PUNJ LLOYD update

celebration of the environment

greentech award

This year Punj Lloyd won the prestigious Environment Excellence Award in the engineering sector. At all our project sites we ensure that nature does not bear our footprints. The focus is to leave a better world for the future. Greentech Foundation, New Delhi, India, is a non-profit organisation promoting industrial safety. Greentech awards are coveted for environment management, pollution-control and eco-tourism.

Our pathbreaking work on the Belgaum Maharashtra highway project won us accolades.

Air pollution reduction

- Material was loaded at speed to minimise dust
- Water was sprinkled at haul roads and crusher plants
- Breathing husks were used to control cement emission
- Stone crushers were placed away from dwellings
- Hot mix plants were provided with dust collectors at the exhaust point
- All equipment and vehicles were regularly maintained

Water pollution reduction

- Drainage systems were innovatively designed
- Oil, grease and HSD were stored on impermeable flooring
- The stone crusher was installed away from water bodies
- Precautions were taken to prevent debris from falling into the river or other water bodies

Soil conservation and contamination prevention

- Borrow areas were selected from non-productive and raised land with soil heaps
- Borrow and quarry areas were closed, graded and provision made for drainage of run-off water

Energy Conservation

- The project was completed five months ahead of schedule,resulting in a saving of non-renewable natural resources
- Low Nox burners were used in hot mix plants to reduce fuel consumption
- All camps and offices were fitted with high efficiency and low energy consumption fluorescent lights. All EXIT signs were displayed in florescent tape

