

# MEXICO

Pt.6

*New times, new opportunities*

**H**aving benefited from PEMEX's investment boom over the past decade, with investment averaging US\$4.6 billion over 1995-2000, US\$10.1 billion between 2001 and 2006 and a forecasted annual CAPEX of US\$20.1 billion over the current Presidential term of 2007-2012, numerous Mexican service providers have gained the expertise and level of technological advancement that enables them to venture beyond the limits of their domestic market. While investment in the Mexican oil and gas industry remains buoyant, creating abundant opportunities, the next challenge is capitalizing on the opportunities in the international marketplace.

**Text and research: Jeroen Posma**  
**Project coordination: Anna Jonca**

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## Innovation is an opportunity

Private companies introducing innovative solutions from abroad continue to play an important role in the technological advancement of Mexican oil and gas industry, however, innovation in the industry has historically been supported by the Mexican government through the creation of a range of research and development centres.

Among these centres the Mexican Petroleum Institute (IMP) is the only one solely dedicated to the oil and gas industry. This institution was created 42 years ago with funding from the Government and especially from PEMEX. At that time there was a partnership between PEMEX and IMP, while today these are separate organizations. Over time, PEMEX developed an increasing need for services and the IMP was gradually becoming a service organization rather than a research organization.

"We decided to change that," noted Dr Cinco Ley, before explaining that the current budget of IMP comes from the work performed, making the IMP self-sufficient. Last year, the first year of Cinco Ley's tenure as Managing Director, the IMP budget exceeded US\$300 million, of which only US\$6 million came from Government funding. "The IMP has become a business oriented institution, which has to support PEMEX through the commercialization of services and technologies," added Dr Cinco Ley. The Fiscal Reform that was recently approved by the Mexican Congress and Senate is destined to make more money available to PEMEX for technology development, in which the IMP will undoubtedly play an important role.

"PEMEX Exploration & Production has a business plan that outlines what they are going to develop, what they are going to find in the future," explained Dr Cinco Ley.

"We know that PEMEX will need technology for deepwater development, enhanced oil recovery focussing both on secondary and enhanced oil recovery to increase production in mature and marginal fields, and different aspects of heavy crude oil management, including production, flow assurance and upgrading of heavy crude oil, and the development of the Chicontepec field."

The Chicontepec field has huge oil reserves, estimated at 140 billion barrels of oil in place according to Dr Cinco Ley, however this oil is difficult to produce. "First, it is a low energy system with a very low permeability, which means that the well productivity is slow. Secondly, it is a very heterogeneous reservoir, so continuity will be a problem. Chicontepec is really a challenge because you have to add energy and need communication between different places in the reservoir when producing," explained Dr Cinco Ley. Right now, the average recovery factor, if the Chicontepec reservoir would be produced in a natural way, is round 7-9% of oil in place. This is very low. We would like to apply new technology to raise the recovery factor to 15-18%, which would represent a large increase for Mexico's oil production. The potential for successful research to, for example, increase in the recovery factor is really huge here in Mexico."

While the IMP aspires to be recognized worldwide for its expertise in mature fields, fractured reservoirs, deepwater and heavy crude oil, other Mexican research institutes are excelling in different niche markets. Twenty seven of such technological research centres across Mexico are part of Conacyt (National Council for Science and



As opposed to Mexico's ancient civilizations the current generation of Mexican service providers are increasingly successful exporters of skills, experience and technology.

Technology), a Mexican government agency responsible for supporting, strengthening, and improving scientific and technological research and development.

Based in Saltillo, located in the northeastern Mexican state of Coahuila, COMIMSA one of the technological centers of Conacyt with the most industry interaction. Although COMIMSA is part of Conacyt, it does not receive any federal funding. "Without self generated income, COMIMSA is dead," recognized Ing. José Antonio Lazcano Ponce, Director General of COMIMSA. "We are involved in both important technological projects and services for the industry; we are an enterprise and a technological research center."

COMIMSA's principal sales are to PEMEX, representing 85% of total revenue. Through different engineering projects the centre works with all divisions within of PEMEX throughout Mexico. "We attend projects from our offices in Ciudad del Carmen, Villahermosa, Reynosa, Tampico, Monclova, Mexico City and, of course, from our Headquarters in Saltillo where our main laboratories are located. These include metallurgical, metal-mechanical, chemical and environmental impact labs," noted José Antonio Lazcano.

Even though he noted that the IMP is very important for PEMEX, COMIMSA's Director General emphasized that PEMEX requires more than only the work of the IMP and COMIMSA. "Now is the moment for PEMEX's restructuring. I believe we can guarantee the oil production, not for only the next 10 years, but for the next 40 years, but we need new technology and more money has to be made available for PEMEX," he stressed. "In order to do our part of the job as well as possible, we need to acquire additional technology from international companies and cooperate with the other Mexican technology centres and universities." COMIMSA strives to identify the latest technology around the world, assimilate it, and transfer it to PEMEX. "We do not pretend to invest resources in R&D to develop

*"Innovation is not the product of logical thought, although the result is tied to logical structure."*

— Albert Einstein



Dr. Cinco Ley, Director General of IMP



**Ing. José Antonio Lazcano Ponce,  
Director General of COMIMSA**

know-how that already exists in the world. However, in very specific niches COMIMSA develops intellectual property to commercialize it with its customers."

Initially, COMIMSA was operating as IMIS (Mexican Iron and Steel Institute) and was focussed on the steelmaking industry. Its longstanding reputation as one of Mexico's

Mexico continues to be specializing in Materials and Manufacturing Processes.

In the foreseeable future, COMIMSA anticipates that its large projects will continue to come from PEMEX. "We plan to help industry to become more profitable, productive, and efficient. COMIMSA needs to do that because the country and the economy need PEMEX's production, and we need to ensure enterprise, government and PEMEX are working together to implement changes and improve technologies with Mexican resources to ensure our country's future growth and success. By improving PEMEX, we improve Mexico."

most important metallurgy labs has guaranteed a good human infrastructure in metallurgical engineering, and has positioned COMIMSA as one of the most important failure analysis labs for ferrous materials. Nowadays, its focus is on the oil and gas industry, with particular expertise in ensuring the security and safety of PEMEX's installations. "COMIMSA has developed a Risk Centered Maintenance System that has great potential for PEMEX," continued José Antonio Lazcano. "By applying our software, and training PEMEX employees, this tool reduces the principal risk in our client's processes by performing preventive maintenance. COMIMSA has implemented this model in seven or eight different PEMEX plants."

