HyPower

Voith Siemens Hydro Power Generation customer magazine

Hydro power country Brazil I Virtual integration speeds up social inclusion I Change at the top of Voith

17
May 2008

Dr. Hubert Lienhard, President and CEO of Voith AG

Good-bye but not farewell

Dear readers,

With another year gone by, hydro power has progressed in both its image and its contribution to reduce CO_2-emissions. In the foreground of changes and opportunities along with global growth of economies and increasing wealth of developing countries, hydro power, however, still has some way to go.

The world continues the debate on emissions from reservoirs. There still is not enough scientific data available to substantiate or disprove these allegations. We have actively contributed to the discussion. We support scientific research to develop a predictive model which will serve as a basis for fact-based discussion. We are convinced, that without such research the discussion will not resolve anything except generating hot air instead of real solutions.

We also still experience disadvantages regarding certificate trading. Hydro power is measured by power density – hardly a dimension that embraces exact volume figures for CO_2-emissions.

But with our industry association, the International Hydropower Association, we are consistently following main strategic goals. Recruiting is one of them: having more members means enabling the association to act strongly and consistently on crucial political issues, like the greenhouse gas issue for example. So I call upon all of you – especially if you are an owner or operator of hydro power assets – to jump on the bandwagon and help the development of truly sustainable hydro power. Building the platform for a sustainability certification and auditing system for hydro power, from which all partners will benefit, is another key field for action.

And in the midst of all of this, I have to say good-bye! Good-bye – not farewell! As you will learn in this issue of HyPower, I have been appointed CEO of Voith AG. So, from now on, my business interests will broaden from hydro to paper, mobility and industrial services for this consistently growing, profitable and strong family-owned global enterprise.

Dr. Roland Münch, has succeeded me as CEO of Voith Siemens Hydro on the 1st of April. You can be assured that he will be as passionate and a strong driver for the development of our hydro power business – especially sustainable hydro – and for the entire industry.

I will not forget hydro at all, since I will take over the responsibility of Chairman of the Board of Directors of the Joint Venture Voith Siemens Hydro and certainly always have a special eye on this industry. It has been my pleasure and deep satisfaction to serve this business over the last six years and to help the future development of this fantastic and largest of all renewable energies. I thank all of you and ask you to still give me your comments and opinions at Hubert.Lienhard@voith.com.

Good-bye and all the best to you!

Yours

Dr. Michael Rogowski, Dr. Hermut Kormann, Dr. Hubert Lienhard and Dr. Roland Münch (from left to right).

Change at the top

The Supervisory Board of Voith AG has unanimously appointed Dr. Hubert Lienhard, member of the Board of Management of Voith AG and CEO of Voith Siemens Hydro Power Generation, as CEO of Voith AG as of April 1, 2008. He succeeded Dr. Hermut Kormann who retired from the position as President and Chief Executive Officer of Voith AG, effective March 31, 2008.

Dr. Hubert Lienhard is the Chairman of the Board of Directors of Voith Siemens Hydro Power Generation, too.

The successor of Dr. Lienhard as CEO of Voith Siemens Hydro, effective April 1, 2008, is Dr. Roland Münch.

Personal history

Dr. Hubert Lienhard joined Voith in November 2001, as a member of the Board of Management. On May 1, 2002, he became Chief Executive Officer of Voith Siemens Hydro. In addition he was responsible for strategic sourcing and risk management of the entire Voith Group.

Under his leadership, Voith Siemens Hydro flourished and grew. Incoming order volume increased from half a billion to more than 1 billion Euros and earnings doubled.

Dr. Roland Münch joined Voith in 2002 as a Member of the Board of Voith Paper Holding, where he successfully integrated the paper technology acquisition of Jagenberg AG. He has been responsible for the Automation Division in Voith Paper since October 1, 2002, and has also served as a Member of the Management Board of Voith AG since July 2006.

Farewell of Dr. Hermut Kormann

Dr. Hermut Kormann stepped down from his position as President and Chief Executive Officer of Voith AG effective March 31, 2008.

His career at Voith began in 1989 as Head of Finance and Accounting. He was appointed Managing Director in 1991. He became Financial Director and Controller and a member of the Board of Management in 1997.

Since April 2000, he guided the development of the Voith Group as President and Chief Executive Officer.

During his tenure as CEO of Voith AG, Dr. Kormann has made a name for himself primarily as a consistent and capable corporate strategist. He was instrumental in steering Voith, driving the Group business from 1.2 billion Euros to today's of 5 billion Euros.

A philosophic farewell gift.

Many political and industrial leaders, customers and business partners attended his retirement party to celebrate and honor his many achievements. He considers his innovations initiative for the global enterprise one of his most important personal achievements. Today, this initiative can be noted in terms of the development of ocean energies, locomotive construction and many technical, economic and environmental solutions within the traditional businesses of Voith. He was praised by many, among others by Board of Directors' Chairman Dr. Rogowski for being a "unique 'champion's league-like' leader within Germany's industry", as well as by the family representative Angela Voith, describing his "noble way in cultural and financial value creation for the enterprise, paired with an incredible sophistication", as invaluable.

A special treat for music-loving Kormann in the event was the presentation by world-famous opera star Montserrat Caballé, her daughter and tenor Albert Montserrat.

Voith continues to grow

Strong figures from Fiscal Year 2006/07 were published in a press conference the same week as the festive farewell of CEO Dr. Hermut Kormann took place. Driven by strong global growth in the markets for paper, energy, mobility, infrastructure and services, orders received rose to 5.1 billion Euros compared to the previous 4.1 billion. Sales broke the 4 billion Euro-barrier for the first time, increasing to 4.2 from last year's 3.7 billion Euros.

The result from ordinary business again rose sharply from 218 to 264 million Euros, with net income up at 153 million Euros compared to 134 million Euros in 2005/06.

Top management was accordingly pleased: "We are well satisfied with fiscal 2006/07, all of Voith's Group Divisions experienced excellent development."

The momentum gained has clearly carried over to fiscal 2007/08. New orders were 47 per cent up in the first three months compared to the same period a year ago. Demand from the industries Voith serves are considered as strong as ever with high levels of orders and sales expected to continue.

With a staff of 2,800 worldwide and exceeding one billion for the first time in 2006/07, Voith Siemens Hydro now represents 21 per cent of the orders received in the Voith Group. ■

A festive tent under Heidenheim's castle saw guests and Montserrat Caballé.

Virtual integration speeds up social inclusion: an opportunity for Brazil's favelas


COCADA

Brazil is a land of contrasts. Poverty and luxury are situated side by side. The most beautiful landscapes are mingled with gigantic cities, making it difficult to distinguish one from the other. The city of São Paulo, for example, has almost three times as many inhabitants as Switzerland.

In January 1542, however, the Spanish explorer, Álvaro Núñes, could not possibly have imagined any of this. He travelled down a wide and then nameless river and experienced nothing but breath-taking natural beauty. He was searching for a route to the city of Assuncion, which today is the capital of Paraguay.

On the last day of January, Núñes first heard a soft, low rush which grew louder and louder. As he traveled down the river it became a deafening and earth shaking roar. When he finally discovered the source of the noise – at a width of nearly five kilometers, the river's tremendous volume rushed to the depths below – he cried out, half terrified, half enchanted: "Mary, Mother of God, what incredible beauty!" Núñes was the first European to see the waterfalls of Iguaçu. It was only due to his skill as a navigator – and a sizable amount of luck – that he in fact escaped the wake of the falling masses of water.

About four centuries later, the sight of these gigantic waterfalls prompted First Lady Eleanor Roosevelt to exclaim: "Poor Niagara!" "Iguaçu" – "the falling waters", translated from Guaraní, the language of the indigenous people, are a living symbol for what has always been associated with Brazil: stunning natural beauty and an abundance of natural resources. The writer Stefan Zweig was so enthused by this that he in his 1941 written book entitled, "Land of the Future", said: "Whoever is aware of how to truly experience Brazil has seen enough beauty to last half a lifetime".

No other country on earth is home to more plant and animal species than the tropical giant Brazil.
On a single hectare of tropical rain forest in the Amazon, approximately 500 different species of trees were counted – in all of Europe, hardly more than 60 exist. More fresh water flows into the Amazon alone than into the world's six next-largest rivers combined – approximately 20 per cent of the water of all rivers on our planet flows through the Amazon basin towards the Atlantic.

Not too far from the spot where the Spanish explorer had once encountered hardship, is the location of the Itaipú hydroelectric power plant, over seven kilometers long and nearly 200 meters high.
Here, 700 cubic meters of water from the retained Paraná River rush through each of the plant's gigantic penstocks leading to the turbines. With 20 generating units installed, the bi-national hydroelectric power plant on the border with Paraguay is in fact the largest in Brazil, but by no means the only one: the country generates more than 80 per cent of its electricity from hydro power stations. An installed capacity totaling more than 80 GW makes Brazil's electricity market one of the world's largest. With a total primary energy consumption twice as large as the aggregated figures for Argentina, Bolivia, Chile, Paraguay and Uruguay, it is definitely the biggest in South America. The hydroelectric prevalence makes the Brazilian generating system differ from that of any other country in the world.

Space Program and "Zero Hunger"

Brazil's economy needs this reasonably-priced and domestic energy; after all, the country lost its agrarian imprint long ago. The public and private services sectors contribute just less than 60 per cent of the national Gross Domestic Product; the industrial sector including manufacturing and construction adds up to just more than one third. The country with the highest population in the entire Southern Hemisphere – just less than 190 million – currently, it is among the world's 10 largest national economies. However, its riches remain unevenly distributed.

Along with the program "Fome Zero (Zero Hunger)", to fight starvation in this country, the government maintains its own space program. For a long time, the metropolitan areas appeared highly attractive – especially to those inhabitants of less-developed regions.

Nowadays, however, there are hardly any opportunities for unskilled laborers, even if names like Belo Horizonte, São Paulo, and Rio de Janeiro still sound magical. Brazil, a country of continental dimensions, faces the great challenge of stimulating development of all its regions but at the same time preserving and respecting their roots and culture.

Viewing contrasts

Rio de Janeiro: many consider it the most beautiful city in the world. Whoever stands on the viewing platform at the famous statue of Christ and looks down at the city from a height of more than 700 meters, may indeed agree. The gondolas of the cablecar ascend to Sugarloaf Mountain, and beyond that is the inlet to Guanabara Bay and the endless Atlantic coastline with its countless gently curved sandy beaches. However, the slums – called favelas in Portuguese – are just as much a part of Rio's scenery.

Travelling from one neighborhood of Ipanema to the famous district of Barra da Tijuca, one passes by Rocinha, the favela of Rio.

Rocinha's main access is located at the foot of one of the countless hills, which separate the city's various districts from each other. Make shift brick structures cover the entire mountainside. Around 150,000 residents who belong to the lowest socioeconomic classes live here, in a labyrinth of structures. But in the narrow alleys and on the nameless steep staircases, which mostly lead up the mountain in place of roads between all the houses, the mood is lively: construction workers in Bermuda shorts and flip-flops lug empty paint cans, along with bricks, up the winding staircases, children play and run barefoot down the mountainside. Women with shopping bags on each arm stand on the steps in the middle of the staircase and gossip. A circular saw whines, a radio blares, chickens cluck on some of the flat roofs.

"We create a win-win situation for all stakeholders and create a relationship that goes far beyond the commercial customer-supplier relationship."

Jose Cavaretti,
AES Eletropaulo

And whoever shifts their gaze to them from below sees an inextricable tangle of electrical cables running across and on top of each other.