Noise pollution reduction

- Silencers, mufflers and noise barriers were fitted on all equipment

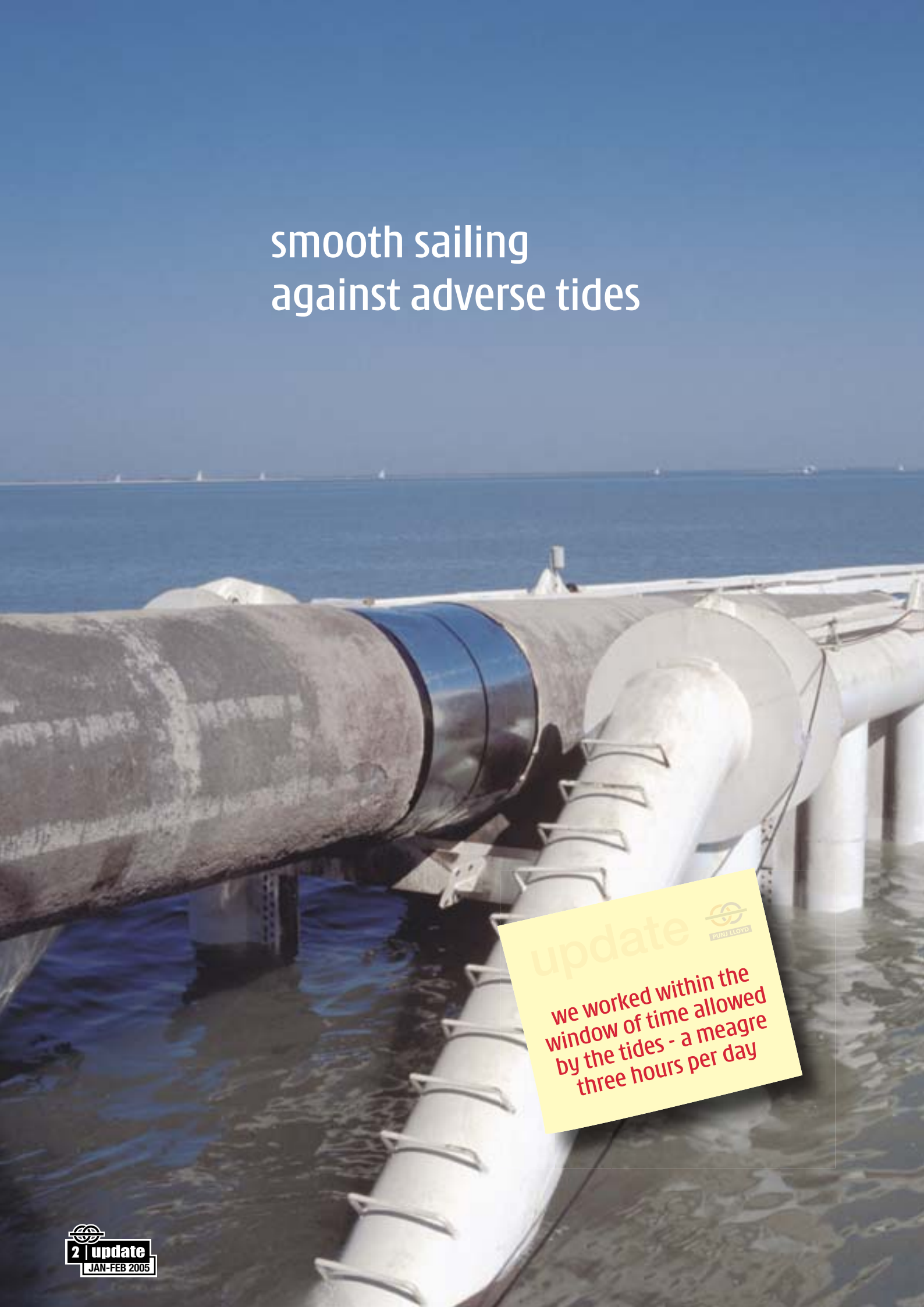
Green Belt Development

- More than 26,000 trees were planted and 368,000 m^2 of grass turfing were laid on road embankments
- Neem, Mango, Shisham, Babul, Shivan, Bel and Ker were planted along congested, urban areas. These trees absorb noise and air pollutants

The award received by Malvinder Singh, *GM Civil Construction*, was presented by Rakesh Nath, *Chairman* of Bhakra Beas Management Board. The award is testimony to our commitment for the environment and Punj Lloyd is inspired by the recognition provided by Greentech Foundation.

◆ Praveen Puri

smooth sailing against adverse tides



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gujarat adani port

To develop the Mundra Port in Gujarat, a joint venture between the Govt. of Gujarat and Adani Port Ltd. was formed. Valentine Maritime (Mauritius) Ltd. awarded the sub-contract to Punj Lloyd for the construction of 48" dia offshore pipeline, 1 km from the landfall point to KP 1 offshore.

Inter tidal pipelaying is a special skill, requiring experience. Punj Lloyd has laid pipelines in tidal flats, Effluent Outfall at Dahej and nearshore in Indonesia.

The statistics of this pipeline is what makes it remarkable. The diameter of the pipeline including concrete coating is 56". Each pipe of 12 m length weighs 27 T. Pipestrings of six pipes each, with a compound weight of 162 T were fabricated at landfall point and then transported offshore during low tide.

The entire length of the pipeline stretch is in the sea. Therefore we worked within the window of time allowed by the tides. The work ceased at high tide, only to be resumed during the next low tide. As a result the time available to us to transport, lay and weld pipes on the seabed is a meagre three hours per day. Shore pull arrangements including installation, civil work, construction of piles were handled by us.

Special Challenges

- each 56" dia concrete coated pipe weighed 27 T
- 30 joints welded in the inter-tidal region
- tie-in joints worked within three hour cycle of low tide
- pipe thickness 20.6 mm
- special joint protection clamp designed indigenously to protect semi-finished joints against seawater
- weld procedures pre-checked in simulated site conditions

update

achieved 156,000 safe man-hours

To prevent water from seeping into the joints between high and low tide, we designed a clamp indigenously to keep the welded joints absolutely dry. Underwater tests on the clamp were conducted and found watertight.