Also, COMIMSA is involved in Environmental Engineering. For instance, the technology centre has developed a bacteria based solution for the cleaning of oil spills. Another important speciality is Manufacturing and Materials Engineering. "Right now we are working in a big project for PEMEX, focussed on the restoration of critical components in turbines," added COMIMSA's Managing Director. "In addition, COMIMSA's training courses for industry are certified by the American Welding Society. As the Mexican certification branch for the American Welding Society, COMIMSA can guarantee the training of people in the different plants and industries in Mexico, for PEMEX and private industry."

Ing. Lazcano's ambition is to consolidate COMIMSA's units all over the country, emphasizing a specific focus for each one. The COMIMSA Unit in Ciudad del Carmen will be focussed on deepwater; the Unit in Villahermosa will be focussed in Risk Centered Maintenance Systems; the Unit in Mexico City will concentrate on Projects Engineering; while the Unit in Northern

**COMIMSA** **CONACYT**

# COMIMSA: Technology, Innovation and Quality.

**TECHNOLOGICAL SERVICES:**

<b>PROJECT ENGINEERING</b> Basic Engineering Detail Engineering 3D Engineering	<b>MANUFACTURING ENGINEERING</b> Components Manufacturing Components Rehabilitation Inverse Engineering
<b>RELIABILITY ENGINEERING</b> Risk Based Inspection Reliability Centered Maintenance Root Cause Analysis	<b>MATERIALS EVALUATION LABORATORY</b> Failure Analysis Materials Evaluation Environmental Evaluation Oil Monitoring
<b>RISK MANAGEMENT</b> Mechanical Integrity Risk Analysis	<b>TECHNICAL TRAINING AND CERTIFICATION</b> M.S. Welding Program AWS, API, and NACE Certification Welders Qualification and Certification
<b>INSPECTION</b> Acoustic Emission Guided Ultrasonic Waves Eddy Currents Internal Rotating Inspection System MP, PT, and UT	

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en Materiales, S.A de C.V.**

Headquarters: Saltillo, Coahuila. +52(844) 411-3200  
Offices:  
Villahermosa, Tabasco. +52(993) 314-2153  
Cd. del Carmen, Campeche. +52(938) 382-6775  
Mexico, D.F. +52(55) 5260-1796  
Reynosa, Tamaulipas. +52(899) 925-7220  
Minclavo, Coahuila. +52(866) 632-4952

[info@comimsa.com](mailto:info@comimsa.com)  
[www.comimsa.com](http://www.comimsa.com)

## Made in Mexico: product quality and customer service

PEMEX operates a pipeline network that stretches approximately 50,000 kilometres across Mexico. The fact that during 2007 this fundamental infrastructure has been a target for attacks that were claimed by a leftist rebel group – disrupting oil and gas supplies and causing hundreds of millions of dollars in damage to PEMEX – underscores the importance of the reliability of PEMEX's pipeline network.

While international pipeline producers such as Tenaris Tamsa have established a strong position in the Mexican market for pipe production, Mexican players have developed into formidable niche players with ambitions that are already stretching beyond their national borders. One of the leading Mexican pipe manufacturers is Tuberia Laguna, a privately owned Mexican company based in Durango, in north central Mexico. "My grandfather started the company in the early 1960s, after he arrived from Europe in 1939, when he realized that the area needed water for agricultural purposes," started Ing Eduardo Anaya Kessler. "In 1976, he bought the Torrance Mill, which we are still running today."

When Eduardo Anaya graduated from university he decided to move back to his hometown and started helping in the business, which was then run by his father, Jesús Anaya Vera. "Of course, over the years we have made large investments in new technologies, welding equipment and inspection methods. A lot of people say that a pipe is just a pipe, but, of course, we have to comply with the API, ASTM and ASME requirements," noted Eduardo Anaya. "Our production process strictly follows the quality assurance procedures prescribed by the ISO 9002 standards. However, it is one thing to comply with the standards, but in accordance with our philosophy of uncompromising devotion to quality, we have tightened and improved those standards."

Tuberia Laguna, which considers itself a middle-size company without limited financial resources, does not have an internal R&D department, as opposed to larger international competitors. In its quest for continuous quality improvement, Tuberia Laguna has become Technical Associate Members of the Pipeline Research Council International. "I am proud to say that besides TenarisTamsa we are the only Latin-American pipeline manufacturer to become a Technical Associate Member of the PRCI," boasted Mr Anaya. "The PRCI has members from all over the world, and our goal is to learn about what is transpiring in the rest of the world. Our membership gives us the opportunity to stay up-to-date on the latest technologies and materials that are being used around the world to make pipelines safer, cheaper to operate, and more environmentally friendly. We want to bring that knowledge to Mexico to contribute to the success of our oil and gas industry. We know that PEMEX is investing a lot of money in these issues, but we want to help them a little bit by sharing this knowledge with them."

Tuberia Laguna is equipped with extensive facilities including a complete metallurgical laboratory, state-of-the-art non-destructive testing equipment, and all the necessary inspection apparatus required to meet the most demanding specifications. "For example, the API standard for flattening tests states that there cannot be any cracks at the weld if you press a pipe to 1/3 of its diameter. At present, we are able to do a 100% flatness test without a crack. That is something that we have been working on and it is an achievement that we are very proud of. The manufacturing concept of Tuberia Laguna emphasizes our commitment to quality at every step of the production process, ranging from the initial quality of the material, its chemical composition and physical prop-

erties to the final dimensional accuracy," stated Tuberia Laguna's Managing Director. "We are trying to help PEMEX to tighten the standards and make sure that they realize that there is one Mexican supplier that can provide these types of products. Also, we are working closely with the Mexican Petroleum Institute to develop new specifications for pipelines that will help to make the industry safer."

Since Mr Anaya joined in 1994, Tuberia Laguna has been reinforcing the relationships with its customers, developed its distribution network, and widened its range of target markets. "Fifteen years ago we exclusively serviced our steel distributors, but right now they only make up about 25%-30% of our total market," noted Eduardo Anaya. "For many years we did not optimize our market share and I felt that we were not being aggressive enough in servicing PEMEX and CFE (Federal Electricity Commission). In response, we started building a wholly-owned distribution channel, recruited a new sales force and tried to be more in touch with our customers. "Over the years we have determined that inventory is the key part of our strategy and our customers value this as a great competitive advantage for us," he added. "We made these early changes while we continued to be committed to maintaining and improving our high quality image in the market."

Over the past seven years, Tuberia Laguna has witnessed an increase in PEMEX's investment in pipeline infrastructure, which directly contributed to Tuberia Laguna sales growth of 18% in 2006. Eduardo Anaya is expecting a growth rate between 10% and 14% for 2008, which he expects to be fostered by the energy sector. "Four years ago we invested in a coating plant for three layer polyethylene, which is a coating required in the Mexican oil industry. Right now we are investing US\$15 million to prepare ourselves for the investment that PEMEX is announcing," put Mr Anaya. "We are not only trying to help PEMEX by supplying the pipe, we are also developing other services such as inspections, cathodic protection and welding inspection. These are services that PEMEX requires, but very few companies are offering this complete package. In the future we want to be considered as a provider of complete solutions for pipelines."