Electricity: the need exists

Favelas need electricity, in Rio, in São Paulo, everywhere. There has been some movement towards the legalization of clandestine connections. Regulation of energy consumption is of paramount importance to guarantee social integration and a better quality of life.
In the metropolitan region of São Paulo, AES Eletropaulo's program for the normalization of what is called informal electric power connections, officializes service and is responsible for sustainability of use and supply in many ways.


do Coxinha

Jose Cavaretti, manager of market recovery in AES Eletropaulo, explains that the program is based on setting up new grids that provide reliable connection and power supply. They also teach residents about efficient and economic use. Awareness of this goes hand in hand with new orientation on personal budgets.

Efficient use of power

In favelas, houses are often dark due to the very narrow streets and alleys, so the demand for lights is all day long. To help reduce consumption, AES Eletropaulo replaces for free common light bulbs with two compact fluorescent bulbs and old refrigerators for new, higher efficiency models. Consequently, this approach also minimizes danger of hazards and injuries through electric shocks and fires, and it preserves the life time of home appliances. In addition to free service installation, the company supplies biconcentric cables for use in new clandestine connections, the so called “gatos”.

In three years, this program has already reached 200,000 families in 600 communities, benefiting more than one million people.

Education, awareness, paid bills

AES Eletropaulo, with the goal of educating its electricity consumers also on cultural and digital aspects of life, has installed in communities’ service centers and libraries computers providing free access to the internet. Access to these centers is granted with the presentation of a paid electric bill. In addition, there is a federal government program granting incentives to low-income consumers (under 220 kW), whereby AES Eletropaulo monitors consumption and offers additional discounts for those meeting the target. In some communities, even non-registered families are granted benefits by presenting their income tax statement.

“These types of programs and regulations create win-win solutions with more comfort and quality for all stakeholders. It is a relationship that goes far beyond the commercial customer-supplier relationship”, says Jose Cavaretti.

An escape from the communication vacuum

Availability of electric power, remains the basic ingredient to speed up not only social and economic integration of the low-income families who live in the favelas. But an at least as important is another ingredient, one would not directly think about: the Internet. Largely isolated from the urban infrastructure, the favelas are a communication vacuum: not organized and without their own voice – people usually talk about them, but never to them, because they are clear “no-go areas” for outsiders. If, by some chance, news reachs beyond the favela limits to the outside world, it is usually not good news. However, this picture has started to change, since alternative forms of communication point the way out of the communicative “dead end”.

Viva Favela!

Viva Favela ("Long live the favela!") is the Internet portal which has served as a virtual bridge between the favelas and the rest of society in Rio since mid-2001. With its own team of journalists and neighborhood correspondents – favela residents reporting from their own community – this portal adjusts the picture. The insider's perspective, up to this point was sorely missed.

This new portal inspires the classic media – newspapers, magazines, and television. Introducing different views of reality clearly shows that there are topics far beyond violence worth sharing.

In addition to reports and real-time news, the communications platform publishes job offers, information on sports and cultural events, introduces and explains educational possibilities and offers health advice.

Basic knowledge on health care, a certain level of general education and increased exposure to culture are instruments which facilitate social advancement, and this makes them important starting points in social projects oriented towards sustainable social change. In this context, it doesn't matter whether the application of these instruments is relayed to a small group in the course of intensive support and monitoring – as is the approach of the Formare project, sponsored by the Voith Foundation (see pp. 52 of this issue) – or that a project is aimed at a rather broad segment of the population. In one case, more in-depth knowledge and skills of a few are transferred little by little to a broader population; in the other case, the superficial knowledge shared by many creates opportunities and conditions for application of these skills. Then, via self-learning effects, the successful application of these skills allows for further extension of the basic techniques – of course, provided that the necessary basic structures are available to initiate these processes.

The cooperative approach of city and state, companies and NGOs, can contribute significantly to this process.

Six years ago, at the start of Viva Favela, hardly anyone in the poor sections of town had access to a computer, let alone the Internet. Viva Rio, an NGO and UNESCO-supported sponsor of the portal, set up terminals in these communities. Already three years later, roughly 10 per cent of residents visited the pages operated by Viva Favela, and 12,000 visitors – even from the affluent sections of town – visited the pages daily. By now, in Rocinha alone, 80 to 100 commercial providers offer low-cost access to the World Wide Web in so-called "LAN houses". Some small entrepreneurs from Rocinha even make their living providing this service.

Virtual precedes social integration

The Internet has become a platform of knowledge and communication which also lends the favelas a voice, and can break the cycle of social and economic isolation. By using chat rooms, blogs and online forums, the favelados do away with the information monopoly previously held by established media. Instead, finally, there is a channel to make local issues public issues, to question the status quo, to make demands, to organize collective action. It can be said that virtual integration precedes social integration. ■

Works at Jocassee generator, SC, USA.

CFD application in hydro generator ventilation systems

Ventilation-cooling is one of the key technologies in the design of large electrical machines with significant influence on machine size and performance. Avoiding peaks in temperature will protect the machine and extend its lifetime.

General aspects

In large hydro generators experimental data are difficult to obtain. So, a combination of a scaled model test, network method, and three-dimensional Computational Fluid Dynamics (CFD) is applied to improve a homogeneous distribution of air flow rates in the machine to control the temperature.

In large hydro generators maximum current density and inductivity are limited by material behavior.

Hence the ideal power of the electrical machine scales with a typical length scale to the 4th power (see formula 1).

Thus energy density can be increased as the output increases in relation to speed. On the other hand, since electromagnetic losses increase with the third power of a typical length scale (see formula 2), large machines tend to have a better efficiency (see formula 3).

The electromagnetic losses relate to sources of heat that need to be exchanged by a coolant through convective processes at surfaces corresponding with a length scale squared. So, with larger machines, the ratio of losses and heat sources versus the heat transferred at surfaces increases linearly with a typical length scale L (see formula 4).

Table 1: Interaction of conventional methods to calculate the temperatures of the critical components in the machine by knowledge of the losses and air flow.

1 $P_{id} = I \cdot U = \int jdA \cdot \frac{d \int BdA}{dt} \propto L^4$

2 $\Sigma P_V \propto L^3$

3 $\eta = 1 - \frac{\Sigma P_V}{\underbrace{P_{id}}_{\propto \frac{1}{L}}}$

4 $\frac{\Sigma P_V}{\dot{Q}_{Convection}} \propto \frac{L^3}{L^2} = L$

Method / Target	Field Calculation Methods	Analytical Methods First Principles
Calculation of Losses	Loss Calculation	
Calculation of Flows	Computational Fluid Dynamics	→ Volume Flow Rates Using Pressure Loss Coefficients
Calculation of Temperatures	Computational Fluid Dynamics	→ Heat Source Networks using Heat Transfer Coefficients

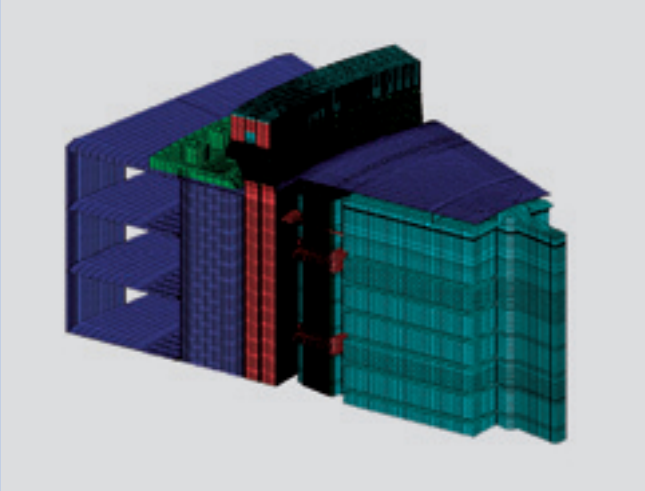


Figure 1: Solid geometry meshed for thermal analysis.

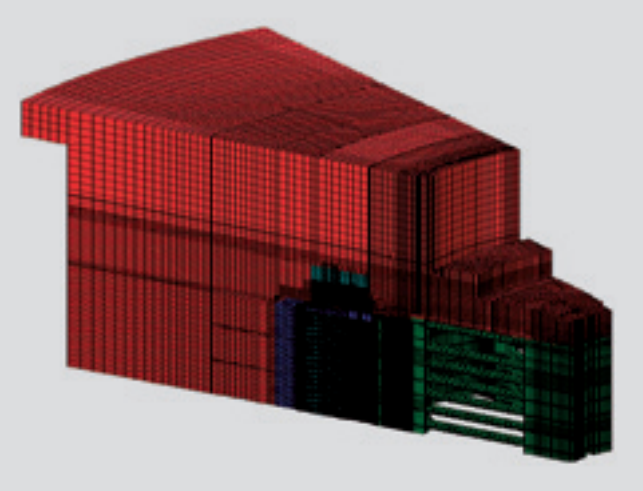


Figure 2: Fluid meshed for flow and thermal analysis.

This clearly shows the increasing difficulties of exchanging heat and the need to improve ventilation-cooling in large machines. Since an increased air flow rate also leads to increased windage losses, the only option is to improve the air flow rate distribution to obtain more efficient ventilation. The final goal is to reach a flat temperature profile in the axial direction and limit the maximum temperatures to increase the life-time of the insulation and thus the lifetime of the electrical machine.

Combination of methods

This target can be reached by doing a scaled model test with an experimental analysis of flow rates, windage losses and temperatures for varying geometries. The obtained design optimizations can then be applied to the actual machine, based on experience. However, because of time and cost issues, it is not possible to build a scaled model for every project. Since only limited details can be obtained in these experiments, the model experiments can only give a basic understanding of the flow and heat transfer processes. There are further challenges to maintain a homologous design with regard to geometry, similar to Reynolds and Mach numbers.

Limited measuring

In large scale machines, only measurements of temperature at few locations distributed over the circumference are normally obtained. The flow rate is only measured behind the cooler and does not provide information regarding the distribution of air flow in the machine. Windage losses are also only obtained for the complete generator by a calorimetric method. The network method has been commonly used as an analytical tool, both for ventilation and cooling. In this method, equivalent flow resistances and air flow paths for ventilation analysis, and equivalent thermal resistances and heat flow paths for thermal analysis respectively are defined and combined through a network.

Network method

Since the flow network is based on internal flow pressure drops from experiments with a flow resistance that is sufficiently high, the Reynolds number is only dependent on geometry. These resistances are taken from handbooks like Idelchick, but are limited for internal flow configurations and cannot be used to describe vortex structures, i. e. in the inlet of the hub and in the recirculation zone. In addition, the method limits the thermal transfer model to exchange heat on experimental geometries with a preferred direction of air flow, which is not the case at the end winding. This flow also cannot be modeled by an internal flow pressure drop formulation. Due to the complex geometries and flow field, this method is only a crude estimate of the situation in the electrical machine. The results of the network method can only be calibrated to the integral measurements as described earlier.

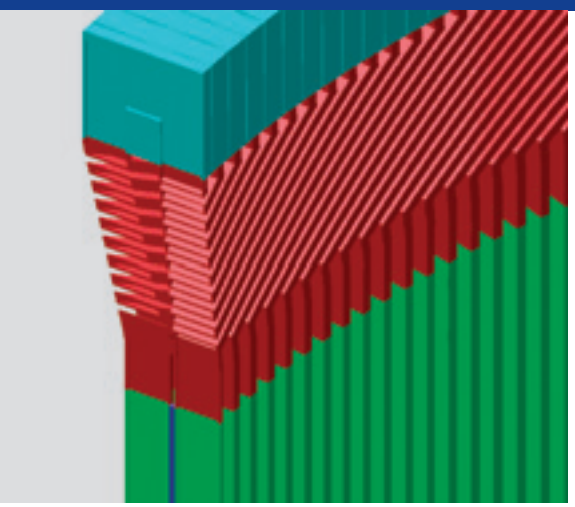


Figure 3: Prescription of homogeneous losses on four different parts of the stator winding.