A crucial operation, the

update

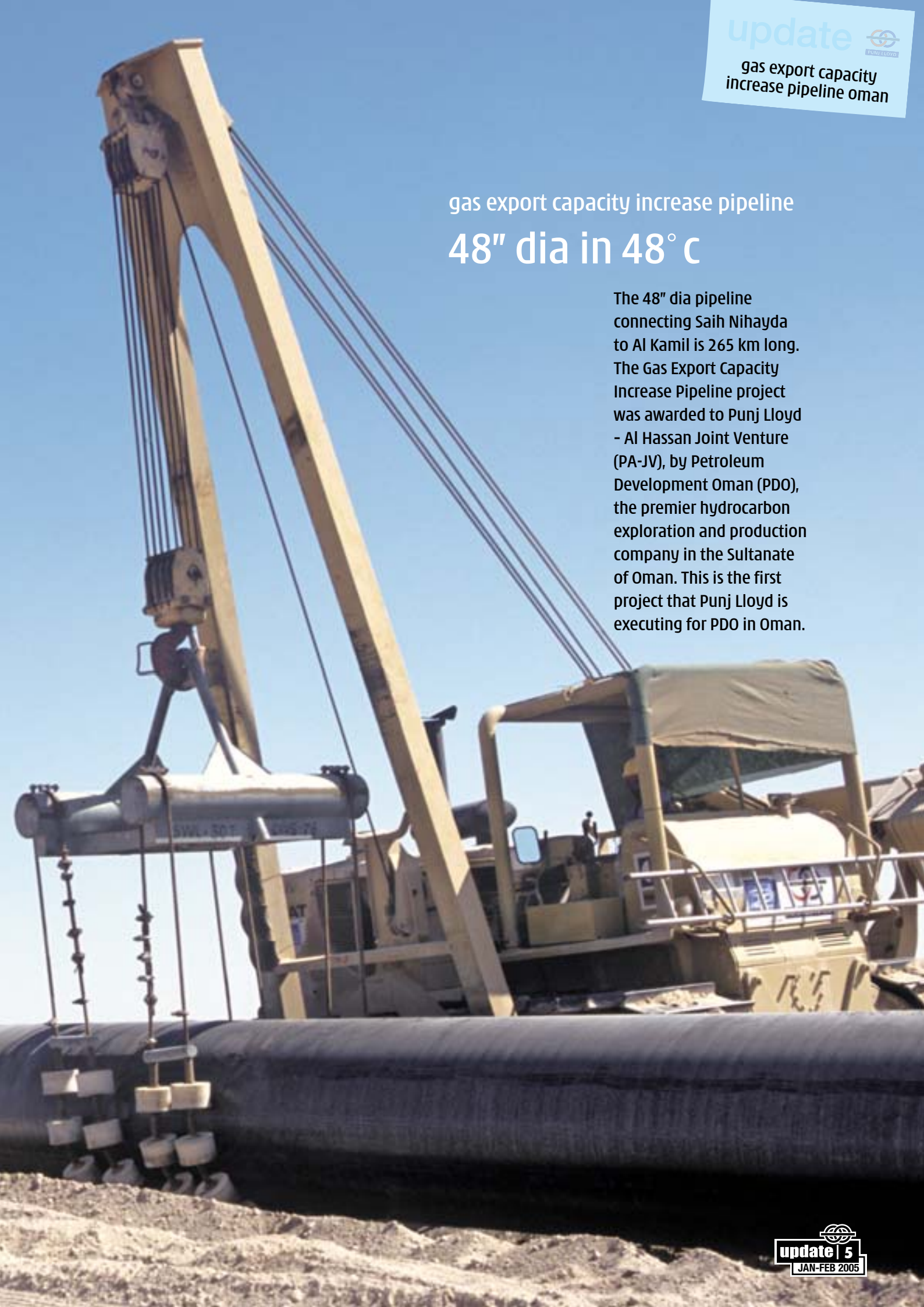
56" dia concrete coated pipe

Tie-in of pipelines can take anywhere between 8 to 24 hours. On this project, it proved to be a challenge.

After the pipelaying operation, 18 excavators were deployed to ensure the pipes were buried. This is called burial by post trenching process.

With the successful completion of the 48" dia offshore pipeline, Punj Lloyd has added to its onshore offshore pipeline portfolio.