## Transcending business

"We did not only want to do business in Mexico, but transcend business. ADS Mexicana does not want to just be a pipe-producing company, but to be an example for others who can do something good for the future of our country. That is how ADS Mexicana was born," started Ing. Juan Raigosa Valadez.

The charismatic Director General of ADS Mexicana aspires to make a difference for Mexico and be a source of inspiration for companies with social responsibility ambitions. At a point during his 1992 to 1999 period as director of Bufete Industrial, Juan Raigosa was working on a project at a wastewater treatment plant at Piedras



**Ing. Eduardo Anaya Kessler, Director General of Tuberia Laguna**



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**Ing. Juan Raigosa Valadez, Director General of ADS Mexicana**

Negras, where he was captivated by the mechanical and chemical resistance of corrugated pipe, and its potential as an engineering product. "I was not only thinking how I could make business, but I also saw an opportunity to help Mexico with its contamination and sanitation problems," he reflected.

After hesitating to plunge into this new market, following a career long experience of working with concrete and PVC,

Ing. Juan Raigosa decided to create a Monterrey-based company to introduce Mexican made corrugated pipe into the market. "Corrugated pipe does the same job as other pipes, but with far less size and weight. With ADS's technology, you can use a pipe that is much smaller, but corrugated, and which can compete with concrete or PVC in drainage, sanitary, and storm uses. The lack of service that the government was giving to the population caught my interest, because there is only 60% or 70% coverage in drainage in Mexico," he explained his entrepreneurial decision. "I want to help Mexico to improve its environment and create a better life for the future. We can use this pipe to bring clean water to the Mexican population."

At that time, nobody was producing corrugated pipe in Mexico, it was all imported from the US. Juan Raigosa realized that if this product was competitive in Mexico while being shipped from the US at high transport costs, there was a great business opportunity. After conducting thorough research he presented this opportunity to potential investors, and found four suitable investors. As a firm believer in alliances, Juan Raigosa invited two potential partners for a joint venture after setting up a modern production plant. "We decided on a joint venture with ADS, gathered information and performed due diligence, and signed a contract at the end of 2000. From there we have been seeing great success," he stated.

Establishing a distribution network consisting of people with an entrepreneurial mindset has been a critical success factor. As a result, ADS Mexicana's distributors have been growing at the same speed as their supplier in the last seven years. "We went from US\$5m in sales in 2001 up to US\$80m last year, from two corrugators up to fifteen corrugators, from 32 people to 400 people, and from one plant to two plants," boasted Juan Raigosa. "The rapid growth of ADS Mexicana, and its type of product, even caught the attention of former President Fox. He attended the company's open house where he was explained that with the same investment you can lay more kilometres of corrugated pipe than traditional pipe solutions. "There are many small towns, in the mountains or far away from cities, without the opportunity to install drainage, and our goal is to train the citizens in these locations to install the pipe on their own. I send the pipe, they dig the hole, and they install it on their own. If we were using concrete pipes in this case, it wouldn't work because concrete is too expensive in transportation and construc-

tion," stressed Raigosa. "Our pipe is very light, 6 meter instead of 2 meter, and does not require a big crane for installation. The main savings are in the indirect cost of construction activities, because something that may otherwise take three months with traditional pipe can be done in two months with corrugated pipe. If you take all these savings, everyone can do more with this technology. Market opportunities are enormous and we could easily reach a turnover of US\$200 million."

Also, ADS Mexicana has started working with PEMEX. In the beginning the company was importing all the resin used to produce its pipe. "We asked ourselves, if PEMEX is so large and produces resin and polyethylene, why aren't they our supplier?" remembered Juan Raigosa. PEMEX is now buying his company's pipes and is destined to become an important supplier of raw material.

ADS Mexicana is constantly working on identifying and developing new technologies and technical solutions to find a more rational and efficient use of water resources. Ing. Raigosa believes water will be as important in the 21st century as petroleum was in the 20th century. "The issue of water is not as critical right now, but population projections show that 70% of the rainfall in Mexico occurs where 30% of the population is located, and we are contaminating the water. With deforestation and urbanization, we are creating a difficult problem to solve 10 to 20 years in the future," he explained. "I think that each company in its own position has to do something, not only by doing business but by taking its responsibility towards the Mexican people. Based on our intelligence and God-given capability we can do more, and the best way to do that is by showing that you take your environmental and social responsibility, while remaining very economically successful. To sum things up, I would encourage the President to set environmental and water resource protection in the top of the agenda," Ing. Juan Raigosa concluded.

## **Innovation distinguishes between a leader and a follower.**

The advantages of Coriolis mass-flow measurement systems – simultaneous measurement of mass, density, temperature and viscosity – are self-evident. It comes as no surprise to find that this principle is used in a huge range of industry sectors, including chemicals and petrochemicals and oil and gas among others.

Endress+Hauser has been a driving force behind the implementation of this innovative solution in the Mexican market, where it has important applications in refineries and on offshore-platforms. "To assure that the amount of oil delivered from a platform to a receiving vessel can be measured accurately, PEMEX Exploration and Production has recently acquired Endress+Hauser unique measurement system to be installed on an offshore-



**Steffen Huber, Managing Director of Endress+Hauser Mexico**



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**Luis Salinas**  
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[luis.salinas@tuberialaguna.com.mx](mailto:luis.salinas@tuberialaguna.com.mx)

**Jesús Gutiérrez**  
International Sales Manager  
Gomez Palacio, Mexico.  
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platform in the Ku-Malooob-Zaap field," stated Steffen Huber, Managing Director of Endress+Hauser Mexico. The purpose of this project is to replace old mechanical technologies with a compact Coriolis flowmeter. Endress+Hauser's Coriolis flowmeter offers zero point stability, immunity to stress and pipe vibration, compact design according with space and area requirements.

This system has higher accuracy (typically +/- 0.1%), requires less human intervention compared with mechanical systems, and does not wear out due to moving parts and no filters are needed downstream. "By implementing the Coriolis flowmeter, PEMEX Exploration and Production will obtain greater accuracy and repeatability independent of the product characteristics, while the meter is of smaller size than other Coriolis competitors," Steffen Huber emphasized.