Mixing CFD...

CFD can bridge the gap to apply experience to obtain new designs, since it is based on first principles, the underlying physical equations, describing the conservation of mass, momentum and energy. It is an effective tool for design optimization, but since the equations are also solved on some kind of discretization to a finite number of nodes, and some equations need to be closed by models, it is of highest importance to compare the results with the conventional methods. These are experiment and network calculation. Fundamentally, it is possible to apply CFD to a changed geometry.

...with conventional

Table 1 shows the interaction of conventional methods to calculate the temperatures of the critical components in the machine by knowledge of the losses and air flow. Here, CFD is also applied to detailed geometries, where its results are incorporated into the analytical flow and thermal networks, to improve the flow resistances and heat transfer coefficient assumptions. With the application of CFD one follows a more universal approach based on physical principles of conservation of mass, momentum and energy. Uncertainty of modeling is shifted from the extrapolation of detail models to complex geometries and to the choice of grid resolution and closure models. This uncertainty can only be minimized if the CFD methods are applied to an experimental setup that is investigated in detail and compared to the numerically obtained results. The accuracy of the universal approach to estimate flow rates, temperatures and windage losses by CFD is confirmed through the scale model test. This knowledge is then used to predict flow and thermal properties and losses on large scale geometries.

Figure 1 shows the meshed solid geometry. On these nodes the heat conduction with sources from the electromagnetic losses is solved. This resolution of the grid is less restrictive than the one for the fluid as shown in Figure 2. Special effort is taken to model the boundary layers, so that the wall functions for the turbulent velocity and temperature boundary layer can be applied correctly. Hence the fluid mesh is larger in node number by a factor of two. Since heat sources are not distributed equally on the solid components, one defines regions on stator and rotor components where a mean loss is specified (as shown by the different colors in Figure 3).

Brazilian Corumbá IV project

At Voith Siemens Hydro, CFD analysis with its pre-processing, solution and post-processing steps and the application of necessary simplifications is part of the standard engineering practices. These were, among others, applied in the 68 MVA, 200 rpm, 13.8 kV hydro generator engineering for the Corumbá IV hydro power plant operated since early 2006. These generators were originally designed with traditional analytical tools and improved over time through measurements in a series of machines, and through laboratory tests.
In the case of the generator for Corumbá IV, the so called radial-radial system – also known as RIM-Ventilation – using the rotor spider and rim to drive the air, was selected as the most suitable ventilation system.

Analytical ventilation calculation

The applied tool uses a net model with parallel and series branches. Each branch is composed of an aerodynamic resistance or a pressure increment.

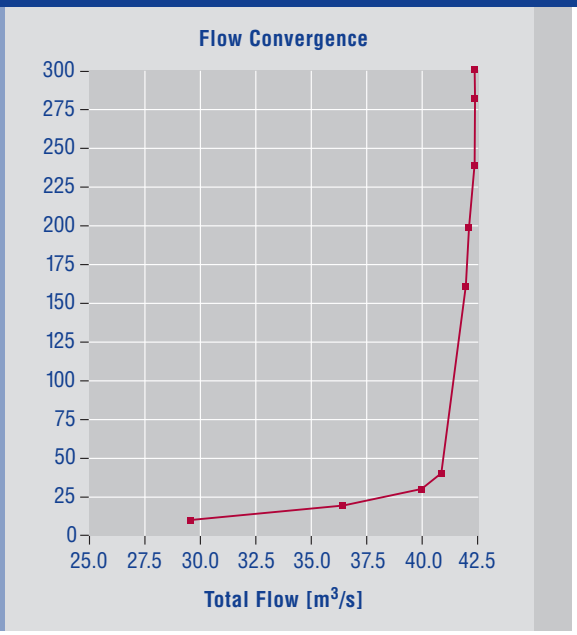


Figure 4: Convergence of flow.

Data are obtained for the geometries of the main components, machine speed, cooling air density, and some coefficients through tests. After the analysis, geometry data are modified, to meet the air flow requirements for the basic design, considering the distribution of the losses in the machine and the boundary conditions given by the electromagnetic and mechanical design.

Numerical simulation and simplified geometry

The most frequently applied technique in CFD for the determination of heat transfer is the application of discretization methods with the help of Navier-Stokes equations for approximated results in discrete points of the considered simulation domain.

In numerical methods, conservation equations are applied in their differential form. These equations are complex and not linear. Solutions to these equations system are iterative; the solution is obtained by a loop process.

For Corumbá IV, the considered geometry was the volume through which the cooling air of the machine flows. By using the existing cyclic symmetry it was possible to reduce the geometry to one sixth of the complete machine model. Geometry of the pole winding was smoothed, the stator frame columns were eliminated and volumes, corresponding to the end windings and circuit rings, were simplified. In addition, stator core and cooler were assumed to be porous solid, to avoid discretization of such small volumes inside these domains. For the stator core, parameters for this simplification were obtained in previous studies. For coolers, data from the supplier were used.

Figure 5: Velocity vectors in the plant.

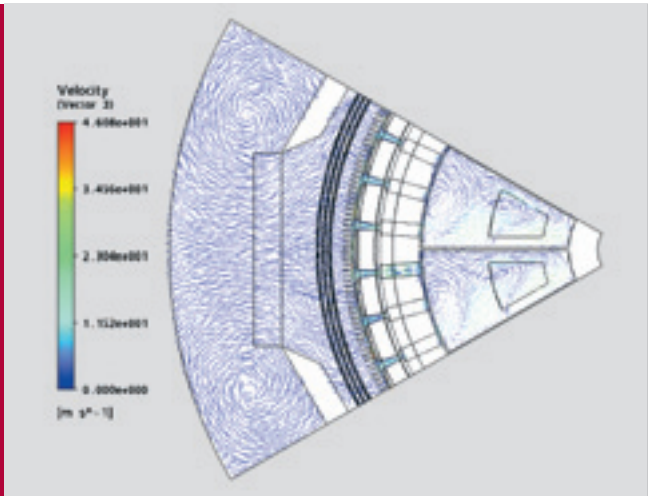
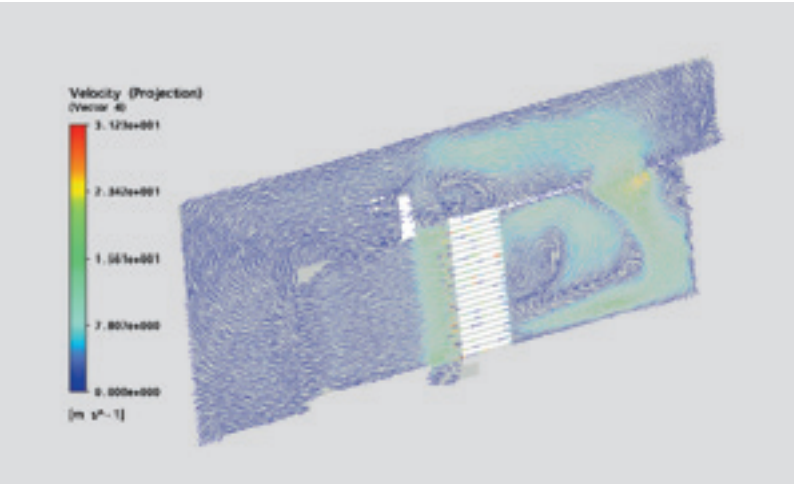


Figure 6: Velocity vectors in the section.



Domains

The path in which the cooling air flows was divided into distinct domains connected by common and identical surfaces:

- Hub: rotational domain (with 200 rpm).
- Rim: rotational domain (with 200 rpm).
- Poles: rotational domain (with 200 rpm).
  The connection to the stator core is done by a cylindrical and hypothetical surface which divides the radial dimension of the air gap in the two halves.
- Upper and lower air guides: static domain.
- Stator core: static domain with properties of porous material.
- Stator frame: static domain.
- Cooler: static domain with properties of porous material.
- Housing: static domain.
  In this domain, the existence of the upper coils' ends and the circuit ring is considered as simplified geometries that disturb the air flow.

Discretization mesh and boundary conditions

The domains were discretized by meshes of generated tetrahedral elements in the CFX-Mesh software. The mesh used in the most detailed analyses for this project has about 1.8 million elements and 400,000 nodes. As a boundary condition, it is assumed that the connections between the different domains are perfect and there is no leak. But mandatory direction for the flow in these boundaries is not fixed; it is a result of numerical calculation. The second boundary condition treats the constant angular velocity of the rotational domains (volume inner to hub, volume inner to rim and volume of air between poles) linked with the speed of the machine, i. e. 200 rpm.

Numerical solution and results

Figure 4 shows the air flow in the coolers versus the number of iterations. After 300 iterations the result of air flow in the cooler converged. Figures 5 and 6 show, respectively, the velocity vectors in the cooling path in the plant and in the main section views. The flow in the coolers resultant of first analysis, where the air recirculation due the gap between the rotational and static air guides was not considered, is 44 m^3/s. The velocity vectors of this result can be verified in Figure 7. Considering the existing gap between the rotational and static air guides, the flow in the coolers is 42.4 m^3/s. The consequent air recirculation can be observed in the velocity vectors of Figure 8.

Figure 7: Velocity vectors without recirculation.

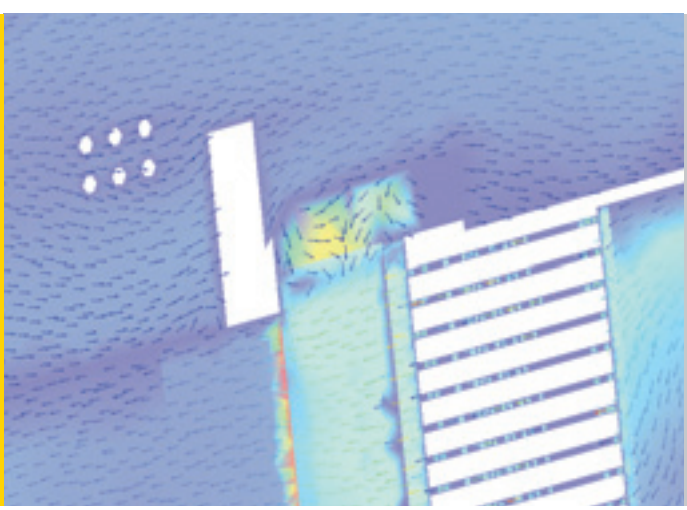
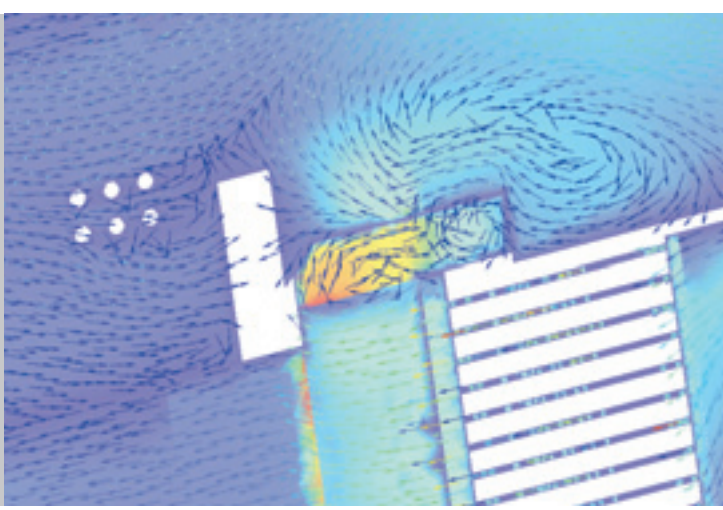


Figure 8: Velocity vectors with recirculation.



