

NSL *Link*

Issue 25

Jul 2018

Digital Transformation



A Note from Our **Executive Director**



Dear Colleagues

Digital transformation may be the buzzword in many companies. But it has certainly made a significant impact on the way we can conduct our business operations more efficiently and productively, providing better insights into our customers' needs and preferences.

In NSL, we are committed to deploy digital transformation strategy to stay ahead of our competitors. Our Chairman, Prof Cham Tao Soon personally chairs NSL Digital Transformation Steering Committee which meets every quarter to guide management on the execution of our digitalization road map in various aspects of our business.

Digital transformation provides an essential technological platform for us to enable a broader business transformation by enhancing every aspect of our business systems and operations, to allow us to work better and smarter. Given such rapid

technological changes in today's world, we need to continuously evolve to ride on such digitalization waves.

Therefore, as a forward looking organization,



**NSL GROUP MUST
EMBRACE DIGITAL
TRANSFORMATION
BY BUILDING AND
ADOPTING A CULTURE
OF CONSTANT CHANGE**

for our continuous strive in business excellence.

Over the last couple of years, NSL Group has implemented numerous digital transformation projects, many

of which have been reported to you and our shareholders in the Annual Report. Recently, the key initiative deployed is Enterprise Resource Planning (ERP) in Eastern Pretech Singapore and Malaysia operations. With this integrated system, the precast business will be able to automate many back office functions and achieve greater productivity. Other process initiatives that have reaped such benefits include enhancing slop monitoring systems to optimize tank transfer operations, and the introduction of Internet of Things and mobile devices on our fleet of vehicles to optimize job schedule for better vehicle utilization rate, productivity improvement and customer service enhancement.

Digital transformation is a long journey and we must always be ready to adapt to the ever changing landscape.

Dr Low Chin Nam

Digital Transformation

At NSL Group, we continuously gear our businesses towards digitalisation, adding value to customers, employees and our stakeholders. Dedicated to one of our core values 'innovation', we constantly pursue new ideas and develop creative solutions with a 'Can Do' attitude.

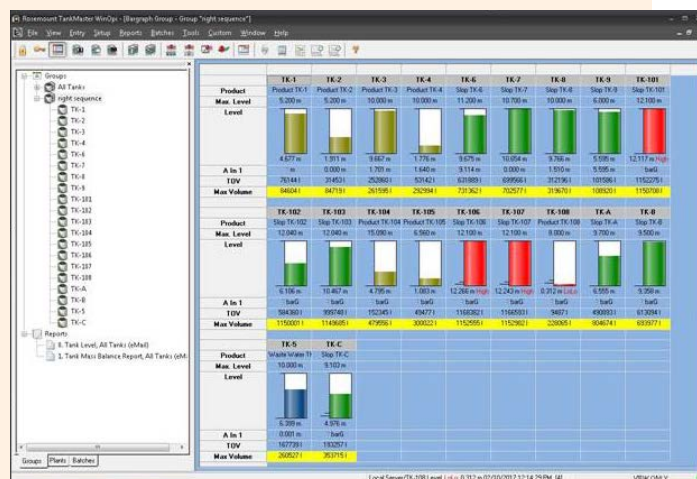
These days, everything that we do leaves a digital footprint. From accessing a phone application, making a payment with a bank card, to reading the news online, these digital data reflects what we do, when and where.

Slop Monitoring Systems Enhanced!

Most recently, the environmental services division has further improved its existing slop tank monitoring systems. The main scope of slop plant operations is to monitor tank transfer data and movements of slop oil and recycled fuel oil (RFO). Currently, the existing slop tank monitoring systems can offer real-time monitoring but operational data (ie: tank transfer data) are still manually hand-written by supervisors and transferred to excel sheets at the end of every work shift.

An upgrade of its existing system was proposed so that its operation records can be recorded digitally. Now, the system has a

function to 'plan, activate, record' its tank transfer activities, making it more productive for supervisors. Other than productivity, this upgrade has made auditing trails more succinct, and information (using tank names, volumes and timestamp) can be analysed further to optimise tank transfer operations.



Equipped with GPS tracking devices

Every vehicle at NSL OilChem Waste Management is equipped with a GPS tracking device and handheld system which allows the customer service team to stay connected with the drivers.

Through these tracking devices, it allows the customer service team to deploy tasks to the drivers on the roads, and helps the operation planners to plan efficiently. Once the job is completed, an email will be sent to both Sales and the Customer Service teams to inform them of its status.



