

ARTICLE TAG Measurement, Standards, Heavy Industry



Feeling The Force: Singapore's Newest Test Facility

IAA INTERVIEWED **DR THOMAS LIEW**, EXECUTIVE DIRECTOR, NATIONAL METROLOGY CENTRE; **LEE SHIH MEAN**, SENIOR METROLOGIST, NATIONAL METROLOGY CENTRE; **SIM SEM PENG**, CHAIRMAN, MALAYAN DACHING; AND **ELTON TONG**, SERVICE MANAGER, MALAYAN DACHING, ON THE RELATIONSHIP BETWEEN MALAYAN DACHING AND A*STAR IN SETTING UP SINGAPORE'S FIRST 20 MN FORCE MEASUREMENT FACILITY. BY **MARK JOHNSTON**

(l-r) Lee Shih Mean, Dr Thomas Liew, Sim Sem Peng, Elton Tong

Singapore in the past lacked the measurement capability to handle many of the heavy industry requirements that are necessary today. Until now that is. With the opening of Malayan Daching's new force measuring instruments testing and calibration laboratory. This new facility, located in Singapore, is capable of testing force measuring instruments, load cells and hydraulic cylinders up to 20 MN. The testing capacity of up to 20 MN is among the highest worldwide.

Set up with the support of A*STAR's National Metrology Centre (NMC) and SPRING Singapore. Like any such facility accreditation is important to give customers greater confidence in the laboratory's test and calibration results and reports. Accreditation has been achieved for this facility under the Singapore Accreditation Council – Singapore Laboratory Accreditation Scheme (SAC-SINGLAS).

Before this facility the highest measurement capability available in Singapore was 2 MN, offered by A*STAR. Now with this new facility applications such as those in heavy industries like oil & gas, marine and offshore, construction, or heavy engineering are now able to calibrate up to 20 MN locally rather than sending overseas, which is both time consuming and costly. Productivity is also expected to increase by more than 50 per cent, with workers being freed up for deployment

of other tasks. It is understood that aside from Singapore, only China and Germany have facilities of such testing and calibrating capability.

Automating For Accuracy

To effectively make use of such equipment and to ensure accuracy it is necessary to employ automation within the system. In regards to control, for us to exert a 20 MN force, it takes a while and if you do it the manual way the chances are you may not even control too well. Elton Tong, business development manager, Malayan Daching, explained: "In regards to control, for us to exert a 20 MN force, it takes a while and if you do it the manual way the chances are you may not even control too well."

Continuing, he said: "There is three stages of control. Firstly, if you want to go to 20 MN, the first stage of this would be to go to say 18 MN in a short

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time. Once we reach 90 percent of our full capacity we then lower down into a medium control, which is a bit slower, but still fast enough to go to perhaps 95 percent. However, once we reach the top five percent towards our target we have this fine tuning to go up to 20 MN. These are the control mechanisms that we have."

Adding: "When we reach the target force that we want we have an automated system where we capture the reading once it reaches the target force. This process needs to be automated as our eyes will not be able to tell the exact force because once it reaches 20 MN the reading of this unit is always fluctuating. If you want to look at 20 MN exactly and take the reading chances are you will miss it by a fair bit. What we did was to have a capture system so when the indicator master shows 20 MN it will capture the units reading. On top of that there is also some controls related to the methodology on how not to overshoot your target range."

Additionally, the company developed customised software to enable the testing and calibrating of high capacity force measuring instruments, load cells and hydraulic cylinders. With a fully computerised system, the entire calibration process will be automated.

Lee Shih Mean, senior metrologist (Mechanical Metrology) added: "One example of this is that when the force you are taking is a set point. In the case of taking a measurement we do not want the force to overshoot and then come back down. In terms of control, it is easier to control when you overshoot and then when you come down you let it hit the set point before you increase the force. This would be considered normal control. However, we do not want that to happen here, we want to go up and then increase slowly and then hit a set target before you go up to the next point. There should not be any kind of decreasing force when it is in an increasing phase. This is the advice we give people."



Collaboration With A*STAR

When asked more about the collaboration with A*STAR, Dr Thomas Liew, executive director of the National Metrology Centre, remarked: "We are the national measurement institute within Singapore, so what we offer is the measurement science knowledge and also our understanding of measurement standards and references. We used this knowledge to work with Malayan Daching to develop this new machine that is capable of 20 MN. I would say, regionally, this is a one of its kind facility and is an expansion of our Singapore measurement capability, which has gone from 2 MN to now 20 MN."

He further explained: "We used our measurement knowledge to help in the selection of reference cells for this machine. We also used our capability as a measurement authority to ensure that the measurement machine that is constructed is measuring the force accurately, ie: traceable to national measurement standards or SI standards. That is our key role."