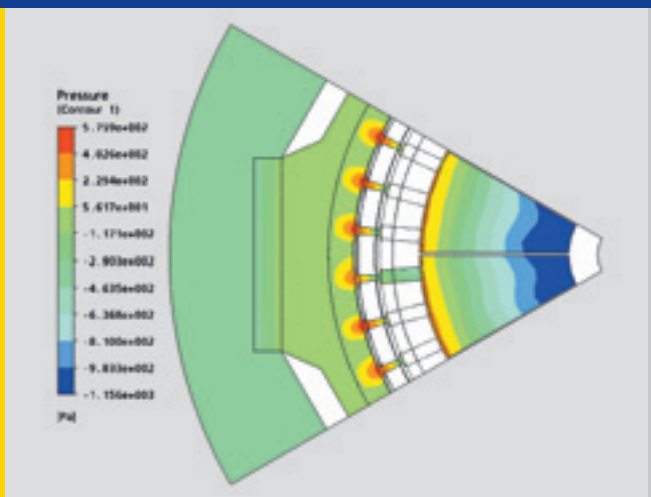


Figure 9: Pressure gradient in plant.

Figure 10: Pressure gradient in section.

Figures 9 and 10 show the pressure gradient in the refrigeration circuit. Figures 11 and 12 show the stream lines of the refrigeration circuit. Recirculation inside the rotor hub and in the housing can be identified.

Measurements in Corumbá IV and results comparison

Values of the air flow in the cooler to be compared are as follows:

- Average measured air flow in the coolers on the real machine: 33.6 m^3/s
- Air flow in the coolers from the analytical calculation: 37 m^3/s
- Air flow in the coolers from the numerical simulation (CFD): 42.4 m^3/s

Table 2 presents the measured air flow in m^3/s.

The differences in the results obtained can be assigned to the fact that the calculated models do not have all the air recirculation circuits passing through the coolers. In the real machine, these circuits are originated by the gaps in the ventilation system. In the analytical calculation, the recirculation from the gaps between the rotational and static air guides as well as the gaps between their segments are considered. In the numerical simulation, only the gap between the rotational and static air guides was considered. The accuracy of the numerical simulation also depends on the level of detailing and discretization.

So, the differences between the numerical simulation and the measurements taken from the real machine can also be reduced by further detailing the geometry of the pole winding and an improvement of the discretization in the region of the ventilation channels in the rotor rim.

The values of the stator heating are the average of readings from the resistance temperature detectors placed between the top and bottom bars in the stator slots. The field heating was obtained from the variation of the resistances of the poles winding. The contractual limits for temperature rise of windings were 85 K for the stator winding and 90 K for the field winding.

Table 2 – Measurements in Corumbá IV

Machine	Cooler						Total of machine	Final average
	n° 1	n° 2	n° 3	n° 4	n° 5	n° 6		
1	5.49	5.53	5.57	5.62	5.64	5.62	33.5	33.6
2	5.66	5.51	5.64	5.62	5.66	5.53	33.6	

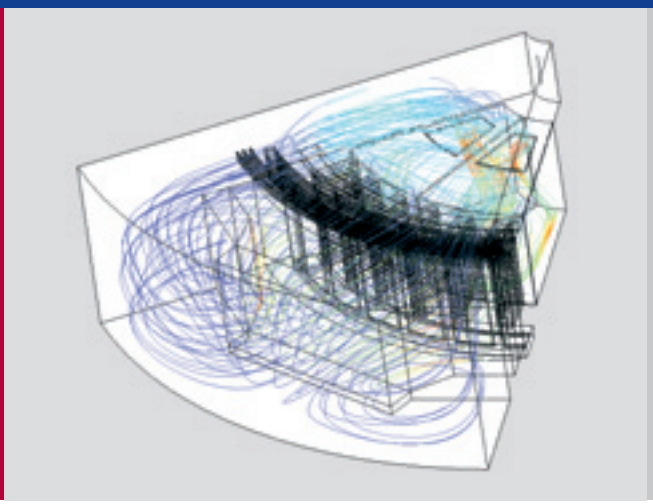


Figure 11: Stream lines (3D view).

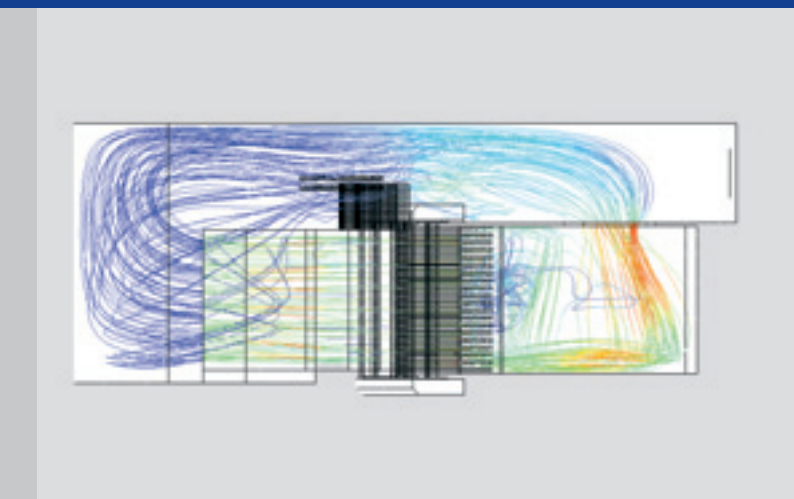


Figure 12: Stream lines (side view).

As shown in Table 3, the values measured during commissioning as well as the extrapolation to operation under rated conditions are significantly lower than the contractual guaranteed limits.

Conclusions

CFD is a valuable addition to the network method for the design optimization of electrical machines. It can even be used as a stand-alone tool to compute flow, heat transfer, temperatures and even windage losses. Furthermore, results of this method are used to improve assumptions in the much faster network model, so that these methods supplement each other. The Corumbá IV approach showed that the application of CFD simulations in the ventilation system of hydro generators is advantageous for the development of new ventilation technologies and the verification of cooling systems in hydro generators.

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A Analytical calculation values during the design phase.
B Values measured during commissioning.
C CFD predicted values simulating the commissioning conditions.
D Values expected by operation with rated conditions and the measured air flow.

Table 3 – Temperature data of Corumbá IV

Case	Current in stator [A]	Current in field [A]	Stator winding heating [K]	Field winding heating [K]	Air flow in the coolers [m³/s]
A	2845	1132	71	42	37
B	2640	1146	61	43	33.6
C	2640	1146	60	44	33.6
D	2845	1132	74	43	33.6

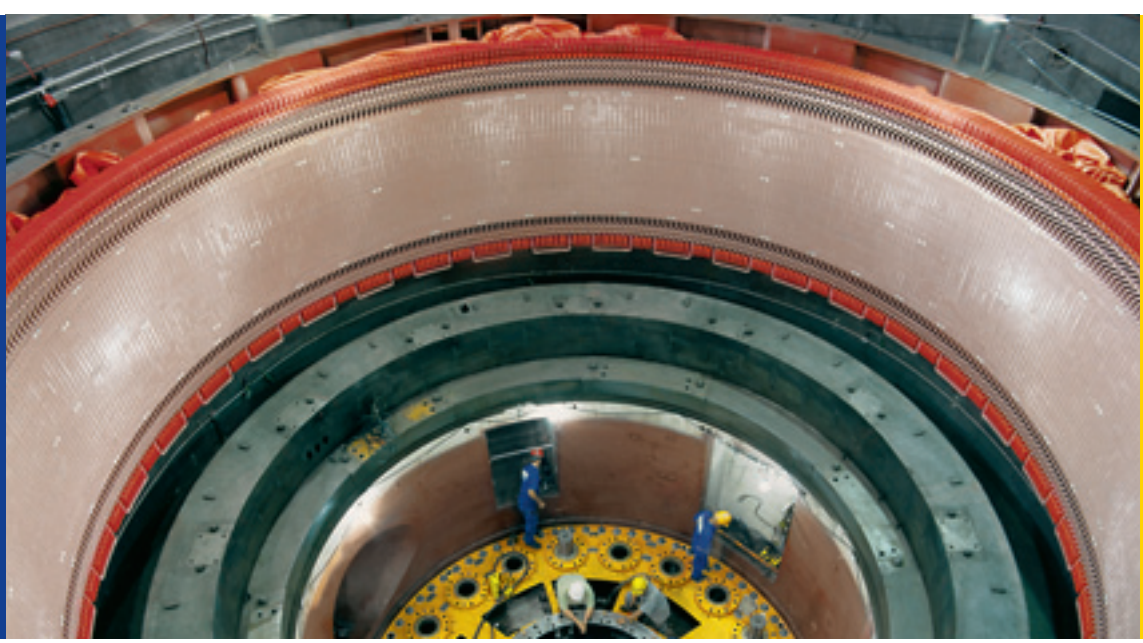
A special 50th birthday present: the modernization of Furnas

50 years ago, in the middle of the Brazilian "economic miracle" era, the then President, Juscelino Kubitschek, faced increasing urbanization and energy demand. He intended the country to grow 50 years in the time of five and announced the plan to build the world's largest hydro power plant: Furnas. With an installed capacity of 1,216 MW, it was beyond the then state-of-the-art engineering.

The hydro power plant was built by a new state-owned company of the same name, Furnas Centrais Elétricas S.A., which was created in February 1957; it is now one of Brazil's largest utilities.

50 years after President Kubitschek left office, current President Luiz Inácio Lula da Silva is busy with the same topic of fostering growth.

In the beginning of 2007 he announced a Program for the Acceleration of Growth (PAC) in order to raise the country's gross domestic product by five per cent annually. 235 billion U.S. dollars of both the federal government and the private sector will be invested in projects of national interest such as building and repairing highways, airports and ports, providing housing and



other infrastructure for Brazil's poor and boosting energy development and investing in the environment. Furnas contributes to PAC with large projects in the segment of hydro power generation, e. g. the Estreito hydro power plant under the consortium leadership Voith Siemens Hydro Brazil.

Around 40 per cent of Brazil's consumed energy runs through the Furnas system

During its 43 years of operation, Furnas became one of the major hydroelectric power plants in Latin America. Since the plant began operation in 1964, it more than doubled Brazil's installed capacity from three to eight million kW and accounted for one third of the total consumed electricity. Now, Brazil's oldest giant in terms of hydro power was due for modernization.

And a consortium under the lead of Voith Siemens Hydro Brazil won the modernization contract.

Voith Siemens Hydro has an office on-site

There is much to do: The upgrade and automation of six generating units, supply of components for the substation and the respective automation, replacement of the complete mechanical and electrical ancillary equipment, construction of new control rooms plus a centralized control room, – that means approximately 70 per cent of the plant's ancillary equipment will be replaced by 2010. Therefore, Voith Siemens Hydro established an office on-site with ten employees who moved from São Paulo to the neighboring cities in order to supervise the disassembly, erection and commissioning of this project.