Optimising manpower through data

At Raffles Marina, there are three main dining spots. Marina Bistro, the alfresco dining area that allows you to have a breathtaking view of the lagoon. Captain's Table, a Chinese specialty restaurant that features cuisines from Shanghai, Guangzhou and Szechuan. Discovery Pub is a haven for those who want to wind down and enjoy a game of pool and darts.

These restaurants run at the speed of light, from serving customers to managing a queue at the entrance. By using data, it allows the management help predict what they should do next.

Read more about how Raffles Marina optimise manpower and achieve customers' satisfaction on page 12.



Applying data analytics for sales

Data analytics is applied across its food and beverage business. For example, finding out the popular dishes in each restaurant helps the club identify its 'best-selling' dishes. With such data, not only does this help the club understand their customers' preference, it also tracks the effectiveness of marketing promotions and campaigns.

Last year, a study was conducted to evaluate the menu at Marina Bistro. From the statistical data, the characteristics

of the dishes that customers enjoyed were identified. The findings were relayed to the culinary team to create new promotional dishes to excite new and existing patrons. As a result, new items like the Italian Pasta, Tandoori Salmon, Nyonya Claypot Curry and Soft Shell Crab Briyani were curated as promotional dishes.

Marina Bistro also refreshes their menu every year, and some promotional items that surpass expectations were reflected in 2018's menu.



Soft Shell Crab Briyani

May 2018 Quiz: Guess the Popular Dishes at Marina Bistro!

In May, NSL Corporate Communications quizzed employees in Singapore by asking them to guess the top dishes (appetizers, sides and main dishes) at Marina Bistro. The correct answers reflected are based on a 10-month analysis.

Altogether, 76 respondents participated and five winners walked away with a \$30 voucher from Marina Bistro.

Question: In your opinion, what is the most popular starter/appetizer at Marina Bistro? (Correct answer in bold)

- Crispy Garlic Truffle Fries
- Chicken Tikka Wrap
- Mushroom Soup
- **Chicken Satay**

Question: What is the most popular main dish at Marina Bistro?

- Seafood Laksa
- **Nasi Goreng Istimewa**
- Hainanese Chicken Rice
- Butter Chicken Briyani

Congratulations to the following five winners! You'll know what to try when you're there!

- Jenny Cheong, NSL Ltd
- Jess Toh, NSL Ltd
- Carol Yen, NSL OilChem Waste Management
- George Lim, Raffles Marina
- Alsagoff Syed Hashim, Raffles Marina

NSL Group Registered Loss Before Tax in 1Q 2018

- Absence of gain on disposal of an investment property and restructuring costs in Singapore's precast operation adversely affected the performance of NSL Group in 1Q2018
- Group Turnover increased by 24% to \$107.1 million

Group Financial Highlights	1Q2018 S\$'000	1Q2017 S\$'000	Change (%)
Group Turnover	107,068	86,104	24
Group (Loss) / Profit Before Tax	(2,416)	2,720	n/m
Group (Loss) / Profit Attributable to Shareholders	(3,155)	2,585	n/m
Earnings per share (cents)	(0.84)	0.69	n/m

n/m: not meaningful

NSL Group achieved a turnover of \$107.1 million in 1Q2018, a 24% increase from \$86.1 million in 1Q2017, due to higher revenue from both the Environmental Services and Precast & Prefabricated Bathroom Unit (PBU) divisions.

However, the Group incurred a loss before tax of \$2.4 million in 1Q2018 compared to profit before tax of \$2.7 million (which included a one-off gain of \$3.5 million from disposal of an investment property) in 1Q2017. During 1Q2018, \$1.9 million of restructuring costs were recorded for the closure of the Singapore precast plant.

Precast and PBU division recorded a loss before tax of \$2.1 million in the quarter primarily due to poor performance by its Singapore precast operation. Plant loading for Singapore market was low due to weak construction demand coupled with depressed prices. The division is restructuring its operation that involves plant closure and retrenchment of its operating staff in Singapore to improve cost

competitiveness. This exercise is expected to complete by end June 2018, resulting in a one-off restructuring cost of \$1.9 million that was recognized in this quarter.

However, the performance of the precast operations in Malaysia and Dubai, and the division's PBU business in Finland improved.

The Environmental Services division reported a profit of \$0.7 million in 1Q2018 compared to a loss of \$1.2 million in 1Q2017. Profit for 1Q2018 was contributed by interim payout of \$1.5 million from business interruption insurance for losses arising from the fire incident in March last year. The division's waste treatment business continued to be negatively impacted by the operational disruption of its incineration and fixation plants. However, the Recycled Fuel Oil (RFO) business improved as a result of higher sales volume and prices.

