9.6.2004 | Corrosion protection under difficult conditions

Biggest coating contract at the gas liquefaction plant in Bintulu Sarawak East Malaysia

The biggest-ever corrosion protection contract in the history of the liquefied natural gas plant owned and operated by Malaysia LNG (MLNG) Sdn Bhd, Bintulu, has been placed with SAPK, a joint venture comprising AstelPeiniger Malaysia (subsidiary of Gelsenkirchen, Germany, based Peiniger International GmbH) Sumatec Sdn Bhd of Kulala Lumpur and local Bintulu contractor Kumus Sdn Bhd. In the context of a general overhaul of two of its production modules, plant owners MLNG, a subsidiary of the Malaysian petrochemical group Petronas, commissioned corrosion protection work involving 200,000 square meters and the assembly of around 350,000 cubic meters of working scaffolding. Bintulu's output of 8.1 million metric tons of liquefied gas per year makes it the world's-largest LNG Complex. Bintulu is located on the north shore of Sarawak (East Malaysia) on the island formally known as Borneo.

The maintenance work will significantly extend the service life of the 15 to 20 year-old Modules 2 & 3. This project is an additional order for the joint venture (SAPK). In August 2002 it was entrusted with revamp and rejuvenation works to module 1 in which during the shutdown of module 1 new coating systems were applied to the complete area of module 1 and, to a lessor extent, fire protection coatings. The project also included a considerable amount of scaffolding work.

On the current project, the maintenance shutdown lasting 140 days for each module, module 2 being completed this year and module 3 next year. During the shutdown period, a total of about 400 to 500 employees and sub-contractors of the joint venture will be on site performing corrosion protection, scaffoldwork, passive fire protection application, steel rejuvenation and metalization works. The scaffolding which is provided by SAPK is for all the trades involved in the shut down works and is not limted just to SAPK's works – including not only the corrosion protectors, but also the companies responsible for insulation, fire protection and electrical and mechanical work. Like any industrial plant and even more so on an LNG plant, the multitude of pipe bridges and structural steel makes scaffold erection a genuine challenge. Although there has to be access to all the plant elements, the scaffold's standing time has to be kept as short as possible to cut costs. To compound matters, the scaffolds have to be given a dust-tight enclosure. All scaffolding used on site is British Standard tube- and fitting-type which is the most adaptable for use on these type projects.

Missing the monsoon

Prior to coating application, all steel surfaces are cleaned using abrasive high pressure blasting techniques, using Garnet as the blasting medium (as this is an inert material which will not spark and be an explosive hazard in the plant). Special safety precautions have to be taken to protect the laborers and the environment, as the old coating contains lead based paints. All the workers wear protective suits and dust masks while the scaffolding is enclosed in such a way to prevent the dust from the blasting operation escaping into the environment. Garnet, a natural mineral, is the chosen abrasive that can be re-used several times and is passed through a recycling machine to remove any lead dust content prior to it being re-used

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or disposed of. “We are carrying out part of the work outside the shutdown period due to the tight schedule,” explains Alistair McDonald, Project Director for SAPK and Operations Director for Astel-Peiniger Malaysia Sdn Bhd. Once the blasting process has been completed, all the waste is collected and sent to the garnet recycling area to remove any lead content with the dust and remains of the old paintwork being separated – during recycling. After a laboratory test to ensure compliance with the strict exposure limits for heavy metals, the recycled abrasive can be used again. The lead contaminated waste is then disposed of as hazardous industrial waste by a special contractor.

In readiness for the new protective coating, the workers apply an inorganic zinc primer coat a mid coat followed by a polyurethane top coat which is coloured as required by the specification. There are altogether ten different coatings systems in use. The weather conditions are closely monitored. “Shutdowns are never during the monsoon period between October and February,” adds Alistair McDonald. “The climatic condition are closely monitored by the Quality Control Inspectors during all blasting and coating activities to ensure the paint material is applied as per the paint suppliers specification. This can at times be difficult due to the high temperatures and humidity encountered in Bintulu, it is a tropical rainforest enviorment”. During the pre-shutdown period, which includes the monsoon months, all the working scaffolds must be moved from the completed section of the plant to the next one to be reassembled there. The first section is already coated, the next shutdown period is scheduled to start in June. By then all the scaffolding must be erected for the areas to be worked during the shut-down as there is limited time to erect and re-locate major scaffolding stuctures.

Knowing how

The safety guidelines demanded by MLNG are extremely exacting for the companies involved, with special attention being paid to compliance with strict quality standards. Kumus, one of the joint venture companies – a local firm specializing in corrosion protection and scaffold erection – is therefore having its employees trained beforehand by Astel Peiniger. For each coating system, the application conditions and precisely specified minimum coat thicknesses have to be observed, the latter being checked during acceptance by MLNG. All the work is to be carried out by local workers from Sarawak in order to increase the group’s acceptance in the local population by providing jobs. Anyway, the Malaysian climate is difficult to cope with for anyone who isn’t used to it. The humidity can be as high as 95 percent during the rainy season, and the outdoor temperatures range from 30 to 38 °C throughout the year.

The fact that, according to regulations, the temperature during work in the enclosed areas must not exceed the 50-degree mark also demands adaptability from SAPK. To assist with maintaining the enclosures at a workable temperature, fresh air is blown into using large fans and air purification equipment. The wearing of cool air feed masks by the blasters is essential to ensure their confort as they can be working for up to 3 hours at a time in the high temperatures. “Our workers safety and protection is of utmost importance to us and our client”, stresses McDonald. Monthly check-ups for all the persons on site, with monitoring of blood lead levels, are carried out in line with the legislation in place. Throughout the project, flexibility is demanded of the employees of the joint venture, as unscheduled delays in the work of one of the upstream trades can always occur during maintenance projects of this magnitude.

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