Fast forward modernization

Already a year ago, the first modernized unit re-entered commercial operation. The next unit to be overhauled is well underway. Within the next three years, a total of six machines will follow piece by piece with a special challenge. As the Furnas power plant is under commercial operation, only one unit at a time can be shut down for modernization. And the work on the disassembled units must not interfere with the operation of the other generating units.

Originally, Furnas was equipped with six Francis turbines. Two additional units followed after ten years of operation. They will not be modernized as part of this project, but will be equipped with the new automation system, too.

Further information

Furnas and Voith Siemens Hydro have enjoyed a long partnership since 1965. Furnas Centrais Elétricas operates 15 hydro power plants, and Voith Siemens Hydro contributed electromechanical equipment to 12 of them, such as Funil (1967), Mascarenhas de Moraes/ Peixoto (1970), Marimbondo (1971), Corumbá (2002) and Serra do Facão (ongoing) to name but a few.

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Monitoring system complements Peixe Angical

Inaugurated in November 2006, the Peixe Angical hydro power plant is incorporating what is developed in the Corporate Technology Centre Brunnenmühle of Voith Siemens Hydro in Germany and accessible to all operating units worldwide. The plant, equipped with three Kaplan runners with an installed capacity of 452 MW, will have a monitoring system provided by Voith Siemens Hydro.

Owner Enerpeixe S.A. selected Voith Siemens Hydro's monitoring solution. The units are similar to the one running in Lajeado, a hydro power plant some 300 km further north on Tocantins River. "We are very happy to work with the same partners again", said Lino Ossami Yassuda of Enerpeixe S.A.: "Hydro power plants have a very long life cycle, so reliability of the chosen system and the offered service are of utmost importance. Therefore, we practically implement the entire Voith Siemens Hydro system. So we will be able to monitor every unit online, from everywhere in the world".

The new monitoring system will guarantee more safety for the operation of Peixe Angical's power generation units: vibration instabilities can be detected, the machine's behavior can be analyzed, and – if needed – appropriate safety alarms activated.

The equipment is based on major modules of the HyCon Optimization and Diagnosis Toolbox, which is a part of the HyCon automation product family.

The system is composed of multi-channel acquisition units for each of the three machine sets.

Monitoring, data acquisition and analysis is performed

- for all mechanical vibrations of the shaft, the bearings and major stationary parts,
- for radial and tangential vibration of the generator end windings,
- for the air gap between the generator rotor and stator,
- for partial discharge at three phases,
- for the clearance between the four runner blades and the discharge ring.

Installed on the Tocantins River between the counties of Peixe and São Salvador do Tocantins, the water runs through Peixe Angical's turbines at 880 cubic meters per second.

With this, the hydro power plant contributes 2,374 GWh per year to the Brazilian electric grid – enough electricity for four million people. A similar monitoring and analyzing system from Voith Siemens Hydro is already in operation in all of the eight Francis turbines at Omkareshwar, India.

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Itaipú hydro power plant: the world's highest annual energy production

Itaipú hydro power plant, located on the Paraná River at the Brazil-Paraguay border, began operation on May 5, 1984 when the first of the 18 initially planned generation units was synchronized.

The 18th unit was commissioned seven years later. In 1991, Itaipú's installed capacity totalled 12,600 MW. The last two of the meanwhile installed 20 units, started operation in September 2006 and March 2007, raising the capacity to 14,000 MW. Voith Siemens Hydro supplied more than 50 per cent of the equipment.

In 2000, the plant produced a generating record of 93,400 GWh, supplying 95 per cent of the electric energy consumed in Paraguay and 20 per cent of Brazil's consumed energy.

Although the Chinese Three Gorges project on the Yangtze will surpass Itaipú in terms of total installed capacity when fully erected in 2009, the South American power station will remain unrivaled in its annual energy production. With 20 machines in operation and favorable hydrological conditions due to the steady flow of the Paraná compared to the Yangtze, Itaipú is expected to reach an annual output of over 95,000 GWh, compared to a currently estimated 84,000 GWh for Three Gorges. A treaty between Brazil, Paraguay and Argentina limits the maximum number of generating units allowed to operate simultaneously to 18. Nevertheless, this allows for 18 generation units to remain running all the time, while two are off line for maintenance.

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La Confluencia Chile

Voith Siemens Hydro Brazil's hydro power plant in Chile to be operational in 2010

La Confluencia will be built on the Tinguiririca River, around 210 km south-eastern of Chile's capital Santiago. The 38.4 million Euros contract includes the supply of two 81.6 MW Francis turbines and generators with a nominal rated output of 95.6 MVA, spherical valves, automation, mechanical and electrical balance of plant equipment and other electromechanical auxiliaries. In addition, the substation, the assembly and the supervision of the commissioning are included.

"This new project in Chile from the Brazilian workshop is very important for us as Chile's main energy source is hydro power. Hydro power generates 52 per cent compared to 48 per cent from imported coal, gas and oil. And the country plans to invest even more within the next few years", said Nilo Faria, La Confluencia's project manager. ■

Baguari Brazil

New 140 MW Baguari hydro power plant on the Doce River in the state of Minas Gerais

© Osvaldo Afonso/Secom MG.

A consortium, formed by Neoenergia, Furnas and Cemig, will invest a total of 360.4 million Euros in the new Baguari hydro power plant, planned to operate at the end of April 2010. The project will benefit more than 500,000 inhabitants, generating around 1,200 jobs in the region.

Voith Siemens Hydro supplies four complete 35 MW bulb turbines with runner diameters of 5.1 meters, the generators, control valves, SCADA automation, and the excitation system.

The customer is committed to an extensive environmental program. According to the Consortium's Environmental Coordinator Ricardo Márcio, this will include a total investment of 15.6 million Euros and will see reduced reservoir size through the application of bulb turbines. ■

Energy Forum Guatemala

Fresh wind for renewables in Guatemala

Carmen Urizar Hernández and Dr. Peter Wengefeld.

During their last visit to Germany, Voith Siemens Hydro had the chance to discuss options of renewable energies in Guatemala with the Minister of Energy and Mines Carmen Urizar Hernández and Carlos Colon Bickford, President of the Comision Nacional de Energía Eléctrica (CNEE). In 1996, CNEE was created by General Electric Law in order to regulate and supervise the power sector.

In March 2007, the Guatemaltecan government reformed local energy law. The most important changes were the lowering of barriers for entering the market and of the minimum requirements for energy producers. This also gives smaller projects, like most renewable energy projects, a new opportunity to be realized quickly. ■

New Member in Brazil's Board

Dieter Hopf starts out in São Paulo

Dieter Hopf.

Within the re-assignment of responsibilities in the Management Board of the Brazilian Voith Siemens Hydro Operating Unit, Dieter Hopf, currently the Head of Sales in Voith Siemens Hydro St. Pölten, is going to São Paulo to become member of the Management Board of Voith Siemens Hydro Power Generation Ltda. responsible for Sales for Brazil and all Latin America.

"The Brazilian Operating Unit has been strongly committed to the market for 44 years and maintains its leadership position with a number of pioneering projects. Our challenge is to further continue to be the ideal partner for our clients", said Dieter Hopf looking forward to his new assignment. ■

Perfectly fit for hydro business in the region

Interview with Osvaldo San Martin, President and CEO of Voith Siemens Hydro Power Generation, São Paulo

Osvaldo San Martin,
President and CEO
of Voith Siemens Hydro
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Mr. San Martin, why is it important to have a close relationship to all these markets from the point of view of a São Paulo based location?

San Martin: It is simply because they are very important markets for hydro power. We have large projects in Chile, Guatemala, Costa Rica, Ecuador, the Dominican Republic, Peru and others. So, we have to be locally present in these markets for our customers and their respective needs. We have pursued projects and customer relationships in these markets with great success.

These markets are unique and diversified at the same time, so we want to be sure that specific customer needs in each market are met by the desired solutions. And – of course – with this closeness we are following the Voith corporate philosophy to be close to its customers, be the preferred supplier and build and maintain long term relationships with highly engineered products, best-in-class services, and offering absolute reliability.

Our policy is to find the right solutions from our customers' perspective; and this can only be done if we are close to them. We need to learn from our customers and not assume what they want or value.

Of course, there is much potential in this region, with small, medium and large projects being carried out in almost all of these countries.

> "Our business approach is strongly related to value creation for operators."

How do you measure this in terms of business figures?

San Martin: In the past fiscal year, our order volume share from Latin America was 25 per cent of our total order intake. Besides the currently high volume in Brazil and orders for international projects, this is an impressive share. Our goal to stay as the preferred supplier for customers in this region continues to develop.

Does that mean that the name of Voith Siemens Hydro is well known in the Latin American markets?

San Martin: Yes, our brand is very strong. We must not forget that before the joint venture, Voith Hydro and Siemens hydro generators had sold equipment separately to these markets for many years with great

Location Info

Voith Siemens Hydro in São Paulo is not only a major operating unit of Voith Siemens Hydro Power Generation. It also has the largest workshop within the global group with the full range of mechanical and electrical manufacturing facilities. It has supported Voith Siemens Hydro's closeness to not only the Brazilian market, but also to other markets in Latin America and has made a clear footprint in these countries through its activities. Regional offices can be found in Chile, Costa Rica, Venezuela and Mexico.

success. We have – as a joint venture – gained respect and acknowledgement from our customers. Since the joint venture in 2000, we have consolidated our brand by developing our scope into a complete solutions and total plant provider, which benefits our customers.

Why do you think has this worked out so well?

San Martin: Very easily said: We have a clear idea of how to be different and unique, making significant contributions and adding value to our customers' business. This sounds simple, but it is a highly demanding approach from which we work day by day. Also, we have offered reliable support in this region for more than 40 years, sustaining business through good and tough times. And we offer more reliability also through our sustained engineering and manufacturing skills. Our processes we consider to be best-in-class from engineering to commissioning, and operation and maintenance of existing plants.

What is your expectation for the future of this business?

San Martin: Our volume expectation for these markets will certainly continue to grow.

We want to grow far above the current 25 per cent share from Latin America in our overall business volume.

How would you compare the Latin American markets with the Brazilian market?

San Martin: These are very different markets, all of them unique and very specific at the same time. Doing projects in Central America is completely different from doing business in South America or Brazil. This starts with legal framework such as national legislation, and goes on with different corporate cultures in customer organizations through different technological aspects of customers. All this has to be understood and complied within a strictly customer-oriented way. In many cases, financing structures with diverse risk profiles prevail.

What is your specific approach?

San Martin: Our customers are very demanding – they want superior value and quality, highly customized products and services, short delivery times and flawless life cycle services. Our operation has to be fully prepared to respond to these demands.

Our strategic approach is to take on a greater role in the value chain and this begins by a keen understanding of how to add value for both existing and potential customers. Then we must translate that insight into strategies and actions to deliver that value through our designs, marketing, production, and unique services.

Our business and sales approach is – and this is true for the global Voith Siemens Hydro organization – strongly related to value creation for owners and operators of hydro power plants, the search for solutions and opportunities, and the development of strategies. This allows us to adopt solutions in terms of technology and commercial conditions within a project's complete lifecycle. Under this lifecycle view we want to perfectly understand the very specific priorities and needs of customers long before the submission of a business solution.

Engineered reliability is our credo and this means, among other things, to provide top quality products, services and solutions. Quality assurance is everyone's job in our organization. Improvements in quality lead to improvements throughout the organization.


VOITH SIEMENS



Are there any main barriers to overcome in the region in order to become so successful: languages, geography, laws, currency, and foreign politics?