After taking into account income tax and non-controlling interests, the Group reported a loss attributable

to equity holders of \$3.2 million in 1Q2018 compared to a profit of \$2.6 million in 1Q2017.

Outlook

The precast business in Singapore is expected to remain challenging from weak construction demand. The restructuring of the Singapore and Malaysia precast operations would lead to a leaner and more competitive cost structure to meet this challenging environment. Dubai operation has healthy order book subject to risk of project delay. Business outlook for the division's PBU business in Finland is expected to remain favorable with full-year contribution from the plant expansion.

Business outlook for the Environmental Services division would continue to improve driven by growth in the RFO business and the full resumption of the waste management services which has been delayed from 1Q2018 to 2Q2018. The construction of the division's organic wastewater treatment facility in Tuas is progressing on schedule for completion by end of 2018.

Relocation of EPS

By Lim Siew Howe

With the return of the Sungei Kadut land to JTC Corporation, Eastern Pretech Singapore has relocated its operations fully to Seelong's plant and office to Tanjong Kling Road. The entire relocation exercise completed in end June 2018.

The Singapore plant ceased operation in end May 2018 and departments such as administration, finance, information technology, human resource, sales and marketing, commercial and engineering departments were relocated to their new office at 26 Tanjong Kling Road.

1

Packing of Documents for Transfer to new Office



2

Packing of Machinery and Equipment for Transfer to Seelong Plant



3

Clearing of Factory to return to JTC



4

Renovation Works at Tanjong Kling Office



Eastern Pretech Group Updates

Malaysia

By Matti Mikkola

EPM Awarded Tanjung Karang Hospital Contract

Eastern Pretech (Malaysia) Sdn Bhd (EPM) was awarded the tender for the construction of a full precast building with a volume of 6,400m³ for Tanjung Karang Hospital in Selangor by George Kent (Malaysia) Sdn Bhd. The delivery is scheduled to commence in 4Q2018.



EPM Clinches KVLRT3 Project

EPM was awarded the project to design, supply and deliver T-beams with a volume of 2,600m³ for Klang Valley Light Rail Transit 3 (KVLRT3) by Sunway Construction Group Bhd. The delivery is scheduled to commence in 4Q2018.



EPM Awarded Factory Project

EPM was awarded the tender for the construction of a full precast building with a volume of 2,080m³ for Ideal Quality Sdn Bhd's factory in Kapar, Klang. The delivery of precast elements will commence in 2Q2018.



Singapore

By Wilson Chong

EPS Clinches Hotel and Residential Project

Eastern Pretech Singapore (EPS) has been awarded the tender for the supply and delivery of precast elements with a volume of 8,600m³ for the residential wing of a 28-storey mixed development at Orchard Boulevard. The delivery of the precast elements will commence from 3Q2019.

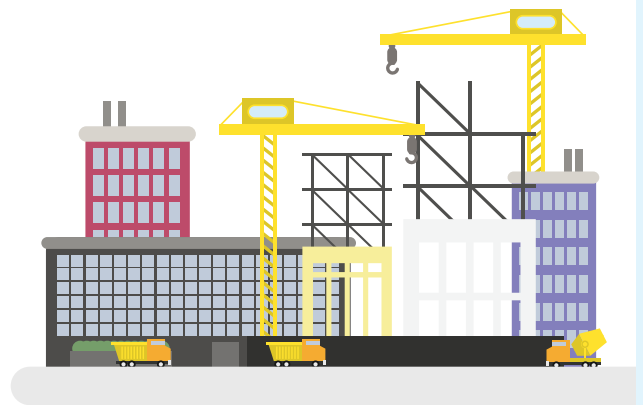


Dubai

By Henrik Jensen

DPC Awarded Tender for Commercial and Residential Building

Dubai Precast (DPC) was awarded the tender to supply 32,000m² of hollow-core slabs and 750m³ of precast beams for a 16-storey commercial and residential building. The production and erection for this project is scheduled to commence in 3Q2018.



Finland

By Jussi Raunio

Parmarine Supplies Bathroom Units to Malmö Arena Hotel, Sweden

Parmarine has been awarded the project of supplying 100 bathroom units to the expansion of Malmö Arena Hotel in Sweden. The delivery is scheduled to commence in June 2018.

This tender follows the success of 300 bathroom units which Parmarine manufactured when the hotel was first built in 2015.



IKEA Penang Receives High IBS Score and **5 Star SHASSIC Rating**



Chief Executive of CIDB (second from left) presenting the award to Kajima's Project Director

EPM is proud to have been a part of the IKEA Penang project which has gained the highest Industrialised Building System (IBS) Score of 92.3 out of 100. The IBS rating is part of Construction Industry Development Board (CIDB) Malaysia's effort to recognise developments that showcase the adoption of modern construction methods.