◆ Vikas Thakur



gas export capacity increase pipeline

48" dia in 48° c

The 48" dia pipeline connecting Saih Nihayda to Al Kamil is 265 km long. The Gas Export Capacity Increase Pipeline project was awarded to Punj Lloyd - Al Hassan Joint Venture (PA-JV), by Petroleum Development Oman (PDO), the premier hydrocarbon exploration and production company in the Sultanate of Oman. This is the first project that Punj Lloyd is executing for PDO in Oman.

Improvisation of equipment at oman

Aluminium gauge plate is used extensively for gauging pipe bends. In the 48" dia Gas Export Capacity Increase Project the pipes have an internal coating of API RP 5L2.

This coating was being damaged due to the aluminium plate grazing against it. The diameter of the gauge plate was 95 per cent of the pipe internal diameter with a thickness of 10 mm. Passing this 70 kg gauge plate through a pipe bend without scraping the internal coating was a challenge.

To counter these problems, Punj Lloyd engineers improvised by fixing wheels at 120° in a triangular fashion on the outside of the aluminium plate. A clearance of 5 mm made it impossible for the gauge plate to touch the internal surface of the pipe. With the wheels, movement became light enough for one person to handle. This display of ingenuity was appreciated by PDO.

Punj Lloyd participated in an on-line bid for the first time, with detailed backup calculations, planning and risk assessment.

The project was won against tough, international competition, in which only a select few reputed and experienced companies were pre-qualified to bid for this prestigious gas pipeline. The large dia proved to be a deterrent to many.

The 48"dia pipeline links the Central Processing Plant at Sai Nihayda Gasfield in central Oman to the Oman Liquefied Natural Gas Plant at Qalhat, near Sur Port. This pipeline will feed the third LNG train and meet the requirements of Kamil Power Plant and Oman India Fertiliser Plant.

Oman's considerable natural gas reserves make it a cost effective and clean energy source for its industries. Therefore, tapping this resource will give a major impetus to the industries of Sur, serve the needs of domestic consumers and provide an environmentally benign alternative.

The pipeline route is through desert and rocky terrain with rivers, valleys or *wadis* as they are called in local parlance. During construction, a very important archaeological consideration is to protect the subterranean canals carrying potable water hundreds of miles from their place of origin. These are called *falaj* in Oman and are believed to be between 1000 to 5000 years of age. During our work on the pipeline, we will be crossing eight such *falaj* with extreme caution. These are underground structures and form a part of an age-old system. Each *falaj* crossing is executed by a unique method, since each one is different in location and depth, which can vary upto 22 m deep. It

update

gas export capacity increase pipeline oman

update

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HSE achievement for oman

An HSE assessment for 48" dia Gas Export Pipeline Project was conducted in Dec 2004 by PDO.
A presentation was made by Project Manager, Amit Kaura on the management of HSE aspects of the project, followed by a documentation audit.

Our performance was appraised as 'good' with a high rating of 3.3 out of 4 (82.5 per cent). This is a record score among all PDO operations (well operations, drilling rigs, oil & gas processing units and pipelines) and other contractors.

The Joint Senior Management Assessment Team of PDO, commended Punj Lloyd on its efficient use of HEMP tool and elimination of hazards by deployment of latest technology. Special mention was made of our commitment to the environment.


Certificate of Achievement

This certificate of achievement is awarded to
PUNJLLOYD and AL-HASSAN
Joint Venture

1 million safe working man-hours
3 million safe kilometers driven
as of 03 DEC 2004

ABDULLAH AL-SHUELY
GAS MANAGER


48" dia
gas export capacity
increase pipeline

PUNJ LLOYD

update


update
environment
friendly and safe
technology

warrants seeking special permission from statutory authorities like Ministry of Agriculture and Fisheries, Environment and Water Resource, Local Municipality and others, before commencing the crossings.

In accordance with our worldwide policy, we make every effort to train and develop the local manpower to a level that they become a legacy and an invaluable asset not only for our company but for the country itself. At the start of the project, a 30 per cent 'Omanisation' target was set but it has exceeded and now stands at 38 per cent. This achievement has been highly appreciated by PDO and other authorities. In addition to the direct recruitment of local manpower, we hire Omani contractors to work for us. This is in line with our Community Development Policy. Such policies have helped us bring together staff from 11 countries at our site in Oman.