San Martin: I would say that these are no barriers. There are differences to be understood, respected and eventually overcome. All in all, we are all citizens of a big America. Our similarities greatly exceed our differences. Today, we obviously have some specific problems related to the business environment, such as currency exchange rates and volatility, but everybody else doing business in Latin America must also face this challenge. Again, local presence is of crucial importance. Opening regional offices in Chile, Colombia, Costa Rica and Mexico is crucial in linking these markets and our company.

Switching the subject completely: Is hydroelectric power generation already seen as an alternative energy resource, in a region where thermal generation still prevails?

San Martin: Certainly, hydroelectric power generation is a popular subject. Today, we can see countries such as Argentina, Peru, Ecuador, and Chile, strongly address new hydroelectric projects in their countries. We must not forget that, for countries like Argentina and Chile for example, dependency on gas is a very serious issue. This dependency can only be mitigated if the power mix is changed, and this change is being addressed and discussed in the governmental spheres of these countries.

For example in Chile, data published by governmental agencies makes us expect hydroelectric power stations to contribute almost 60 per cent of the power generation projects in the next 10 years. This is an impressive figure for this country. We are talking around 10,000 MW between 2007 and 2018. This is an indication of radical change. And such change is required to overcome the development over the last several decades, when natural gas was the fuel primarily meeting growth in energy demand in the country.

Does this apply for the whole of Latin America?

San Martin: Yes, the same trend can be seen everywhere in South America, where hydroelectric generation is discussed more and more in public media, featuring hydro as the power source for the future. Some countries are changing their legislation to accelerate hydroelectric power plant construction.

What is Voith Siemens Hydro's credo for their activity in these countries?

San Martin: Our presence in these countries transports our leading-edge technology and expertise in the supply of complete solutions for the whole hydroelectric sector. Our experience in the region is unique. We are executing large jobs in Peru (Callahuanca and El Platanal), Ecuador (Baba, Mazar, Angamarca), Venezuela (Guri), Costa Rica (Pocosol), Guatemala (Xacbal), Mexico (El Gallo and Chilatán), Chile (La Confluencia) and many others.

I would say that today we are perfectly fit to develop any type of project in this region.

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Guaranteed hydraulic performance more than fulfilled for Revelstoke's Unit No. 5

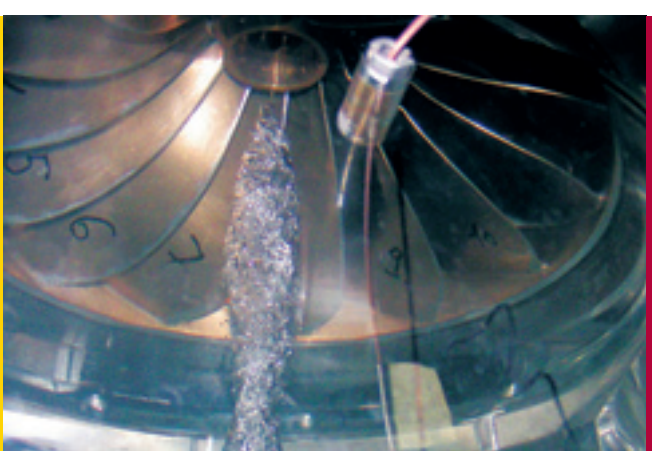
Two model tests for the Canadian hydro power station have been very successful for Voith Siemens Hydro. The first one took place at Voith Siemens Hydro's hydraulic research laboratory Brunnenmühle in Heidenheim. Its results now have been independently confirmed by the hydraulic laboratory of the Swiss École Polytechnique Fédérale de Lausanne.

In both tests, the hydraulic performance of the turbine model reached and even exceeded the specifications and guarantees in all aspects. Therefore, Voith Siemens Hydro got the authorization to proceed with the second stage of the Revelstoke contract, which includes design, supply and installation.

Last summer, representatives from the owner-operator, BC Hydro, stayed in Heidenheim for two weeks to attend the first model acceptance tests. In their own words, they saw "impressive achievements".

Mary Hemmingsen of BC Hydro during her visit of the Brunnenmühle test laboratory.

The Revelstoke model runner in the test rig.



As the unit has to be integrated in the existing structures of the power house, design of the turbine and generator held some challenges. Just to give an example: the draft tube diffuser of the unit had been built in the 1980s, when the plant was commissioned. Thus, certain main dimensions and hydraulic boundary conditions for the turbine design were heavily constrained or even fixed by existing structures. Moreover, the existing power-house crane is only able to lift up to 1,000 tons which sets a weight limit to the turbine and generator. The impressive diameters of these components are 7.1 meters (turbine) and 13.9 meters (generator stator core diameter), respectively.

After the tests in Heidenheim, the École Polytechnique Fédérale de Lausanne in Switzerland, which maintains one of the rare independent testing laboratories for hydraulic machines in the world, cross-checked the test results Voith Siemens Hydro produced in its facilities. The successful result: BC Hydro asked Voith Siemens Hydro to proceed.

BC Hydro is studying the option to add yet another Francis unit for Revelstoke and two additional units for Mica, a plant approximately 100 kilometers further north, in order to meet the growing demand in Canada's Western Province of British Columbia.

Revelstoke hydro power station has an installed capacity of 1,840 MW with provisions for an ultimate capacity of around 2,864 MW. To date, the powerhouse has four large generating units in service since 1984. Each unit has a capacity of 460 MW.

Project Info

Voith Siemens Hydro Montreal was awarded a contract by BC Hydro for supplying a new 512 MW-Francis turbine and a 532 MVA-generator for Unit No. 5 for Revelstoke in October 2006. Its commissioning is targeted for October 2010. The contract value is 48 million Euros.

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Voith Siemens Hydro equips Turkish power plant Uzunçayir

Voith Siemens Hydro will deliver the complete electromechanical equipment for Uzunçayir, a Turkish hydro power plant located in the East of Anatolia in the Euphrates' upper basin. The contract will be completed in a consortium consisting of Voith Siemens Hydro St. Pölten, Voith Siemens Hydro Turkey and Siemens Sanayi ve Ticaret A.Ş.

The existing dam and the power house were built by the national utility DSI. According to the new Turkish energy law the Independent Power Producer (IPP) Limak İnşaat Sanayi ve Ticaret A.Ş. acquired these civil structures together with the power generation license in a public auction. The major challenge was to meet the customers' expectations of a capacity increase of the machines without modifying the civil structures.

Voith Siemens Hydro is supplying three Francis units of max. 32 MW and the associated electromechanical equipment for the existing power house. Originally, it was constructed to house three turbines with a unit capacity of 24 MW.

This contract is the fifth within the last 24 months from a Turkish IPP investor within the large hydro segment for Voith Siemens Hydro.

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The construction site of Uzunçayir hydro power plant on the Munzur River in Turkey.

Contract award for Picote II in Portugal

Voith Siemens Hydro, together with its Portuguese consortium partner Siemens S.A., will deliver the complete electromechanical equipment for the Picote II hydro power plant.

The 56 million Euro contract covers the supply of a 248 MW Francis turbine, 273 MVA-generator, and related electrical equipment including the excitation system, automation and balance of plant equipment. Portuguese utility Energias de Portugal (EDP) is the owner and operator of the plant. “After the award of Venda Nova II pumped storage power plant in 2000, EDP again entrusts Voith Siemens Hydro with the award of Picote II”, said the Management of Voith Siemens Hydro Kraftwerkstechnik Heidenheim, on the occasion of the signing ceremony.

Picote II will be built on the Douro River, which runs through northwestern Spain and the northern Portugal and, after its 900 kilometer long journey, flows into the Atlantic Ocean near Porto. It is part of a national plan that is designed to help Portugal to intensely build up its generation capacities from renewable sources. This plan includes the expansion of wind energy by 2,000 MW through 2020. In order to stabilize the grid due to the intermittent nature of wind power, the same amount of new hydro and additions of capacity through rehabilitation of existing hydro power plants will be built in parallel. The main focus of this hydro development lies on storage plants such as Picote I and II, but also on pumped storage power plants that store huge volumes of energy in their upper reservoirs.

Picote II will be built in a cavern, 125 meters into the mountain, and is the first hydro plant to be built within the new national energy plan. After its commissioning in fall of 2011 it will increase Picote’s total capacity by 125 per cent.

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New Romanian subsidiary founded

Romania plays an increasingly important role for St. Pölten's hydro power activities in Eastern Europe. Therefore, Voith Siemens Hydro St. Pölten established a new subsidiary in Bucharest at the end of 2007. The new branch can rely on more than 100 years of market experience as St. Pölten works in Romania since 1898.

Achieving important milestones, 2007 was a pivotal year for the plan to increase the Romanian presence of Voith Siemens Hydro. In January, the rehabilitation contract for the Lotru-Ciunget hydro power plant was signed. With an installed capacity of 510 MW, Lotru is one of the country's largest hydro power plants and plays a key role in domestic energy generation. It contributes 1,150 GWh per year to the local grid. As it can be operated in generator mode as well as in compensator mode, it contributes significantly to the grid's stability, too.

The original units were built in the 1970s, and the machines were due for modernization decided Hidroelectrica S.A. and awarded Voith Siemens Hydro St. Pölten a contract worth 77.8 million Euros.

In May, the start of the main erection phase of Ipotesti hydro power plant on the Lower Olt River near Slatina was celebrated. Ipotesti is part of Hidroelectrica's refurbishment scheme for all hydro mechanical equipment in each of the five hydro power plants on the Lower Olt downstream of Slatina. The project scope includes a total of 20 machines to be commissioned by September 2010.

"Romania is a hydro power country with an installed capacity of 6,350 MW. Many plants are 40 years old or older. Therefore, Romania has a considerable potential for modernization, services and automation", said Dr. Gerhard Blaschitz, Managing Director of Voith Siemens Hydro St. Pölten.

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Re-opening of Wiesberg power plant

In August 2005, a depression in the Adriatic region caused heavy rains in the Balkans, Austria, Switzerland and Southern Germany. The abundance of water destroyed the power supply in those regions as well as telephone lines. Railway lines were flooded and impassable; even power plants had to be cut off in order to avoid more damage.

The Wiesberg hydro power plant in Vorarlberg/Austria, right at the border to Switzerland, was affected, too. The 105 year-old plant was buried under ten meters of rubble, tree trunks and mud. Both neighboring rivers, the Rosanna and Trisanna, were rerouted, their banks slightly damaged.

A feasibility study, conducted post-disaster, indicated that reconstruction was possible. So, two years after the Alpine flood, the Wiesberg plant was re-opened with a big ceremony. However, financial losses for the plant owner Donau Chemie AG were about 21 million Euros – about one third higher than estimated immediately after the flood.

Seven million Euros from the Austrian fund for catastrophies smoothed the way for the reconstruction project.

But execution endured some set backs. There was the risk of landslides in winter, terms of delivery for parts were not that easy to combine with the project schedule and only a limited number of river stones could be used as building material. Even so, already nine months after the flooding 90 per cent of power production were reached at Wiesberg again: an appeal to enforce the works in order to reach full power output as soon as possible.

High-level representatives of Austria's government and industry celebrated the re-opening during a ceremony for Vorarlberg's historic hydro power plant. Tyrol's Governor Herwig van Staa pointed out that it was very important to come to the aid of Donau Chemie AG, as the Wiesberg hydro power plant, and the Landeck power plant are special symbols of the region.

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Voith Siemens Hydro buys Austrian small hydro expert Kössler

Voith Siemens Hydro Power Generation GmbH & Co. KG based in St. Pölten recently acquired Kössler GmbH Maschinenfabrik based in St. Georgen, Austria. Under this plan global operations will be expanded based on joint expertise. The antitrust authorities approved the deal in late 2007.