This score is the highest to date and CIDB's Chief Executive, Dato' Ir Ahmad 'Asri Abdul Hamid visited the site of IKEA Penang on 3 May 2018 and presented the award to main design and build contractor, Kajima (Malaysia) Sdn Bhd.

Kajima also received a 5 Star Safety and Health Assessment System in Construction (SHASSIC) rating for its safety and health performance during construction works. Representing Kajima to receive the awards was Project Director Eiichi Suzuki, accompanied by Ikea's Senior Construction Project Manager Agung Wibowo.

During the event, Mr Matti Mikkola, CEO of EPM gave a short presentation explaining the precast concrete structure of the building and EPM's history of building all the IKEA's in Malaysia to date. Attendees from CIDB received a better understanding of how the production was done off-site in two of EPM's factories with the components being delivered to the site on trailers daily and the total installation period was only 5.5

months. Mr Matti also emphasized that on the average the manpower on site was not more than 70 workers. A cast-in-situ construction method in comparison would have required up to 500 more workers.

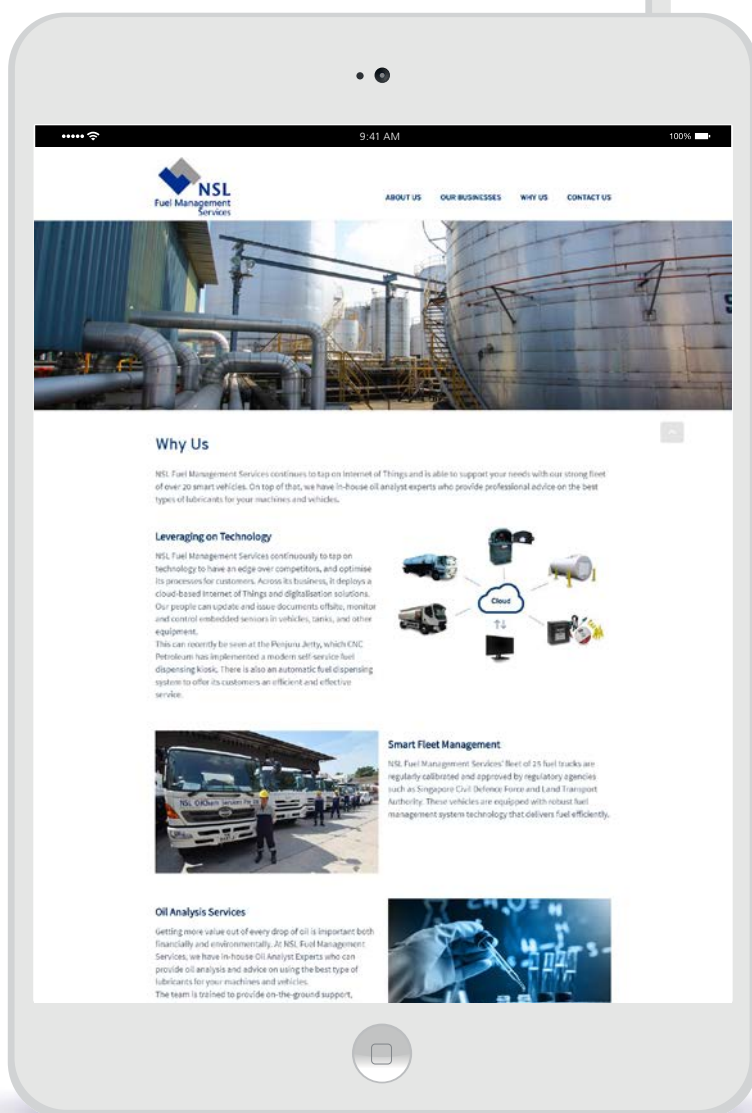
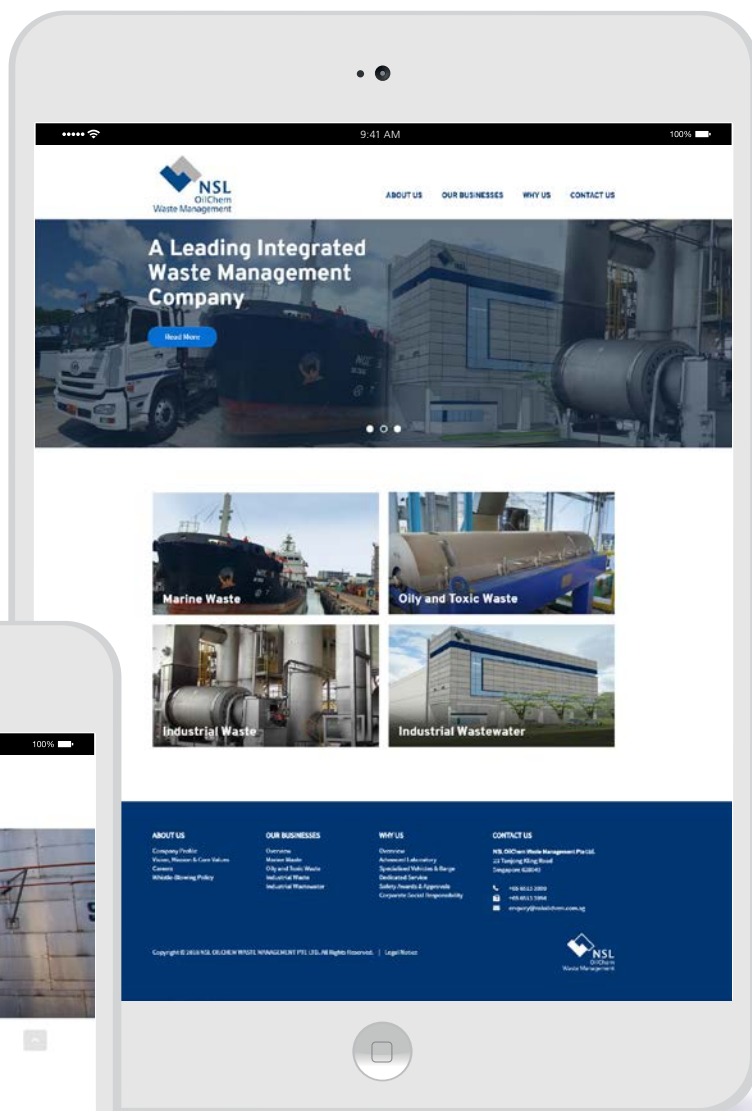
The presentation was followed by a lively Q&A and discussion. CIDB's questions were mainly answered by IKEA and Kajima representatives, who gave very positive views on precast, including speed, quality, cleanliness and reduction in manpower.