The technology to be applied, Endress+Hauser's ten inches model of the multivariable compact Coriolis flowmeter, can achieve a 2,200,000 kg/h flow and can be installed in two systems to double the flow measurement capacity. "PEMEX personnel will be able to verify the measurement device on site, and will acquire a third product to make the verification in line. With this third flowmeter Pemex wins reliability, accuracy, saves time and costs", Huber boasted. "Our fuel management systems will come with a calibration service for 6 and 10 inch flow meters. This unique sales proposition that we are offering in the Mexican market generates direct time savings for our clients."

The ten inch Coriolis flowmeter is a perfect fit in Endress+Hauser's strategic shift towards becoming a total solution provider as opposed to a technology and products supplier. "A fuel management system is exactly project and solution business, this is the direction we want to go", confirmed Steffen Huber. "2007 has been a very successful year for Endress+Hauser Mexico, with annual growth reaching 26%, and we are on track to reaching our turnover target of US\$25 million by 2011. Selling fuel management systems based on new measurement technology to PEMEX, but potentially also to CFE other participants in the channel, while be a core part of the company's strategy.

## Investing in drilling fluids

Three decades after its discovery, the Cantarell field has undeniably started its decline. After Cantarell's production peak in 2004 – reaching over 2.1 million bbl/day – output has already fallen by more than 800,000 bbl/d to 1.3 million bbl/day in November 2007. It could fall by another 200,000 bbl/day in 2008. In December 2007, Mexico's Ministry of Energy forecast that total oil production would decline from the current 3.1 million bbl/day to 2.5m bbl/d unless significant reform is implemented. Unable to wait for politician to reach agreement on the future of the petroleum energy, PEMEX has started its uphill battle to compensate for the production decline in Cantarell, and embarked on the most ambitious drilling campaign in the company's history. However, to date Pemex has drilled no more than 20 exploratory wells in water deeper than 300, indicating enormous growth potential. In addition, PEMEX has already communicated its plan to drill 5,421 development wells in the



**Ing. Alfredo Coppel Salcido,**  
President of Global Drilling Fluids  
de México

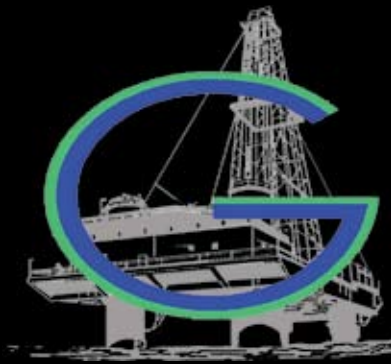
Chicontepec area over the 2007-2012 period. Drilling companies are the obvious beneficiaries of such programs; however, service providers offering drilling fluids are also eager to capitalize on the emerging opportunities.

Global Drilling Fluids de Mexico, a 100% Mexican organization, was incorporated in 1993 to take part in the oil industry by providing comprehensive drilling fluid services. Global's shareholders decided that the best option was to acquire a company that already had market knowledge, technical experience and an established market presence. This insight marked the creation of Global Drilling Fluids de Mexico, which therefore finds its roots in the investment community rather than among drilling engineers.

Alfredo Coppel, President of Global Drilling Fluids de México, believes that his company's competitive edge over the major international players in the Mexican market is its ability to make fast decisions and provide timely service while having the freedom to not expatriate dividends, but instead, reinvest them to acquire emerging leading edge technologies. To overcome the disadvantage of not having 30 years of in-house experience, Global Drilling Fluids de México has to continuously search and find the right trends in the industries and enter into alliances to offer the full range of services required for the drilling of an oil well.

According to the PEMEX Business Plan, the total value of the Mexican drilling fluids market equaled US\$1.1 billion over the 2003-2007 period, allocated in three main exploration areas: Northern Region around Reynosa, known as the Burgos Basin, Southern region, covering the Villahermosa area, and the Marine Region including Ciudad del Carmen. PEMEX's intention is that no more than 50% of the market value is owned by one participant. To date, there are basically six competitors in the Marine region who comply with PEMEX's infrastructure requirements for participation in public tenders: Halliburton, MISWACO, QMax, DME, Grupo Protexa and Global Drilling Fluids de México. In 2003, Global won two tenders in the Marine region, representing US\$75 million and US\$55 million contracts, which have been executed in full and upon extension generated an additional US\$22 million. Currently, the company is performing two contracts in the Northeast and Southeast regions, and aspires to add a marine contract to its portfolio to increase its share of the Mexican drilling fluids market. Alfredo Coppel takes pride in the fact that his company achieved four years of continuous work for PEMEX without being fined or penalized for non-performance of a contract. He identified the large stock of raw materials as the key to this success. Global Drilling Fluids de México has a barite grinding plant that can hold between 20,000 and 30,000 tons, located in the southern part of the State of Veracruz from where it supplies warehouses and storing silos in Dos Bocas and Ciudad del Carmen.

"Pemex, our main client, has launched an ambitious investment program in exploration and production for the next 12 years, we are talking of an average of US\$25 billion dollars per year, which opens an attractive future full of opportunities for our business. Everybody knows that energy sector reform is a priority on the agenda if the Mexican Congress this year and we all hope that important changes in the law will be approved, enabling private sector participants to introduce new technologies that are already available in this area," anticipated Mr Coppel. "PEMEX needs it and Mexico needs it, so we hope that we, as a Mexican company, will be able to contribute our country's objectives." Moreover, Global Drilling Fluids de Mexico's solid growth ambitions should ensure a proper return on investment for its stockholders.



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## Adaptability is the name of the game

Reliability, safety, cost-efficiency and time efficiency have been key parameters in measuring PEMEX's success in meeting the logistics challenge that the company has been facing since it constructed its first offshore platform in the Bay of Campeche. As the number of platforms rose to approximately 200 at the moment, the transportation of workers and equipment has become the domain of a select number of industrial air transportation service providers.

The long time market leader in the Mexican market, ASESА, was created by Humberto Lobo in 1977 as part of Grupo Protexa, which he was running as President. At the time, Grupo Protexa was growing aggressively and in the following decades played an important role in the development of the Mexican oil industry by constructing the majority of the offshore drilling platforms in the Bay of Campeche. Over the years, ASESА developed from a one-helicopter company into a market leader in supporting offshore activities in the oil industry.

As the son of ASESА's founder, Ing. Humberto Lobo de la Garza has been setting the company's strategic direction since his appointment as Managing Director. In October 2007, following organizational changes in Grupo Protexa, he seized the opportunity to acquire ASESА through Grupo Lomex, a group of enterprises that is controlled and operated by father and son Lobo. This acquisition marks another turn in the constantly evolving corporate strategy of ASESА.