Operating Procedure

Mr Tong explained more on what is

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expected once a company contacts them and wants to make use of their new measurement capabilities: "If say a customer or client calls in for an enquiry the first thing we do is assess their equipment, for instance, what kind of equipment do they have? What is the capacity? Is it within our scope in terms of facilities and also the size of the load cell or the hydraulic jacks, and whether it can fit into our calibration frame. After we establish the suitability of the request, then we will talk to them more on the specification, such as what kind of accuracy they need, and what kind of sensitivity they need."



The new 20 MN facility at Malayan Daching.

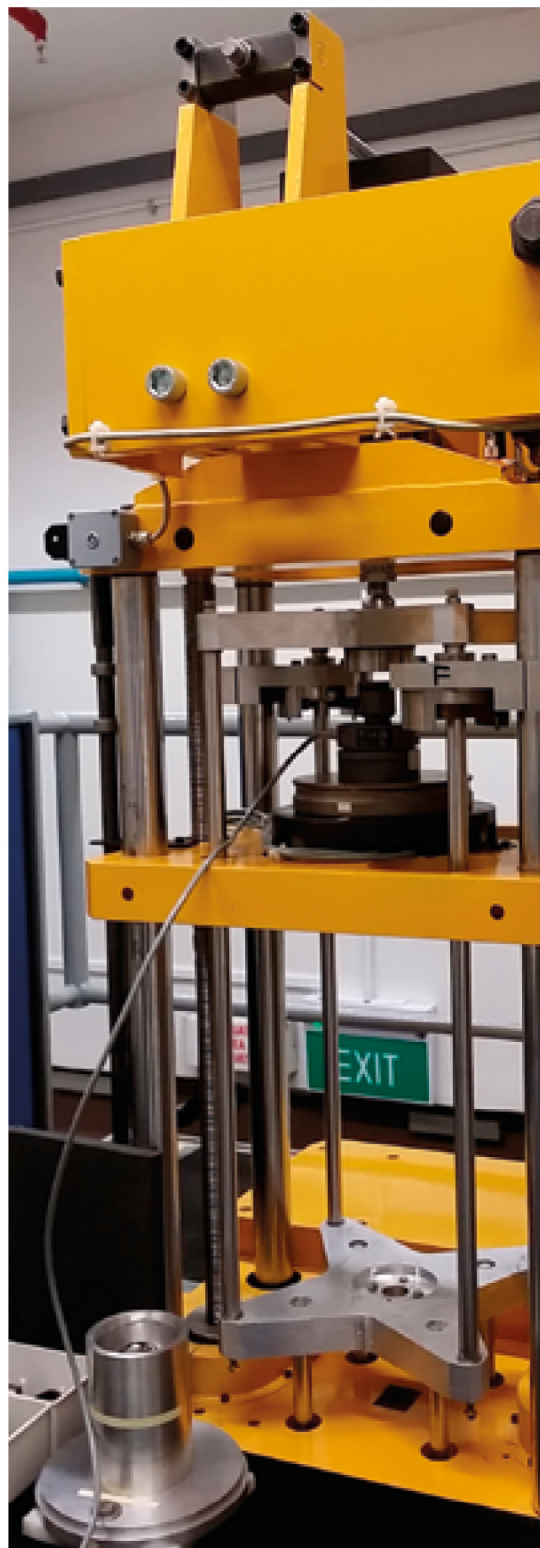
"If they are ok with our scope then we will probably go into a little bit more detail on what kind of indicator do they have, because if you have a load cell, the load cell will signal to an indicator. We need to understand how we can work with this indicator, and then if everything is fine and the engineers are happy then the job will be done," he added.

Integration And Standards

Mr Tong expanded on the issue of integration and how this new service fits in with the company's existing capabilities: "This new capability is a separate offering compared to what we previously had. From weighing of physical test kits to more measurement of load cells. We are ISO/IEC 17025 accredited since 1988 so our quality manual we can still make use of the same quality system that

we have been using and then on top of that our engineers who have all trained in the weighing business (the weighing calibration part), for them to learn on the new calibration for load cell force measurement is quite an easy transition. It impacts their productivity because for calibration we do not have every day where they are fully booked and they are fully utilised so with this new calibration services it is easier for them to work with us a bit and increase their time on work so I think that is a good increase."

To meet the strict requirements of ISO 376 and ISO 7500-1, the team dedicated six months (instead of the usual two to three months) to develop and troubleshoot a customised software that is able to control the calibration process to an accuracy level of 5 ppm (parts per million).



Force Transducer Calibration at The National Metrology Centre's (NMC) in Singapore.