Mr Matti Mikkola presenting to CIDB executives

Introducing NSL OilChem Waste Management and NSL Fuel Management Services Websites!

We are proud to launch the revamped NSL OilChem Waste Management and new NSL Fuel Management Services websites. Both completed in February and April respectively, they bear the NSL corporate identity branding. They are also crafted with more pictorials, allowing users to have a good glimpse of our diverse business. In addition, they are also mobile responsive, hence giving online visitors an optimal viewing experience on both mobiles and desktops.



In each website, its businesses are categorised clearly in the homepage. It is user-friendly and provides visitors easy navigation to a specific business. Don't forget to check out the 'Why Us' navigation tab where it showcases the unique selling points of our businesses.

Visit the websites at:
www.nsloilchem.com.sg and
www.nslfms.com.sg

Optimise Manpower and Achieve Customers' Satisfaction

In an effort to improve on staffing level, Raffles Marina (RML) management conducted a manpower review of their employees at the restaurants Captain's Table and Marina Bistro. To assist RML in this review, NSL Enterprise Risk Management (ERM) department was tasked to analyse the operational characteristics and resource allocation at both these restaurants.

Two main objectives were set: manage customer's satisfaction and staff costs; and justify the hiring or replacement of service staff.

Understanding Customer Behaviours

To set the foundation right, the RML team must first understand the behaviour of both customers and service staff. A two-prong data driven methodology was set up to understand trends in the number of visiting customers, their arrival time as well as the duration they spend at the restaurant. Tapping on RML's current Point-of-Sales system, two findings were concluded at Marina Bistro: Most customers arrive between 11:45am and 12:45pm and it was most crowded between 12:30pm and 1:30pm.

It was also reflected that both Marina Bistro and Captain's Table were most crowded during weekday lunch and weekend dinner respectively. In addition, customers spent about an average of 50 minutes for lunch. During off-peak periods, patrons spend a larger range of time from 30 minutes to 2 hours 30 minutes.



