices

such as pumps, fans and valves, which are to be started, stopped, opened and closed in certain sequences. The control system has also been integrated into the distributed control system, type 800xA from ABB, used by Finspång's Technical Services Dept. For this, Prevas used existing program modules provided by Technical Services. The result is that the operators in Technical Services' heating station are able easily to control the heat supplement from SSAB as a natural part of their regular attendance duties.

The 6-7 MW of power, so far extracted from the new installation, is a direct replacement for the fossil fuel Technical Services previously burnt to heat the municipality. In other words, the department has managed to replace a fuel which had to be bought with ready-made heat which is free. Initially, the new installation was intended as a peak-load cutter, but now it will be a basic energy provider to the heating network.

According to an investigation called "Waste Heat as a Resource" approximately 5 TWh of district heating from waste heat was produced annually in Sweden in the

first years of this millennium, corresponding to approximately 10 percent of total production. According to the Waste Heat Investigation and its various reports there is potential for further approx. 3.5-5 TWh. The Swedish Central Bureau of Statistics estimates the usage of electricity in industry in the Östergötland region at approx. 8 TWh and in the Örebro region at 6 TWh, corresponding to more than 40 per cent of those regions' total energy consumption. If only one per mille of these 14 TWh could be recycled, it could provide thousands of private homes with all the heating they need.

The sustainability argument is a weighty one for Swedish municipalities since they all want to get away from heating oil and get their heating from other sources, e.g. from waste heat which industry is unable to make use of, concludes Birgersson. *

If you want to know more about this project or find out what Prevas can do for you, please contact Robert Majanen, phone: +46 13 328 622, email: robert.majanen@prevas.se

Siemens in Finspång, Sweden began as STAL, Svenska Turbinfabriks AB Ljungström. The company is hundred years old and has many unique innovations to its credit.

ENERGY-EFFICIENT GAS TURBINES

SIEMENS INDUSTRIAL TURBOMACHINERY AB HAS A PROUD HISTORY, SPANNING 100 YEARS AS AN INNOVATIVE TURBINE MAKER. PREVAS HAS DEVELOPED PIMS, STANDING FOR PROCESS INFORMATION MANAGEMENT SYSTEM, AND FUNCTIONING AS A “BLACK BOX”, A DATA ACQUISITION FUNCTION ACCOMPANYING EVERY TURBINE ON ITS WAY OUT TO ITS



Hans Holmström
CEO OF A COMPANY
THIS YEAR CELEBRATING
100 YEARS AS A TURBINE
MAKER.

– Exactly 100 years ago the two engineers Fredrik and Birger Ljungström established our company. Gas turbines in airplanes are called jet engines, while stationary versions are normally used to produce electric power, steam or heating. They can also be used as rotary power sources for compressors and pumps. Our founders wanted to build a much more compact and efficient steam turbine than those existing at that time. Around the time of WWII, Sweden decided to build a jet-driven fighter airplane of its own and STAL was commissioned by the Swedish Defense Forces to develop the engines for the two planes known in Sweden as “The Flying Barrel” and “The Lance”, since British and American makers didn’t want to sell to Sweden. Unfortunately, Rolls Royce got the order in the end, which prompted STAL at the

beginning of the 1950s to convert their engine into a stationary gas turbine for electric power generation.

Ten years ago, Siemens acquired the company from Alstom and we are by now almost solely focused on gas turbines. We deliver from 50 to 100 units a year to customers throughout the world and have developed a number of models in power increments from 5 to 50 MW. Our combo units, which are combinations of gas and steam turbines, are characterized by very high efficiencies. A good example is the combined power and heating sets we have delivered to Gothenburg Energy, whose core consists of the SGT-800 gas turbine and the SST-900 steam ditto. Both of them are made in our workshops in Finspång. The Gothenburg installation was commissioned in 2006, giving the local residents 1,250 GWh

of electricity and 1,450 GWh of district heating a year, representing approximately a third of the city's needs.

When it comes to burning natural gas or thick heating oil, we can do that more efficiently than any other supplier of similar equipment. For obvious reasons, this is important from a sustainability point of view.

Siemens' gas turbines are tremendously flexible when it comes to fuels and are able to manage everything from very viscous heavy oils to methane gas. This capability is becoming ever more interesting as oil companies venture out to ever greater ocean depths and onto deserts in their quest for oil and gas. Our gas turbines are in the lead when it comes to minimizing the ecological footprint.

The gas turbine generates electricity by being connected to a generator via a gearbox. The hot exhaust gases from the turbine are fed into a flue gas furnace which is used to boil water, the steam of which is fed into a steam turbine which is also capable of producing electricity. In this way even more energy is extracted from the fuel. But there is still energy left after the steam turbine. The residue is squeezed out by feeding the steam condensate into a heat exchanger whose output is fed into the district heating network.

A turbine installation requires service and maintenance. For this reason, Prevas has developed software for analysis and remote supervision of the turbines so that Siemens' service engineers get easy access to service data from the customers' installations, and so they then are able to take appropriate preventive action to reduce wear and prolong service life.

Tabs on billions of measured values a day

Tommy Andersson is Prevas' manager in Finspång and Norrköping. He explains how PIMS contributes to making Siemens' turbines both greener and longer living:

– Prevas' PIMS is short for Process Information Management System, a data acquisition function accompanying every turbine on its way to the customer. Siemens calls the PIMS core its 'Data Collector' and has made it a part of its turbine control system. From previously having performed



preventive maintenance of the turbines according to a time schedule, the customers are now able to collect service data on a continuous basis and so able to identify trends and upcoming service problems ahead of time, before they have a chance to cause stoppages. The economic benefits of this are great.

Common practice was previously for service engineers to pay a visit to an installation, connect up and then investigate its state of health. This created a lot of travelling. The customers demanded better tools for analysis in order to reach higher levels of reliability and availability. The customers wanted state-based maintenance and answers to regular questions such as: "How is my installation at this point in time? Do we have to perform preventive maintenance right now or can we wait until the current cold spell is over?"

When the competition stiffens, Siemens wants the capability to collect measurement data from their installations and statistically find out how the internal material is stressed in different running modes and, on the basis of this, develop an experience bank and a comprehensive statistical knowledge base. In addition, by enabling analysis of the resulting emissions of different running modes in real time, the sustainability efforts are greatly facilitated.

Consequently, data must be collected from all the sensors in customers' installations, compressed without loss of valuable information and sent to Siemens' offices at regular intervals for evaluation. Since the collecting software resides in more than 500 installations, it must be of the highest quality. In the region of 2.7 billion measured values are received every day and the volume is continuously rising.

There are many interested parties to the system. Engineers need its data to design new turbines. The Service

Department wants to develop new business opportunities and new offerings. Technical Support staff, receiving service requests from customers, need it as supplements to those requests. These latter people are then able to connect up remotely to the customer's installation or look up stored service data for the installation involved.

The customer, in his turn, gets access to service data through an interface which Siemens provides under the name CMS for Condition Monitoring System.

Through PIMS, Prevas' customers are able to look into their operating processes and identify problems that were impossible to spot previously. The reaction when the system occasionally is down is often: "Now, we are totally blind!"

Production engineers now view PIMS as an absolute necessity. "Suddenly we know what's going on!" *

If you want to know more about this project or find out what Prevas can do for you, please contact
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