Safety is of paramount importance to us. Every workman undergoes a safety induction programme before being mobilised to site. Transportation of men

update

gas export capacity increase pipeline oman

update

one million safe working hours and three million safe kilometer driven

and material is a high-risk area. Experienced and knowledgeable 'Transport Safety Officers' are part of our project team. They make Journey Management Plans and keep constant contact with the vehicle enroute. Night driving is not permitted as a part of Project Safety Plan. Line pipes numbering 14,000, each weighing 7 T have been safely transported over a distance of 350 km in Oman. PDO has awarded us one million safe working hours and three million safe kilometer driven certificates in recognition of our efforts.

Technology we work with...

Environment friendly and safe technology were introduced in Oman. They enhanced the speed of activities and helped cut costs. Some of these are mechanical trenching, vacuum lifting, automatic welding and automatic method of non-destructive testing of welded joints called Automatic Ultrasonic Testing.

Trenching

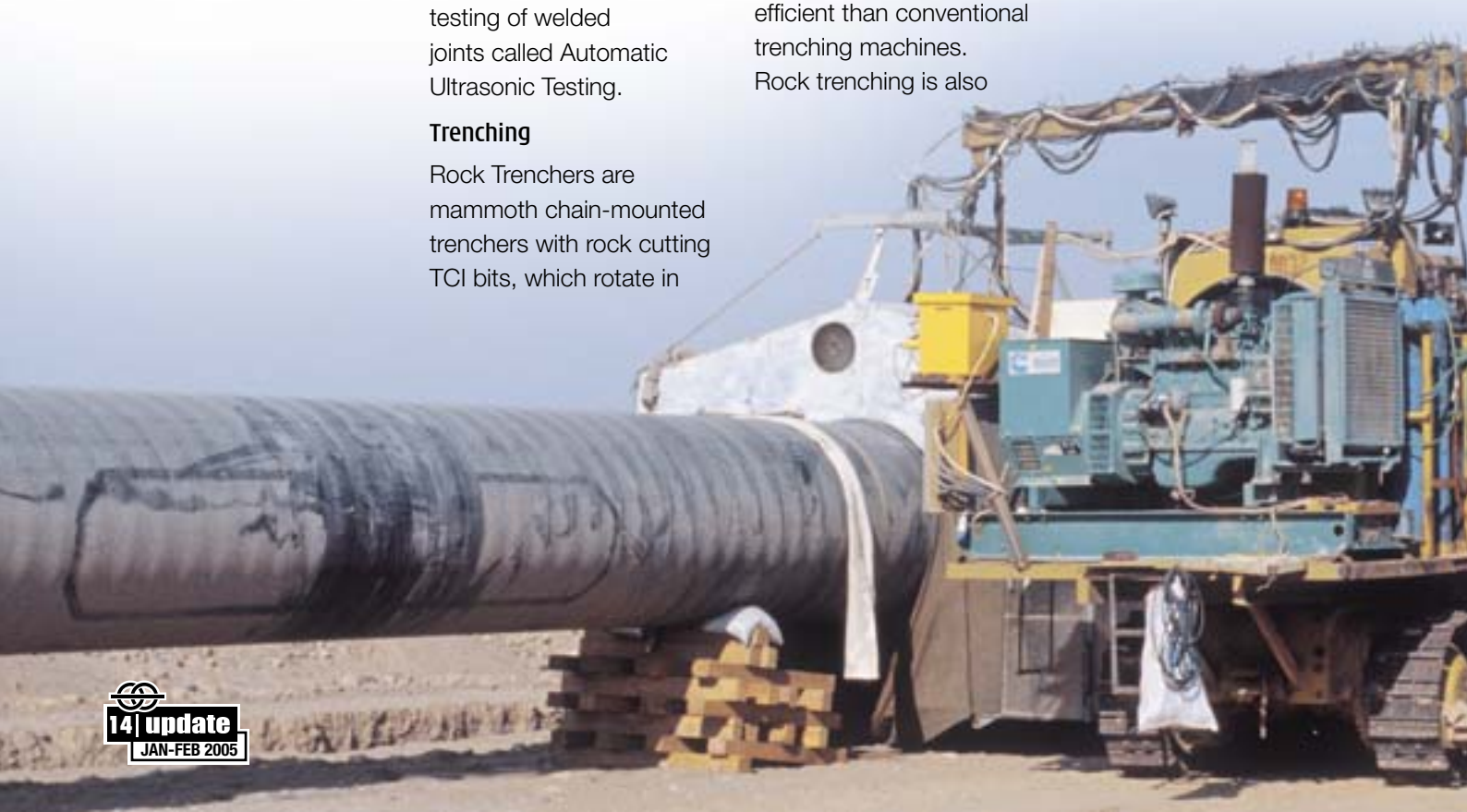
Rock Trenchers are mammoth chain-mounted trenchers with rock cutting TCI bits, which rotate in an elliptical cycle, cutting the soil and rock beneath. They excavate hard rock and rocky strata without blasting, thereby reducing noise, vibration and dust pollution considerably. The trenchers are able to crush rocks to very small pieces and dig a perfectly rectangular trench. They are faster and more efficient than conventional trenching machines. Rock trenching is also environment friendly as it helps to recycle trenched material for padding. It is also much safer than conventional trenching.