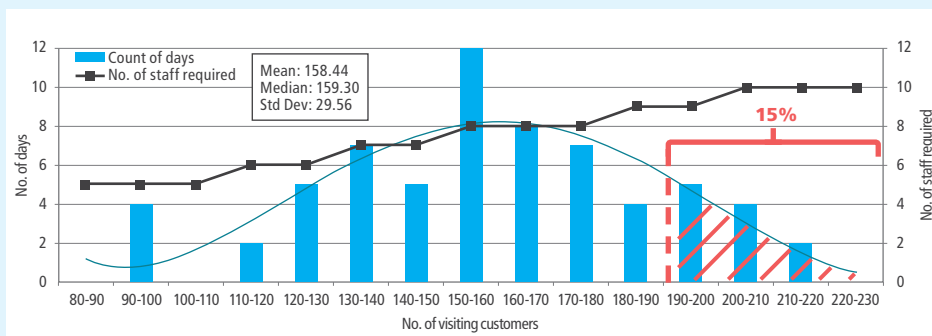
Analyse Activities by Service Staff

A time-motion study was conducted to track the timings clocked by various service staff at the two restaurants. Each granular task was recorded including time taken for ushering of customers, delivering of food, clearing the table.

What are the findings?

Insights gathered from the two pronged approach allow the derivation of service level at the restaurants by considering the interactions between customers and service staff. In this context, service level is defined as the probability that the restaurants will be understaffed.

Marina Bisto: Distribution of Visiting Customers during Lunch



The chart shows the interaction during weekday lunch time at the marina bistro by superimposing the trend of visiting customers and the number of service staff required. Shaded in red is the probability (0.15) that the restaurant may be understaffed.

This same model was found useful as it can be utilized to consider the impact of other scenarios such as staff re-deployment. For instance, the re-deployment of service staff from Captain's Table to Marina Bistro during weekday

lunch can improve the service level at Marina Bistro by 10%.

In conclusion, a staffing matrix was established to determine the number of staff required for a set level of customer service at the restaurants. The matrix will enable RML to manage their manpower strength effectively. Staff can also be deployed in multiple shifts to meet the demand of customers at various time periods. Re-deployment of staff can help to improve service level; however, it requires much consideration and effort in order to implement it effectively.

Denim & Diamonds

Raffles Marina celebrated its staff dinner and dance on Monday, 16 April at Joy Garden Restaurant, SAFRA Jurong. Themed Denim & Diamonds, 100 staff and 10 guests attended the event dressed to the nines.

3 staff were awarded Best Employees of the Year 2017 and 19 staff were awarded Long Service Awards. Hearty Congratulations to the recipients!

Plenty of games, activities, stage performances, great food and not forgetting the grand lucky draw lived up the atmosphere at the party. Mr Lou Sooi Hoy, Sous Chef walked away with the grand prize – an Apple Macbook Pro 13 inch.

The dinner was indeed a great way for staff to unwind and to also build camaraderie among one another.



All smiles for the camera



Dr Low awarding the Best Employee Of 2017



Cheering their colleagues



Interesting dance performances for the night



Spontaneous performances and activities by staff



Mass dance of the night



Lou Sooi Hoy, walks away with the grand prize, an Apple Macbook Pro 13 inch.



On 9 March 2018, NSL OilChem Waste Management, NSL Fuel Management Services and NSL Chemicals held its Dinner & Dance at Hotel Fort Canning Singapore. Themed Soccer Club Night, 265 employees spontaneously donned their favorite jerseys and took part in games.

Dr See Soo Loi, CEO of NSL Chemicals and Mr Jeffrey Fung CEO of NSL OilChem Waste Management greeted everyone in their opening speeches. Altogether, 31 Long Service Award recipients were recognized for their commitment and dedication to the organization.

It was a special night as everyone also celebrated NSL Chemicals 50th Anniversary with a champagne popping. In addition, a group of employees were recognised for their exemplary performance at work. They include:

- The Quality Control department
- The Tuas team
- The Neste Project team
- Individuals including Nicole Chen, Tay Mei Chiek, Hao Xusheng, Andy Khoo, K.Mani Saravanan, Vijian A/L Muniandy, Wui Jui Heng, Winston, Tan Qiu Hua and Delvin Chng

Check out the all the fun and games during the night!





It was an eventful start of 2018 for the employees at the Environmental Services Division. In addition to the Dinner & Dance in Singapore, employees were also invited to a 3-day trip from 13 to 15 April to Ho Chi Minh, Vietnam. The objective of the trip was to foster greater employee engagement and synergy.

Apart from doing all the touristy activities (a tour to Cu Chi Tunnel!), a Townhall Meeting themed 'Forging the Corporate Culture', was fronted by Mr Jeffrey Fung, CEO of NSL OilChem Waste Management. All 70 employees were encouraged to voice out their thoughts on ways to improve the corporate culture across the division.

To wind down towards the end of the trip, they also had their own 'Vibrant HCM Race' where everyone went on a gourmet discovery, and visited places of interest in the city. It was all in all a fabulous weekend break.