"Since 1997, the company has gone through many change processes as we have been working with different types of aircraft to adapt to the changes in the environment and the kind of missions that were needed," reflected Ing. Humberto Lobo de la Garza. "In 1997, we were solely focused on offshore operations and followed a strategy of using one type of aircraft to operate all different missions. Our offshore operations in Mexico require short distance flights on very intensive schedules – with seven to nine landings per hour and average flights of five minutes. The perfect fit for the aircraft was the Bell 412EP Helicopter – which enable us to save costs in maintenance, training, spare parts; it made everything easier. This single-model aircraft strategy has been working great ever since."

Ing. Lobo de la Garza believes that there is no big secret to ASESА's success. "It is a bit of everything: good strategy, good people, good timing and good luck. I think that we had the right strategy and vision at the right moment." Although the fleet has been very important, Lobo de la Garza emphasized that ASESА's main asset is its people, before describing the corporate culture as loyalty, quality, and teamwork. "This business is not like track and field, where you're racing by yourself. If one of your team mates doesn't succeed in what we are doing, then the team fails," he emphasized. "We believe in long-lasting relationships with our people, that is part of our philosophy. It's a small industry, and many of the different employment options are competitors, and all our competitors are good."

After having worked with PEMEX for more than 30 years, its client's shift into deeper water also marks a turning point for ASESА. Lobo de la Garza recognizes that his fleet has to change for many reasons. "Our fleet will become bigger, with different types of aircrafts from large to light helicopters that fly farther and faster, whatever is necessary to fit our customer's needs. At the same time, we



Ing. Humberto Lobo de la Garza, Director General of ASESА



Lobo de la Garza: "This business is not like track and field, where you're racing by yourself. This business is about teamwork."

still need to provide the same service that we are providing today," he noted. "However, our biggest challenge is getting the contracts and to be aware of the environment."

Last summer the company fulfilled its first 4-month contract for a private drilling company. "While the PEMEX tenders are predominantly cost oriented, the international companies are sometimes willing to pay more for the better service. Of course, they do not want to overpay, but they are willing to pay for safety, service and quality. Our standards are very high, and international companies are willing to pay a premium for that. Depending on the level of service, quality and safety that a company wants, they may be willing to pay the difference. Our client was very happy with the service, so as we grow we'll be trying to reach that market as well," stated Lobo de la Garza.

As a privately held family company, ASESА is able to make quick decisions in times of change. Lobo de la Garza referred to the Spanish saying "Al ojo del amo engorda el caballo", which means "when the owner is taking care of the cattle, the cattle get bigger". "I believe in that, I believe that family gives strength to the company more than it weakens it, and helps us to continue on our ambitious growth trajectory," he wrapped up.



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## A poor businessman with a rich company

"Why we started? Because there was a need needed to be filled, because the importance to take care of the environment was not well defined yet in Mexico," began Juan de Dios Saint Martin. "We found that the costs of damage to the environment were not being valued properly. Based on that need, we started to design technologies and solutions to provide environmental protection services to oil fields, where the needs of the industry were easily noticeable.

In March 1993, Juan de Dios created Saint Martin Construcciones as a company with a 3 ton truck and 20 employees. Nowadays, the

company has 2,000 employees and the mission is to become the world leader in environmental protection and petroleum services.

Juan de Dios Saint Martin learned the business by working in the field, which is something that he still does and enjoys. "A good business man is someone who knows the business by heart, and certainly not someone who remains

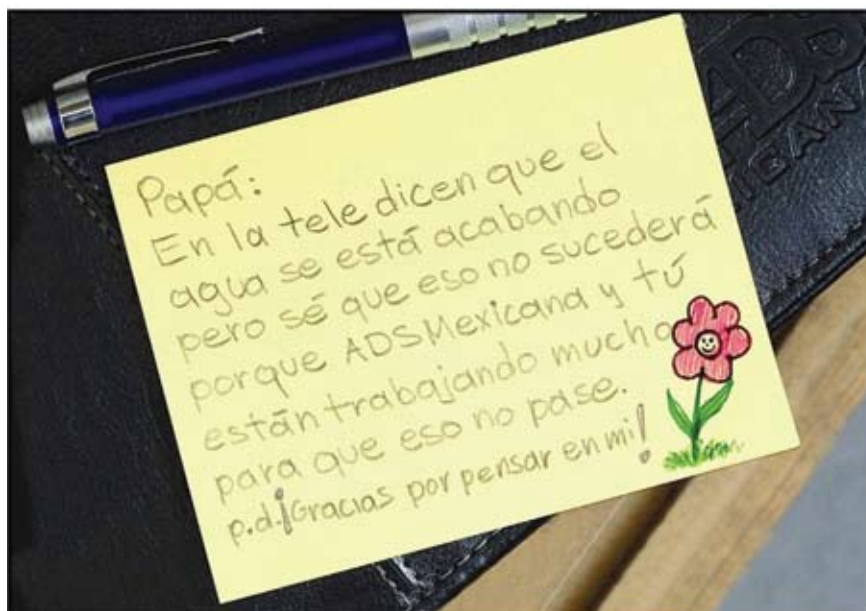


**Juan de Dios Saint Martin Zepeda, Founder and Director General of Grupo Saint Martin**

sitting behind a desk," he noted.

Saint Martin Construcciones started by offering technological demonstrations free of charge to PEMEX. The company recognized that there was a lack of knowledge of new environmental protection technologies. Through its education process, Saint Martin Construcciones demonstrated PEMEX the necessity of acquiring the high technology services that it was offering. "By demonstrating facts and figures we clearly identified that there was and still is large potential for the improvement of the environmental performance in the Mexican oil and gas industry, which will reduce costs at the same time," stated Juan de Dios.

Its initial projects were focussed on the treatment of wastewater polluted with hydrocarbons. "PEMEX's operations are divided by region, and in the south region there are 5 districts, each of which had 8 to 10 water treatment installations. PEMEX used to pay for the transportation of the polluted wastewater by trucks from their operations to the wastewater installations. After treatment of the wastewater, PEMEX needed to incur transportation cost once again to finally dispose the water, turning the process into a very costly activity. A proper management system for the treatment of wastewater was therefore an urgent need. The old fashion PEMEX method of digging reservoirs in the soil for use as wastewater storage facilities was enlarging the environmental damage. In such, hydrocarbons start seeping into the soil and begin affecting the groundwater, which increases the environmental deterioration by 50% or more. Taking that into account, we developed a system called the Ecological Patrol, which is a mobile wastewater treatment plant that is able to separate water, oil and solids," explained Juan de Dios Saint Martin. The Ecological Patrol is placed close to a drilling location from where it collects



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polluted water, which is then put into 100 m<sup>3</sup> storage containers. Subsequently, the polluted water is being treated and the clean water is stored in another tank. Once all six tanks of the Ecological Patrol have been filled, the process is repeated from the beginning.