This method requires less manpower as compared to conventional blasting and excavation. Only three people – the Trencher Operator, Banksman and Surveyor were required for this operation.

Rock trenchers maintain the required depth and profile of the trench, which has a smoother finish. Use of rock trenchers has eliminated hazards associated with blasting. So far 165 km trenching has been completed without blasting.

Vacuum lifting

This method of pipe lifting, unloading and pipe stringing is based on the principles of vacuum application, as its name suggests. The vacuum



lifting machine lifts and holds pipes with a vacuum of 0.6 - 0.7 kg/cm^2 and places the lifted pipe at the stringing location, with its ability to rotate 360º. Application of this technology not only reduces safety hazards but also saves time.

Automatic welding

Welding of pipes is carried out by semi automated machines, which are controlled by inputs given to the numerical logic controller. It comprises three main units - Internal Welder, Hot Pass Welding Bug and Filler Capping Welding Bug.

We carried out hundred per cent root welding before releasing an internal pneumatic clamp. Internal welding eliminates root defects to a great extent. The number of welding heads depends on pipe diameter and production requirement. A complete root bead is deposited in less than a minute.

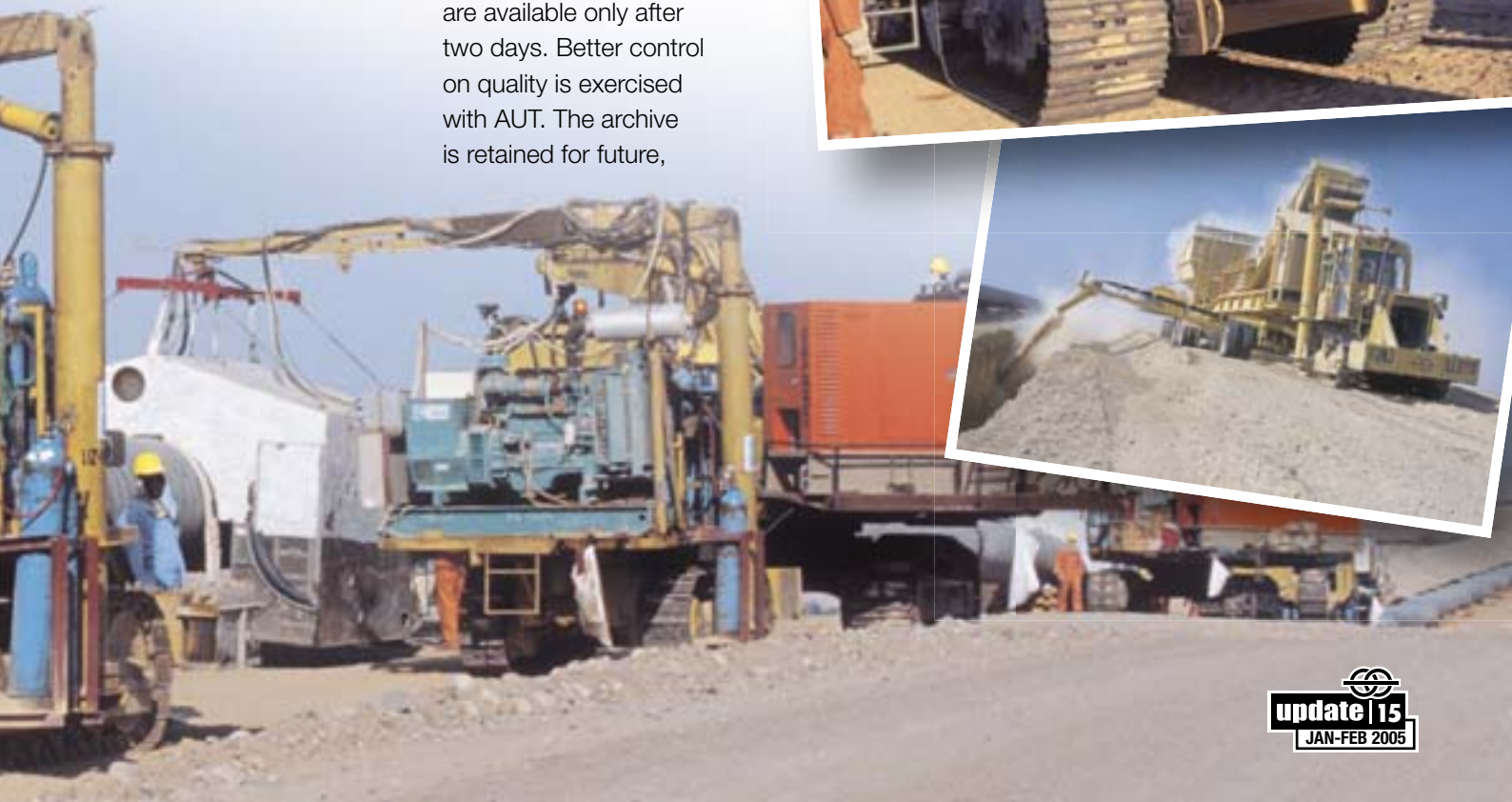
The primary advantage of this technology is that productivity of welding per day is doubled or tripled, saving man-days. In automatic welding, since the filler wire is continuously fed for fusion, there is no wastage of material. This ensures reduction in waste generation. As the technique requires very little human supervision and the process is semi automatic, occupational hazards are reduced considerably.

Automatic Ultrasonic Testing (AUT)