▲ Everyone was treated to a sumptuous Vietnam cuisine at Elisa Floating Restaurant



Check out the fun employees had (including a 'seaweed' dance routine) using **#NSLOilChemHcm**

Discovering new places together! ▶



"I've attended the retreat for the third time and I appreciate the time spent together with colleagues and enjoying the food culture in Vietnam. The main highlight this year was using Instagram to capture all our memories in Vietnam. You can check it out at '#NSLOilChemHcm'."

– Lim Su Cha, Supply Chain Senior Executive



What better way to cool down on a hot day



Making her way out from Cu Chi Tunnel



Gourmet discovery!



Check out their 'thinking hats'!



Yummy dragon fruits



Having a taste of Balut (a developing bird embryo that is boiled)

"This is my first retreat and I would like to appreciate the committee for putting in so much effort! What touched me most during the trip was my group's interaction with Mr Jeffrey Fung. During the amazing race, one of the missions was to purchase items from a local market. Mr Fung offered to carry the plastic bag (that was pretty heavy) for almost the entire day. It may be a small act of service, but to me, it reflects the humility spirit as the highest ranked person in the division."

– Anonymous, Quality Control

SRC Continues to **Engage Employees**

Piloxing

Throughout March and May, employees were invited to take part in Piloxing, a creative fusion of Pilates and kickboxing. This high-spirited interval workout not only strengthens your core, but sculpts and elongates your muscles. Just ask our participants who stretched and flexed their muscles after a day of work!



NSL @ THE MOVIES



Avengers Infinity War – 345 strong!

Touted as the most anticipated movie of the year, SRC booked an entire movie theatre on 5 May at Shaw Theatres, Lot One Shoppers' Mall. All 345 employees, family and friends were awed by Marvel Cinematic Universe's action-packed blockbuster by their favourite superhero and/or villain (Thanos, anyone?).

Love Movement 2018

NSL continues to support and extend financial help to Melrose Home from the Children's Aid Society of Singapore. This year, the SRC collected \$7,588 from employees in Singapore.

To top it up, the Group has also made a corporate donation of \$10,000. The total amount of \$17,588 will go towards supporting the children's meals.



▲ The donations were collected in the form of red packets, which symbolises good luck



NSL Games 2018/19



Did you know that all employees in Singapore are invited to participate in the 'NSL Games'? The NSL Sports & Recreation Club (SRC) organises competitive sports and games for subsidiaries in Singapore to compete and vie for the prestigious NSL Games Trophy. Last year, NSL OilChem Waste Management Group (NOC) walked away as the overall champion for NSL Games 2016/17!



Be the game changer for NSL Games 2018/19. It's not too late to participate and claim the trophy for your subsidiary!

Archery Tag

The first event of NSL Games 2018/19 saw 28 employees attending a friendly match of Archery Tag in March. Each participant was geared with realistic but safe foam tipped arrows and bows to compete with each other. It was a thrilling event as participants strategized to eliminate their opponents. Congratulations to NOC for walking away as overall winner!

▶
Going for the kill!



▲ *Channeling her inner 'Katniss Everdeen' from Hunger Games*

Roll some Pins!

On May 19, 40 employees participated in the second NSL Games 2018/19 activity, bowling. It remains the most popular sporting activity that employees enjoy in Singapore!

Overall, the NOC participants outshined and emerged as the top subsidiary! In addition, prizes were given out to commend the top three male and top three female bowlers!



Position	Results (SBU)	Results (Male)	Results (Female)
1 st	NOC	Andy Khoo, NSL Chemicals	Nur Azri, NOC
2 nd	NSL Chemicals	Mehd Rahdi, NOC	Lim Su Cha, NOC
3 rd	Eastern Pretech (S)	Ngiam Tee Leng, NOC	Lee Bee Yong, EPS

6 Steps for Effective Toolbox Meeting

Toolbox meeting is one of the best ways to communicate the importance of safety. It should be conducted daily first thing in the morning or before the start of the work shift. Running effective toolbox meetings can be challenging. To help make it easier, these 6 steps aim to provide a clear and systematic format for conducting such meeting.

Further details on effective toolbox meeting can be found on https://www.wshc.sg/files/wshc/upload/infostop/attachments/2018/IS201804170000000425/Toolbox_Meeting_Guide.pdf

Step 1:

Are you fit to work today?

Assess workers' fitness to work for the day or shift. All workers should be physically and medically fit to carry out all the tasks assigned to them.



- 1. Drunken test** – Is the worker able to walk in a straight line, heel-to-toe for 6 steps?