Mexico's environmental regulations are clear about drilling activities: they must have zero environmental impact. In order to obtain clean industry certification a company must comply with government standards on 16 elements, which include such as: wastewater treatment, dark water treatment, geomembrane services, environmental monitoring (water, noise, soil and air), tank rental, and structure cleaning among others. "Saint Martin is the only company that goes directly to the field solving problems, showing a real reduction of the environmental impact," boasted Juan de Dios. "Our principal goal is to identify the special needs of the company and develop specific and unique strategies to satisfy these needs. We recently invested US\$46 million to develop the largest and best hazardous waste non-hazardous treatment plant in Latin America. Today, the plant is operating at 65% of capacity, and Saint Martin Construcciones controls 33% of the market for the treatment of drill cuttings produced in the south and marine regions. Saint Martin has treated more than 500,000 m<sup>3</sup> of wastewater and 2 millions tons of polluted soil, which has made us the company that has treated the largest amount of waste from dumping ponds throughout in Mexico. Moreover, due to the technology that Saint Martin employs, we have managed to offer PEMEX these services at the best market price in history."

By continuously searching for the best technologies available in Europe and the United States – which are then introduced in Mexico under exclusive agreements – Saint Martin Construcciones strives to keep its set of environmental services at the leading edge. "No other company in the world is offering such a wide range of equipment; we are capable of satisfying our clients' needs right away," put Juan de Dios. Also, he is full of ideas for new applications and new technologies and is planning on a long time horizon. "Great courage is needed to make progress in this business. We are reinvesting 90-95% of your total income in new services and technologies. I consider myself a poor businessman with a rich company."

This strategy is aimed at making Saint Martin Construcciones the best environmental services company in the world. However, the first target is Latin America, which is an attractive market for Saint Martin Construcciones since the Latin American countries are

15 years behind Mexico when it comes to environmental protection. "PEMEX is one of the best oil companies in the world, and a leader in Latin America, in the environmental protection field thanks to committed companies that offer the best services in the field. This is thanks to companies, like Saint Martin, that search for new technologies and invest in innovation. Without a service philosophy and social commitment toward environmental protection, having the best machinery is definitely not enough to provide a good service," realized Juan de Dios, a unique businessman who put environmental protection on the map in Mexico.

## Flow measurement in refineries

DR RA FURNESS, DipChemE PhD CEng FInstMC ISA Fellow,  
MEASUREMENT CONSULTANT



To make material and energy balances it is mandatory to be able to measure the amount of oil and gas imported and product exported in any hydrocarbon facility. This difference is the refinery loss, and world-class benchmarked installations have figures well below 0.5%. There are many ways to measure flow and these have been classified by BS EN 7405 (1991) according to the basic technology used.

I recently reviewed all the metering installations at a major South American oil refinery. The initial survey took five days and looked at crude oil and natural gas imports and then on the downstream side at refined petroleum products, LPG and heavy hydrocarbon fluids. Very many installations were orifice meter based and almost everything I saw was at least 20 years old, with the exception of one installation. PD meters require clean fluids so the station inlet is fitted with filters and air eliminators making the pipework unnecessarily complicated. Inlet lengths really should be longer, and the product quality will be directly affected by the condition of the orifice plate itself. The DP cells also require recalibration and adjustment every 30 days, making the whole installation maintenance based.

Metering stations such as those described earlier represent, in my view, the old approach to metering in refineries.

For gas measurement, vortex or ultrasonic technology is more accurate and certainly more stable over time.

However, even when a newer technology is chosen, the user needs to be careful of the design of meter offered by the supplier. Take LPG metering for example. Some bad designs and the installation actually increases the possibility of flashing (where the lighter fractions present in the LPG come out of solution). Inlet contractions where the pipe area is reduced too quickly, results that proving of this meter was very poor. Below is a modern approach where the inlet is correctly designed and pressure drop across the meter is lower.



Modern inlet mass meters used for physical applications

In general, no moving part, in-line and electronically based technologies are better than most conventional meters traditionally found in many refineries. It is quite surprising that old ideas, methodologies and standards persist in an industry where accuracy and stability is needed. The newer technologies of in-line Coriolis mass, ultrasonic and vortex give better accuracy and longer term stability and so represent better value and accuracy than DP, PD or turbine-based technologies from the recent work we have performed. Measurement standards always seem to lag behind technological advances and this lag places the user in a dilemma. Again, we can advise that new designs and recent applications are strong evidence that older design standards can be dispensed with.

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## Target Zero: safety culture as business driver

As opposed to its main competitors in the air transportation business, Heliservicio is not a family company. This is an institutional group consisting of different businesses, one of them being aviation. The aviation group is mainly focussed on helicopters; it sells helicopters, runs a maintenance centre for helicopters, and operates helicopters. The advantage we have are the economies of scale we can generate being an institutionalized group as well as the organizational structure that reduce overheads," explained Javier Garcia Bejos, Director General of Heliservicio.

Throughout its thirty years of operation, Heliservicio has accumulated over 350,000 flight hours and has grown its fleet to 30 helicopters. This fleet is a mix consisting of Bell 206s and Bell 407s, which are small single engine aircraft, and a large fleet of Bell 412s and Bell 212s. "We have the largest fleet in Mexico and one of the largest fleets in Latin America," boasted Heliservicio's Managing Director, who heads a team of 80 pilots and over 300 employees.

Heliservicio has a partnership with Bristow Group, the world's largest helicopter operator. "In our joint venture with Bristow we focus a lot on a program called 'Target Zero', which is a concept that does not tolerate any accident or incident in any part of the company. This commitment is supported by Heliservicio's ISO 9000 certification, and is the face that we show to our customers, and it is why they rely on us," emphasized Javier García. "We are building a safety culture together with our people. If not, our ambitions would only exist on paper. It is important to put people on a path to result, and the path is Target Zero."

More differences separate Heliservicio from its competitors. Javier García describes Heliservicio as a very dynamic company because it is working in all areas of the market. "We are involved in offshore transportation, onshore power line inspection and tower construction, seismic studies, and onshore monitoring of pipelines," he noted. Activities such as seismic study services pose particular challenges related to the geographic characteristics of the country. "Nevertheless, Heliservicio has a large seismic operation that relies on great pilots flying these complicated missions," underscored Javier García. "There is increasing onshore exploration activity – several companies such as COMESA are working on seismic studies in different areas – and we are supporting their activities."