Kössler is a full-line supplier of small hydro power plants providing engineering, manufacturing and installation. With a staff of 74, the company achieved sales of around 17 million Euro in the last fiscal year. Kössler will become part of the Small Hydro Division of Voith Siemens Hydro Power Generation and will combine their technical expertise, their customer orientation and operational speed with Voith Siemens Hydro's technology and global sales network.

The increasing demand to generate electricity from renewable sources is coming into focus on a global scale. Both small as well as large hydro play an essential role in emission-free generation and have great potential to contribute to CO_2 reduction measures.

Therefore, the strengthened global set-up within the small hydro segment is of high importance for both companies. "With this step into a joint future we combine 80 years of Kössler's small hydro know-how with 140 years of Voith Siemens Hydro's business expertise", said Dr. Gerhard Blaschitz, CEO of Voith Siemens Hydro's Austrian unit: "And we will be able to increase service for our customers".

Volpert Briel, Head of Voith Siemens Hydro's Small Hydro Division, said: "Product portfolio and global outreach of both companies complement each other nicely and the result will be much more than just the sum of its parts".

New Management Team

Kössler's new Managing Directors are Josef Lampl (Sales, Finance, Controlling and Human Resources) and Robert Doppler (Project Management including Design, Sourcing, Manufacture, and Erection). Both are experts in the area of small hydro equipment and work with Kössler and Voith Siemens Hydro for many years.

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Special training program for staff of Ethopian Electric Power Corporation

Voith Siemens Hydro Heidenheim, Germany, hosted ten Ethiopian Electric Power Corporation (EEPCO) employees who will operate the Gilgel Gibe II hydro power plant. During an intense five-week training course, the EEPCO staff learned about the equipment Voith Siemens Hydro supplies for Gilgel Gibe II and how to handle the operator-interfaces in the plant.

An extensive program was developed for the Ethiopian guests comprising various modules which covered all aspects of maintaining and operating the plant successfully. Experts gave the EEPCO-employees an understanding of the hydraulic design of the 105 MW Pelton turbines as well as of the mechanical design of the generators. Operation of the control and automation system as well as the governor were also part of the course. Training certificates were given at the conclusion of the successful course.

The EEPCO employees also had the opportunity to learn more about Voith Siemens Hydro's manufacturing and R&D facilities and to get to know their contacts personally, which strengthens their relationship with each other.

Voith Siemens Hydro considers this as one of its core values in customer relations.

This close relationship among the staff of both companies will continue. The same EEPCO employees worked with the Voith Siemens Hydro team throughout installation of the electromechanical equipment on-site. At the end of 2006, the first EEPCO-team had already been trained and qualified regarding electrical topics. With the conclusion of this second training course, focused on mechanical issues, the off-shore training program for EEPCO is complete; however, interaction and cooperation will continue.

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Hydro power is a vital source of electricity in Africa

One of the biggest challenges for almost every African country is providing electric power to its citizens. Currently, some 540 million Africans do not have access to electricity. Through the expansion of hydro power, this situation could be significantly improved. To date, only seven per cent of the hydro potential in Africa has been developed. Another 290,000 MW could still be unlocked.

Over 70 per cent of Kenya's power is generated by the country's hydro power stations. Presently, just under 680 MW are produced and another 440 MW are under construction. Voith Siemens Hydro is participating in this development: several turbine/generator units are being overhauled at the Kiambere hydro power station. Two new 84 MW Francis runners, uprated from the original 72 MW units, were manufactured in São Paulo and already arrived on-site.

The rotor poles of the generators with a nominal output of 85 MVA are also overhauled. Additionally, the generator cooling system is optimized; new governors will be supplied as well as a new excitation system. In the summer of 2008, the operator, Kenya Electricity Generating Company (KenGen), will reconnect the modernized power station to the grid.

Kiambere is Kenya's second largest hydro power station and receives its water supply from the Tana, the largest river in the country. It is one of the five power stations of the Seven Forks hydro power network, which is of vital importance to the electricity supply of the 2.8 million inhabitants of Kenya's capital Nairobi. Voith Siemens Hydro has already supplied the equipment for the Gitaru hydro power station, which is also part of the Seven Forks.

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Africa, as we know it from movies, books and travel brochures. But what the picture does not show: on the African continent, some 290,000 MW of hydropower can be developed.

Energy Source: Being the largest river in Kenya, the Tana supplies Kiambere hydro power station with water.

Well positioned in China

Voith Siemens Hydro Power Generation Shanghai has recently awarded its largest contract since its foundation in 1994: the supply of the electromechanical equipment for the Jinping II project on the Yalong River in Sichuan province. Additionally, the operating unit will supply the first three units for a new hydro power plant Nuo Zha Du.

Worth approximately 120 million Euros, Jinping II is the largest-ever deal for Voith Siemens Hydro Shanghai. The order was placed by Ertan Hydropower Development Co. The contract marks the kick-off of a major hydro power development along the Yalong River, China's fourth-largest source for this type of energy generation. Located at the lower reaches of the river, Jinping II has a total capacity of 4,800 MW making it the largest of the five hydro power stations on the Yalong.

It will be equipped with eight Francis turbines, each rated at 600 MW. The power station has a maximum head of 318 meters and, at 17 kilometers, its penstock is one of the longest in the world.

With the award of Nuo Zha Du Chinese customer Huaneng Lancangjiang Hydro Co. again relies on Voith Siemens Hydro after Xiao Wan. Voith Siemens Hydro will supply the first three turbines for this new hydro power plant, which will be built in Simao City on the lower reach of the Lancangjiang by 2014. When complete, nine 650 MW Francis units will have a total capacity of 5,850 MW.

Xiao Wan's on-site workshop is now fully operational. For Voith Siemens Hydro Shanghai, this is the third on-site manufacturing facility after Long Tan and La Xi Wa. Transportation conditions for Xiao Wan were very limited, making on-site manufacturing necessary. Work on these units is ahead of the project schedule.

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Promising perspectives at Voith Fuji Hydro's 10th anniversary

Voith Fuji Hydro K.K. celebrated its ten year anniversary in fall. On October 1, 1997 the company was founded in Kawasaki as a joint venture of the then Voith Hydro GmbH, Heidenheim, and Fuji Electric K.K., Tokyo. Today Voith Fuji Hydro, with around 120 employees, is responsible for the Japanese hydro market and Southeast Asian and Pacific countries.

The company's foundation coincided with severe deregulations of the Japanese power generation market leading to a massive decline of all energy related business in Japan. Since then, however, major restructuring, strengthening of high technology competences and increasing international activities led to a successful turnaround of the company.

The global trend for clean and renewable energy generation drives also the Asia Pacific area, providing an attractive potential for hydro business opportunities in the region. "With this celebration we express our thanks to all our employees for their great efforts during all these years", said Dr. Martin Küchle, President of Voith Fuji Hydro: "Based on a strong foundation we look forward to the next ten years which will have its own challenges but look quite promising"!

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View from the 70th floor of the Landmark Tower.

Mr. Ginjiro Yanai, CEO of joint venture partner Fuji Electric Systems.

Dr. Hubert Lienhard, then CEO of Voith Siemens Hydro during his speech (with interpreter).

CHA President Pierre Fortin speaks with Denys Turcotte, President and CEO of Voith Siemens Hydro Canada.

Close to customers

The major hydro conferences in 2007 provided excellent opportunities for the international and North American Voith Siemens Hydro sales force to reach out to customers.

In Chattanooga, Tennessee, USA, during Waterpower XV, in the Hunter Museum in July and in Hydro 2007, directly below the famous Alhambra buildings of Granada, Spain, in October, the traditional Voith Siemens Hydro customer events offered perfect evenings of entertainment and relaxation after a busy conference day.

Both events provided good venues to establish new and strengthen existing contacts on the exhibition floor and at sessions. It also gave the company a platform on which to present its innovative drive in ocean technologies, and on its commitment to the hydro industry, relating to IHA's Sustainability Guidelines and Sustainability Assessment Protocol.

The company's intense positioning in hydro power was also well visible in the Forum on Hydropower, the annual event by Canadian Hydropower Association (CHA), gathering industry leaders and experts in Ottawa, Canada, in November, 2007.

The 2007 conference had its focus on the industry's capacity to innovate and adapt. "A mature and well established technology, hydro power has contributed extensively to Canada's economic and environmental well-being, and will continue to do so for coming generations", concluded Pierre Fortin, the President of the CHA. A good example of this ongoing innovation is the industry's development of technologies to optimize efficiency while reducing its environmental footprint, by, for example, integrating fish ladders and fish-friendly turbines. ■

Conferences, seminars and symposia

Date	Event / Further information
May 7 - 9, 2008 Christchurch, New Zealand	**2nd Australasian Hydro Power Conference** Paper presentation by Voith Siemens Hydro www.hydroconference.co.nz/
May 21 - 22, 2008 Aberdeen, UK	**All-Energy '08** Booth by Wavegen, A Voith and Siemens Company [No. H 12] www.all-energy.co.uk
June 11 - 13, 2008 Bled, Slovenia	**Hidroenergia 2008** Paper presentation by Kössler, A Voith and Siemens Company www.esha.be
June 30 - July 3, 2008 Prague, Czech Republic	**9th International Conference on Flow-Induced Vibrations Conference 2008** Paper presentation by Voith Siemens Hydro www.it.cas.cz/fiv2008
July 14 - 18, 2008 Sacramento, CA, USA	**HydroVision 2008** Booth by Voith Siemens Hydro [No. 801] Paper presentations by Voith Siemens Hydro www.hcipub.com/hydrovision
August 24 - 29, 2008 Paris, France	**42nd CIGRE Session** www.cigre.org/gb/events/session.asp
October 6 - 8, 2008 Ljubljana, Slovenia	**Hydro 2008** Booth by Voith Siemens Hydro [No. 23] Paper presentations by Voith Siemens Hydro www.hydropower-dams.com/hd_71_0.htm
October 27 - 31, 2008 Foz do Iguaçu, Brazil	**24th IAHR Symposium on Hydraulic Machinery and Systems** Paper presentations by Voith Siemens Hydro www.iahrmachinery2008.com
November 26 - 28, 2008 Vienna, Austria	**15th International Seminar on Hydropower Plants** Paper presentations by Voith Siemens Hydro www.viennahydro.com
March 15 - 22, 2009 Istanbul, Turkey	**5th World Water Forum** www.worldwatercouncil.org

First company-internal workshop on hydro's sustainability

Voith Siemens Hydro, with representatives from the World Wide Fund for Nature (WWF), held a first workshop for sales staff and also discussed various aspects of sustainability in hydro power projects last summer.

The importance of knowledge about sustainability in hydro power projects was emphasized by Voith Siemens Hydro's former CEO, Dr. Hubert Lienhard, in his introductory and concluding remarks. He stressed that energy supply and poverty alleviation will remain issues of global importance with the challenge of balancing environment, economic growth and social development with respect to building new infrastructure.

Martin Geiger, Head of the WWF's global Freshwater Program, and Dr. Petr Obrdlik, an expert in the field of aquatic habitat, came to Heidenheim to present WWF's vision of free-flowing rivers worldwide. This discussion provided first approaches to matching hydro power plants with the preservation of free-flowing rivers and the ever growing demand for renewable energy from water.