AUT is the technology to inspect weld joints online. The advantage with this method is that the results are known immediately as this is a back to back activity with welding, unlike conventional radiography or X-ray inspection, where results are available only after two days. Better control on quality is exercised with AUT. The archive is retained for future, unlike radiography where developing, storage and disposal of radiography film pose environmental hazards.

Work on the pipeline progresses on schedule and when the project is completed, Punj Lloyd will be a part of the realisation of the infrastructural dreams of another great country.

◆ Amit Kaura



community concern

At Punj Lloyd our emphasis is for the local community we work with, improving their lives, adding to their skill sets, making it easier for them to earn a decent living. The project in Oman has a unique environment, diverse people and varied landscapes. The project passes through different settlements and local communities. Challenging terrain comprise sand dunes, small hills, Mosques, archeological sites, farms and Al Saleel reserve forest on either side of the 265 km pipeline route.

We have come across two types of communities along our ROW. The conventional village community, settled permanently at one location. Sustaining their lives by cultivating farms, growing animal fodder, vegetables and dates, rearing cattle, goats, sheep and camels. Some of these camels are reared for commercial purposes and are used in camel racing.

The *Bedouin* community have an interesting and unconventional lifestyle. They are nomads and put up temporary settlements, wherever they decide to stay. *Bedouins* depend solely on their livestock and do not cultivate land. Along the pipeline route many temporary settlements have come up. Interestingly, they live as independent families in the vast desert, their homes like makeshift sheds. They do not build their temporary homes close to each other, like the Indian *Banjaras*. Again unlike their Indian counterparts, they own cars and SUVs for transportation. Theirs is a patriarchal society and the local *Sheikh* is the tribe leader. They are very hospitable and offer *kazur* (dates) and *kawa* (black strong coffee without sugar) to their guests in traditional style.