Every time when there is a natural disaster in Mexico, such as the recent flooding in Tabasco or Hurricane Stan in Chiapas, Heliservicio moves all its teams to the affected areas and works together with the CFE to restore electricity. "Also, when two platforms collided in the Gulf of Mexico last October, we had the only helicopter flying there to save the lives of the people who were thrown into the water. Thanks to Heliservicio and our pilots, the lives of 40 people were saved," García mentioned with due pride. "After Hurricane Stan hit Chiapas, our pilots and helicopters were flying there for 20 days. Our people were sleeping on a mountain top, without a bed, but we were the only company with the capability to fly there, because of our mobile fuel tanks, which enabled us to save the lives of many people together with the CFE. That is hard work for the company, but thanks to the pilots, mechanics, maintenance centre and our logistics we can face those kinds of challenges. This business is not only about the market share, prices, margins and how many



Lic. Javier García Bejos, Director General of Heliservicio



Heliservicio in action in the Bay of Campeche

hours you are flying, it also is about how much you are doing for the country, for the oil, gas and energy industries and for the areas that are affected by natural disasters. Heliservicio is committed to these values. We have the helicopters and pilots who can do the job, and we are very proud of that."

Heliservicio's offshore activities are centred around its large operating base in Ciudad Del Carmen, from which it serves PEMEX and all the oil and gas companies that are working with PEMEX. "In the last few years the market has been changing a lot," recognized Javier García. Nowadays, his company is not only providing its services to PEMEX but also to the private companies that are working for PEMEX. These include companies such as Halliburton, Schlumberger, Pride International, Diamond Offshore, and Noble Drilling. "All the international companies that are working in Mexico are flying with us, because of our safety standards," boasted Javier García. "The private companies have a very strong focus on safety because they have to meet strict requirements for insurance purposes. They audit our safety procedures before flying with us, and choose Heliservicio because we are the safest company flying in Mexico. We are giving our customers a world class service, we are the benchmark."

Despite its commitment to private companies, Heliservicio considers PEMEX's growth in the coming years to be its crucial business driver, especially through its deepwater exploration projects. "These projects, which are farther offshore, will require faster and bigger helicopters with a longer range," anticipated Javier García. "Our big goal is to grow with PEMEX in the next few years, which will be crucial for the Mexican energy sector."



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## New guidelines for lifeboat servicing

The International Maritime Organisation has published guidelines on lifeboat maintenance which call for the inspections and service to be done by the original manufacturers. As the Executive Vice-President Service Division for the Umoe Schat-Harding Group – the global market leader in marine life-saving systems – David Bradley was asked whether it is true that some owners are now complaining that this is pushing up service costs. “Quite often there is a lot of catch up servicing required, so initially proper service costs after a period of neglect can appear high. But once the equipment is maintained in good condition there are cost and safety benefits for the owners,” he countered.

The Umoe Schat-Harding Group is the world’s largest manufacturer of lifeboats and davits and its equipment is installed on about 8,000 ships and a high percentage of oil rigs and offshore installations. Yet, the company rejects the suggestion that it is creating a monopoly of service stations. “Schat-Harding has invested heavily in setting up a global network of service bases which are staffed with trained engineers and which hold stocks of the correct spare parts. Today we have service facilities offering inspections and service in 60 countries, employing over 350 trained staff. That’s not a monopoly, it’s a global service network so that owners can get swift, correct serving and spares when and where they need it,” David Bradley noted. “We have supplemented that network of owned bases by entering into agreements with independent service stations which meet our standards and where we can train their engineers on our products.”

Recently, there has been a lot of discussion about the safety of on-load release hooks. We asked Mr Bradley what Schat-Harding doing to stop the accidents involving these hooks. “We have looked closely at all the incidents where lifeboats have been prematurely released from on-load release hooks and we see that in almost all cases the accidents were caused by either a lack of proper maintenance of the hooks or poor training of the crews. We believe strongly that if ship owners and rig operators follow the IMO Guidelines and ensure that on-load release hooks are serviced by the original manufacturer that will go a long way to preventing accidents. Many of the hooks in service today – there are over 70 different designs – are copies of copies of old designs and they are quite sensitive to maintenance. We have re-engineered our range of hooks to change the way they work so that they are as safe as can be. However, the crew must still know how to work them, and we believe training is vital,” he explained. “Our advice to owners is not to be seduced by promises of major changes in technology. Modern lifeboats, hooks and davits are very safe and very effective. The focus has to be on training crews to use the boats safely, and on maintaining the systems correctly. We are here to help with that, and we always hold in the forefront of our minds that our job is to save lives.”

## Great responsibility for Mexico’s market leader

Duncan y Cossio has been working in the marine business since 1974, and currently has seven service stations for life rafts and one service station for lifeboats. With these service stations – which are all approved by the Mexican Marine Authority and the US Coast Guard while its processes are ISO certified by Germanischer Lloyds – the company plays a very important role in the Mexico’s offshore safety.

In a business where training and experience are key words, Duncan y Cossio can rely on a workforce of 140 employees that have an average career length of 10 to 12 years with the company. “Moreover, the managers in charge of our service stations average 17-18 years of service, while I have been here 27 years,” boasted Alejandro Montañez Luna. He was appointed as Director General by Duncan y Cossio’s owner, Mr Alfredo Sierra Diaz, who has made large investments in Ciudad del Carmen, where Duncan y Cossio has service stations for life rafts and lifeboats in the Puerto Pescadero Laguna Azul.

From this operational base, Duncan y Cossio has gained at least 85%

of the life raft business in Mexico and developed a dominant position in the market for life boats. In a market where both domestic and multinational competitors are operating, Duncan y Cossio’s strong position is supported by a rule that is enforced by the International Marine Organization: if you are trained by a certain manufacturer, then you are allowed to represent, service and offer maintenance of their products; otherwise, you are not. “This policy is strictly followed by the Mexican authorities. Therefore, there is a kind of peace in the market,” confirmed Alejandro Montañez.

In this environment, Mr

Montañez has witnessed a gradual change in the mindset of the people in PEMEX over the last 10 to 12 years. “Mexico is a signatory country of the International Marine Organization convention SOLAS, which stands for Safety of Life at Sea. Mexico follows these resolutions, which has made PEMEX much stricter in the marine safety area as the company follows its rules for safety standards on platforms, ships, and services,” he explained.

“At the same time, PEMEX has been working with an increasing number of international service providers, and has to meet or exceed the safety level of its partners. Also, the new drilling companies that arrived in Mexico in the last four years – including Pride International, Noble Drilling, Diamond Offshore, Nabors Drilling – have given us a lot of work in life rafts and lifeboats after they realized that a Mexican company can offer the same quality as the American companies,” recognized Alejandro Montañez. “This increase in work has been good for Mexico, while the fact that PEMEX is getting better every year is good for our business.”