Changes in International Hydro Association

The Hydro Equipment Association (HEA) is pleased to announce that three of its members were re-elected to the industry association's Board: HEA Chairman and CEO of Voith AG, Dr. Hubert Lienhard (Germany), Philippe Cochet, President of Alstom Hydro (France), and Dr. Hans Peter Schiffer, Managing Director of the HEA (also Germany), will continue to represent the hydro equipment manufacturers in the 18-strong committee until 2009.

Dr. Refaat Abdel-Malek is the new IHA President, who was appointed unanimously in September 2007.

Voith Siemens Hydro is fully aware of its responsibility to develop hydro power projects in an environmentally and socially sustainable way. The company considers itself to be a leader in its intense consideration and promotion of sustainability issues within the hydro power industry, including the continuous education of its staff worldwide.

In the future, the "Sustainability Assessment Protocol" – developed by the International Hydropower Association (IHA) – shall be increasingly applied in the whole industry as an assessment tool through which sustainability performance in hydro power projects can be measured. In addition, the company has already started to work on a process to find out how sustainability in hydro power projects can be assured in the decision making process of an equipment supplier.

Participants in the workshop worked on a case study with the Sustainability Assessment Protocol in their hands to exercise verification of performance against rules.

The presentations provided by groups were quite impressive. Participants found crucial relations between case and Protocol, but also discovered the difficulty of not having sufficient information on the project to assess many aspects. However, the way forward, with a further developed Protocol from IHA, is clearly set for the global organization of Voith Siemens Hydro.

Relationship building with WWF, one of the world's largest NGOs, shall not only show the readiness for dialogue and cooperation but shall be developed further. It is the best approach to work through controversial views of hydro power development. Even if there might not be the one and only solution for all stakeholders, substantial and solutions-oriented dialogue on a trustful basis will help going forward.

Remarkable move towards sustainable solutions

The interest and need for sustainable solutions in hydro power is clearly visible in the first foreign language version of the IHA Sustainability Guidelines and Sustainability Assessment Protocol. Both documents are now available in Mandarin and can be downloaded from IHA's website.

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Voith Foundation São Paulo supports social and vocational projects

What managers like to call "Human Resources" in business language is ultimately the individual talents and strengths of the company's employees.

These employees are part of the local society. They grew up here. Much of what makes them so valuable to the company as employees is due to their particular social circumstances. So at the end of the day, companies should connect to and take responsibility for the society from which it recruits its manpower.

Social commitment is a tradition at Voith

The Voith Group has taken social responsibility very seriously for a long time. And in this tradition, the Voith Foundation, established in São Paulo in 2004, operates in the tradition of the Hanns Voith Foundation founded in 1953 with the mission of supporting the professional education of gifted and disadvantaged young people.

The charitable organization coordinates the social commitment of the Voith Group in Brazil. Since its foundation, it has developed numerous initiatives of its own and has supported programs that promote the social integration and educational opportunities of children and young people from poor or disadvantaged families in the neighborhoods near its manufacturing facilities.

Employees help as volunteers

Steps to improve the instructional and educational opportunities are integrated into a framework of intense collaboration with local schools. A positive learning atmosphere is consciously being created with the aid of practical teaching models and modern educational methods in order to reduce the number of high school dropouts.

Many Voith employees have already committed themselves to these schools as volunteers, actively helping in its maintenance for example. The work of the Voith Foundation includes not only access to education for those living adjacent to the Voith premises but includes cultural activities, too. Dance and theater performances take place as well as literature and writing projects, with which fantasy, creativity and creation of social awareness are equally stimulated.

Formare – train, develop, cultivate

The support of the so-called Formare Program, which was initiated by a Foundation of the Brazilian Railway and Auto-Parts Supplier Iochpe-Maxion, is intensive. The program stands for advanced training, education and the development of young students. As a Formare partner, the Voith Foundation builds on this good concept to improve the vocational prospects of young people from lower income levels.

With Formare, Voith offers students between the ages of 15 and 17 a year of theoretical lessons and practical insights into the company's day-to-day operations. In keeping with the program's motto "Learn to learn, learn to do, learn to be", participants are prepared for their professional careers as well as for their lives as citizens. The spectrum ranges from mathematics, physics and English to PC applications and technological design, right through to industrial material science and administrative systems. It also includes topics like hygiene, health, safety, and environmental stewardship. Over 70 Voith employees volunteered to look after the teenagers' training. The teenagers receive free transportation to their courses, medical care, food and a monthly income.

Expansion of Foundation activities is planned

"A comprehensive education is the most effective way to advance equality of opportunity in the long-term and to introduce a communal development of social sustainability", explains Udo Gierlich, Foundation President and Business Development Director of Voith Industrial Services in Brazil. "There are ample ideas, concepts and good suggestions, and the employees are always more than ready to help. We will make our contribution and continue to expand our social and educational project activities for the future", Gierlich promises. ■

Udo Gierlich

Udo Gierlich is Business Development Director of Voith Industrial Services and President of Voith Foundation since January 2006.

He believes that education in a broader sense creates possibilities for social integration and development: "Education is the major leverage for social transformation in medium and long terms. We are evaluating the possibility of expanding our areas of influence in the future, particularly focusing on sports activities", he says. Proposals and plans are abundant: "The third sector is developing in different companies and countries. We are seeking to do our part".

Taking the media to the ocean

20 journalists in Scotland to find the energy of waves

Lively discussions on-site.

A group of print and television journalists visited Wavegen's Inverness-based wave tank facilities and the Limpet wave power station on the Island of Islay, off the Scottish West Coast.

On a day with perfect weather and wave conditions, the group learned about Voith Siemens Hydro's progress in wave technology development towards commercial application and optimized turbine use in the latest breakwater project award for Northern Spain's Mutriku harbor. ■

Contract for first tidal current machines

With German Minister Glos in Korea

Signing ceremony.

Witnessed by Michael Glos, Germany's Minister of Economics and Technology, the official "go ahead" for the first phase of the world's first tidal current power park was officially given. Dr. Hubert Lienhard, former CEO of Voith Siemens Hydro and Jong-Seon Park, his counterpart of the joint venture partner Renetec, signed a Memorandum of Understanding with CEO Soo-Yang Han of Posco Engineering & Construction regarding development, installation and trial run of the first three tidal current turbines.

Voith Siemens Hydro Tidal Corporation's first project will be located offshore the South-Korean province Jeollanam-do. When complete, it will have an overall rated capacity of 600 MW. This will satisfy the energy demand of approx. 400,000 households in that region. In contrast to other tidal power concepts, no dam is needed for tidal current power plants. ■

New Head for Tidal

New Managing Director for tidal current activities in Korea

Tae-Hyoung Kim.

Tae-Hyoung Kim has been appointed Managing Director for Voith Siemens Hydro Tidal Corporation in Seoul, the joint venture company for tidal current technology recently established by Voith Siemens Hydro and the Korean renewables company Renetec. Prior to his appointment Mr. Kim worked as Managing Director for the Korean subsidiary of a German company. He specialized in the field of electrical, electronic and optical connection, transmission and networking.

Mr. Kim holds a Bachelor of Sciences in Industrial Psychology from Sung Kyun Kwan University in Seoul, Korea, and a Master of Business Administration from San Francisco State University, California, USA. In his former business positions he has gathered valuable experience in the development of business opportunities and marketing strategies for new products. ■

New CEO for Wavegen

Matthew Seed joins Wavegen's Management Board

Matthew Seed.

Matthew Seed has become the new Chief Executive Officer of Wavegen based in Inverness, Scotland. He succeeds David Gibb who resumes the position of Chief Financial Officer.

Mr. Seed joins Wavegen, from Advantica (formerly British Gas Technology) where he held various positions. The most recent was General Manager for the commercialization of the British Gas Lurgi coal gasification technology including a special focus on China and North America.

Mr. Seed has a broad background in the energy industry, ranging from oil and gas exploration to project delivery and technology commercialization. He holds an honors degree in Engineering from the University of Cambridge and is a Chartered Engineer and Member of the Institution of Mechanical Engineers. ■



Voith Turbo

How to maneuver a 365-meter ships' convoy?

A ships' convoy consisting of 25 pontons or "barges" lined up like building blocks and driven from the back and the sides by a push boat is not an everyday sight. When this convoy is also required to adapt to the river flow across its entire length of 365 meters, it borders on the seemingly impossible. But a Bow Steering Module (BSM) fitted with a Voith Schneider Propeller allows this complex task to be easily accomplished.

Rio Tinto is an Australian mining company specializing in the extraction of raw materials such as iron ore. The company currently operates iron ore mines in Brazil, from which 1.5 million tons of the precious raw material are dug up every year. Thanks to the cooperation with Voith Turbo Marine, the company was able to solve the logistics problem of transporting the iron ore from the heart of the country to a large sea harbor.

Along a stretch of 2,400 kilometers, the raw material is moved to Buenos Aires on the Rio Paraná, through Brazil, Paraguay and Argentina.

The convoy, consisting of 25 barges that are best described as floating containers, can transport 33,000 tons of iron ore. The 25 barges, arranged in rows of five, are put between a push boat and a BSM forming a convoy with a total length of 365 meters. While the push boat moves the convoy and provides accommodations for the crew, the BSM is exclusively responsible for steering and maneuvering the fleet.

The BSM is operated by a VSP size 26. The reason for a BSM is obvious: if there is additional steering force at the bow, the braking distance of the convoy is shortened and accidents are prevented. During storms and strong currents, the convoy can be much better controlled, and the journey time is reduced by approximately one third.

"This is ready cash" – this is how Ivo Beu of Voith Turbo Marine summarizes the advantages of the BSM. After all, the 2,400 kilometer journey from the loading harbor to Buenos Aires can take four to six weeks, depending on the water level of the river. ■

Voith Industrial Services

Brazil is quickly moving towards integration of its units

In October 2007, the Industrial Services division merged its three companies in Brazil into one entity, – Voith Serviços Industriais do Brasil Ltda.

With several branches, present at the main industrialized states in Brazil like São Paulo, Bahia, Espírito Santo, Minas Gerais and Rio Grande do Sul, over 2,400 employees work for the new company. They support several industrial sectors such as automotive and its suppliers (DaimlerChrysler, Ford, VW Audi, DOW, John Deere), energy (Petrobrás), mechanical engineering (Voith, Vetco Gray) and logistics (MRS). The scope of supply ranges from cleaning activities, maintenance of production equipment, maintenance engineering and retrofit of tooling machines.

Growth in the services area is the result of the increase of the Brazilian economic activity which attracts day-by-day new investments to the country. A growing tendency at major groups is related to the development of strong, reliable, and long term partnerships. The customers demand a wide scope of supply with qualified personnel, solidity and innovation in order to allow them to focus on their core businesses.

Recognized in 2006 with the Q1 Certificate from Ford and the INTERAÇÃO Award from Daimler-Chrysler, the Brazilian unit of Industrial Services is able to develop and offer tailor-made solutions for each type of production support activity. ■

Voith Paper

Voith Paper successfully concluded the fourth test run of the ATMOS technology at the Chilean Talagante mill of CMPC. The company is considered to be the second largest tissue producer in Latin America. The now installed equipment greatly changes the tissue market by ensuring the production of premium tissue with significant production cost reduction, for example via reduction of energy consumption. The targets of the last test run were are an additional speed increase, a further reduction of the required energy and the development of other premium tissue products. All targets were achieved. ATMOS is an innovative technology, which was developed to significantly reduce the main problems of the production of premium tissue using standard TAD technology. ATMOS now makes it possible to produce premium tissue based on high contents of recycled fiber, while maintaining commercial machine speed levels, decreasing investment costs by 40 per cent and production costs by 35 per cent compared to TAD technology. ■

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