While working on our pipeline, our endeavor is to ensure that their life is not disrupted in any way. We teach them new skills and offer them employment at our sites. As a result these communities are happy to work with us during the project and become a part of our global workforce.

According to company practice, we have hired Omanis as Community Relations Officers (CROs) and through them have developed relationships with the local community. We have informed them how this project will benefit their country and community. All interaction between the local community and the project team are handled by the CROs with the help of the Local *Sheikhs* and *Walis*, who are Governors for the *Wilayats* (Districts).

We have employed Omani drivers, security personnel, unskilled, semi-skilled and skilled workers to carry out activities on the pipeline, such as stringing, welding,

joint coating. We have also provided business opportunities in the form of sub contracts to Local Area Contractors (LAC) and Local Community Contractors (LCC). Some of the challenges faced are the barrier and the difference in work culture. Our dedicated CROs and project team are hard at work to achieve success.

Upliftment of any community anywhere is incomplete without the full and enthusiastic participation of the women folk.

Our commitment to the cause of women is apparent in a first time experiment undertaken at Oman. We have hired local community women as the 'Ladies Patrol Team' to patrol the open trench and ensure that no livestock or people fall into it. This venture has earned us appreciation by PDO, our client.

These ladies patrol the ROW in their traditional local costume, educating local residents of safety hazards.

In Oman, as elsewhere on our sites worldwide, we can truly boast of our multicultural workforce.

◆ Subramanian Ramesh Sivathanu

KIOGE, Almaty 5-8 Oct 2004

KIOGE has been organised for the last 12 years in Kazakhstan and has come to be recognised as the best exhibition for the Oil & Gas sector in and around the Caspian region. Every October, representatives from the best companies participate in the KIOGE Exhibition and Conference. Last year over 400 international and local companies from 35 countries participated.

Punj Lloyd Kazakhstan participated in this exhibition. The corner stall was designed to project our commitment to build infrastructure in Kazakhstan. Each panel told a part of the Punj Lloyd story and the sequence gave an overall picture of the company. Some panels carried photographs of our expertise in extreme weather conditions in snow and under the scorching desert sun. Others spoke of the large equipment fleet owned by Punj Lloyd. Some panels portrayed our HSE concern while others spoke of our renowned partners. Ashok Bakshi, J K Dhar, Atul Sharma welcomed visitors at the PLK stall. Kyz-Jibek Bukarova and Sabina Syzdykova from PLK helped them.

Punj Lloyd's participation was appreciated by Timur Kulibayev, First Vice President and other senior officials from Kaz Munai Gaz.

We had representatives from KBR, TCO (TengizChevroil), Nelson Resources, Stroy Trans Gaz, Lukoil, Saipem, Agip, Kaz Trans Oil among the 250 visitors.

The exhibition highlighted the presence of Punj Lloyd in Kazakhstan Oil & Gas industry, with practically all key people visiting the exhibition.

◆ Atul Sharma

MSQ upgradation site

Indian Oil Corp. *CMD*, M S Ramachandran and *Director*, Jaspal Singh during their visit to the Haldia Refinery in February 2005. The Chairman commended the safety precautions of Punj Lloyd at the MSQ Upgradation site. Started in January 2004, the project is scheduled to be completed in May 2005.

project exports promotion council award

Consecutively for two years, Punj Lloyd has received the prestigious project exports award from the Project Exports Promotion Council of India.

In 2003, the award recognised our achievement in breaking new Geographical Boundaries. In 2004, we were awarded for 'Maximum Overseas Construction Contracts Secured and Foreign Work Secured in New Areas'.

All organisations which export projects overseas are members of the Council and automatically compete for this prestigious award. It is a matter of great pride to have won this award for the second time against competition from other players in the field.

The award was received by V K Kaushik, *Joint Managing Director* and *Chief Operating Officer* of Punj Lloyd. ◆

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