**Alejandro Montañez Luna, Director General of Duncan y Cossio**



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## Big thinking precedes big investment and big achievement

Oceanografía, which not surprisingly is Spanish for oceanography, will celebrate its 40th anniversary in 2008. "My father started the company as a survey engineering group, conducting the first pre-lay surveys and oceanographic studies for the construction of platforms in the Tampico/Tuxpan area," stated Ing. Amado Yañez Osuna, Director General of Oceanografía. "In addition to its primarily positioning as an engineering survey company, Oceanografía was the first diving contractor in Mexico. In the 1970s, when the Mexican offshore industry slowly started developing, my father bought the first diving system and became one of the pioneers of the development of this industry in Mexico," he added to illustrate some of the major milestones in the history of this family business.

Since 1990, when Amado Yañez joined Oceanografía, the company began developing as an integrated offshore service provider, investing in a wide range of assets, both vessels and equipment, offering the latest technology. Other achievements that Mr Yañez takes pride in include

the introduction of differential GPS to the Bay of Campeche, and the fact that Oceanografía was the first to execute a Mexican flag building program, which means that the vessels it builds have been Mexican flag since the start of the construction phase. Moreover, Oceanografía brought the most modern diving support vessel into the Bay of Campeche and has been designing and building its saturation diving units locally. "Furthermore, we entered the construction business of pipe-laying and acquired one of the elite pieces of equipment in the world, which is the LB801, a lay barge that made us a more consolidated group," added Amado Yañez

Eighty percent of Oceanografía's revenue is currently based on pipeline construction services. "We have integrated our services in this field, ranging from the construction of pipelines to inspection, maintenance and repair," noted Ing. Yañez. "We are specialized in everything related to sub-sea pipelines and infrastructure, and possess state of the art technology, ROVs and saturation diving systems, Dynamic Positioned DSV vessels which are all have been designed and purposely built to suit the existing and expected future needs of our core market. Also, we are proud to have the largest fleet of Mexican Flagged Construction ships manned and operated by Mexican personnel."

Following its tremendous growth and development over the past decade, Oceanografía has been forced to embark on an intense process of institutionalization to transform the company from a family owned business into a corporation. However, the quick decision making ability that characterizes most family owned businesses is carefully preserved in this process. "We are strengthening the com-

pany in all areas to become highly competitive in the international market and take advantage of the opportunities not only in Mexico but also in other countries that are very active in this field," confirmed Ing. Yañez. "Worldwide we look at leaders in our sector like Oceaneering and Caldiva, who we consider to be the frontrunners. In Mexico, companies like Cotemar and Grupo Diavaz are leaders in our market too, so we look at them as good competitors."

Amado Yañez believes that PEMEX has the potential to become the next big story in the international oil and gas industry. "All the ingredients are there and I feel very positive about PEMEX's future, which is the main reason why we have made very large investments in assets. Right now we have ten vessels under construction and we feel that this approach enables us to provide our clients with a very safe and efficient offshore service. I think that is one of the key components of our success," he stated. At the same time, Yañez is trying to develop Oceanografía into an international company. "We try to envision what our clients need and move aggressively to be ahead of our competition," he emphasized. "We hope that our ambitious

building program of high tech vessels will position us as a frontrunner in the service industry."

In anticipation of future opportunities as PEMEX is moving into deeper waters and more challenging circumstances, Oceanografía is developing its fleet to be able to operate in up to 3000 meters of water depth. "Some of these new generation vessels will be entering our fleet in the middle and end of 2008, after which their crews will then start getting acquainted with the deepwater capabilities. We



Ing. Amado Yañez Osuna, Director General of Oceanografía, posing with a miniature of the vessel 'Goliath'.

are also working with the suppliers and manufacturers of deepwater equipment like ROVs and cranes to start learning more about the newest and most suitable technologies for Oceanografía's current and future client needs." Flagship investments currently include the "Goliath" and "Sampson", both US\$250 million vessels crane construction vessels that will rank among the premier offshore construction vessels in the world. The Goliath, a 180 meter long vessel with fixed lifting capacity of 1600T, is scheduled for completion in July 2008. "This is a big investment and securing work for these vessels is a priority," emphasized Ing. Yañez. "It is our goal to have contracted employment for all the vessels upon delivery from the shipyard. We believe that the projected developments of PEMEX in the offshore sector will keep our fleet occupied. At the same time, Oceanografía will continue its efforts to gain a larger international presence to obtain the capability to put its fleet to work in other markets. Our dedication and first priority is Mexico, and PEMEX has always been our best and core client. However, Oceanografía and its Mexican labour force have to operate like an international company that can be competitive in other markets, that has to be our new mentality."

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## Coupling critical mass and cost competitiveness

"If you want a brand new helicopter today, you have to pay for it today and it will be delivered in 24 months. At the same time there are no helicopters available for short or long term leases, and the prices in the second hand market are higher than in the market for new helicopters," Enrique Zepeda started explaining the key challenge that Pegaso has been facing in 2007. As any company, Pegaso tried to get more helicopters to compete for more contracts, and managed to add two helicopters to its fleet last year.

The highlight of the year for Pegaso's Managing Director was the successful participation in the tender for the renewal of its main PEMEX contract that took place in September. This US\$80 million, five year contract that Pegaso secured in September 2007 covers six helicopters of its fifteen helicopter fleet. At the same time, Pegaso has dedicated four helicopters to servicing the offshore operations of private companies including Halliburton, Schlumberger, Cotemar, Nabors Drilling and Diamond Drilling.

The utilization of the fleet working for PEMEX is higher compared with the private companies. "You are not allowed to have aircraft on the ground, the contracts are not flexible enough to allow using different aircraft from those exact ones contracted, which makes maintenance challenging," stated Zepeda. On the other hand, the private companies require a maximum quality service, but allow us to change the helicopters for maintenance operations. Neverthe-

less, due to the high utilization requirements, the largest return on investment is derived from PEMEX contracts."

In 2008, Pegaso will add another three helicopters to its fleet, which Mr Zepeda strives to put to work under contract to PEMEX. In a perfect world, we would be having 14 helicopters working for PEMEX in 2008. This month, a contract for three helicopters that is currently owned by Pegaso is coming up for tender. Winning this contract once again will be crucial in achieving Enrique Zepeda's ambitious future plans.

Pegaso continues to concentrate on the 9 passenger helicopter market, a niche market in which Mexico's smallest air transportation services company can outcompete its competitors based on cost advantage. "I have always been trying to have the most efficient helicopters and the most efficient operation, but if PEMEX requires larger helicopters in the future I might acquire them," explained Zepeda. "In this business you need to have critical mass to be competitive. If you are too small, everybody will eat you alive, but Pegaso is now large enough to compete on a level playing field. We are going to catch our larger competitors; that is just a matter of time."



Enrique Zepeda Navarro, Executive Director of Pegaso Air Transportation



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