- 2. Body temperature test** - Temperatures should not be above 37°C



- 3. Health declaration** – A worker who feels unwell must say so

Step 4:

Look. Think. Do.

Simple risk assessment before work can save life. Remind workers to be observant of the hazards around them. Before commencing work, they should:



Step 2:

Personal Protective Equipment (PPE)

PPE should be provided and wore by the workers according to the task assigned e.g.



Hard hat



Safety Glasses



Gloves



Reflective vest



Safety Boots

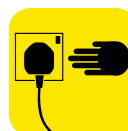


Ear Plug

Step 3:

Task

Communicate the tasks and highlight all hazardous work activities for workers to take note. E.g. work at heights, hot works, lifting, moving vehicles, electrical, etc. It should include safe work procedures and control measures to observe for the tasks.



Step 5:

Report unsafe act or condition

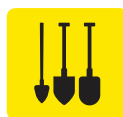
We should encourage workers to share on any unsafe act or condition that they have seen on the previous work day or foresee for today's work, offer suggestions to improve safety.

Step 6:

Remind all workers to perform the following housekeeping tasks before they end the day shift.



- 1. Sort:** Keep what is necessary and throw away unwanted or spent materials.



- 2. Set in order:** Arrange tools back to their original positions.



- 3. Shine:** Sweep and clean the work area.

Tips

- Start the meeting on a positive note.
- Compliment workers who have performed well.
- Use visual aids and give hands-on.
- Invite workers to participate.
- Keep the group small e.g. 20.

Antioxidants: What's the Hype?

By Ng Jia Min and Ng Jiaying

Antioxidants are found in many fruits and vegetables. The Pharmacy Department at Singapore General Hospital explains its benefits and uses.

Gerontologist Denham Harman, also known as the 'father of the free radical theory of ageing' was the first to discover the concept of free radicals in 1954, which are now suggested as one of the major contributors to ageing.

Free radicals are reactive molecules and are involved in disease development. Sources of free radicals include stress, pollution as well as smoking and high alcohol consumption. The need for antioxidants in our daily life is thus crucial due to increased exposure to such free radicals.

What are antioxidants?

Antioxidants are thought to be able to slow down ageing and thus improve skin health through preventing reactive oxygen species from causing damage to our biological system. This is done by detoxifying these reactive oxygen species and thus be able to repair the resulting damage on proteins, fats, and DNA.

Antioxidants are also capable of repairing damaged molecules like your DNA and can promote the destruction of cancer cells therefore stop cancer growth.

With healthy DNA, immune systems are strengthened. By preventing brain ageing, better memory performance and prevention of progressive cognitive impairments can be expected, suggesting antioxidants'

role in preventing diseases like Alzheimer's.

Beta-carotene (a substance from which Vitamin A is formed) and vitamin E are believed to be weapons against heart disease and cancer. Both these vitamins are fat-soluble antioxidants, which can protect your cell membranes.

Vitamin A: What is it and why we need it

Vitamin A is derived from beta-carotene (plant sources), which is responsible for the red-orange colour of some vegetables and fruits, especially carrots and sweet potatoes, and from retinoid (animal sources).

Vitamin A is needed for healthy skin and mucus membranes, for good eye health and vision and aids in building our immune system. Some studies have suggested that at least 4 daily servings of beta-carotene rich fruits

and vegetables is required to lower cancer and heart disease risk.

According to Singapore Health Promotion Board¹, about 750mcg of Vitamin A in terms of retinol activity equivalents (2500IU/day) is required every day in normal adults. However, the US RDA² suggests not taking more than 3000mcg per day (10 000IU/day).

Vitamin E: What is it and why we need it

Vitamin E comes in eight different subtypes with different antioxidant activity. Out of these subtypes, alpha-tocopherol has the greatest antioxidant activity, and it is the only form that is recognised to meet human requirements.

Common dietary sources of Vitamin E include:

- raw vegetable oils,
- eggs, and
- nuts.





In the human body, vitamin E protects cell membranes and circulating serum lipoproteins from oxidation, thereby possibly delaying chronic diseases, inhibiting the 'wear-and-tear' pigments (also known as lipofuscins) accumulation which is a sign of ageing.

One study conducted found out that, people who take at least 200IU vitamin E per day have 37% lower risk of developing cardiovascular diseases.

There is no dose range of Vitamin E recommended by Singapore Health Promotion Board but generally, World Health Organization² considers doses between 150-720mg (225IU to 1080IU) a day to be a range without side effects.

Vitamins A and E: Risk factors of taking too much / over-dosing

Despite the benefits that antioxidants confer, moderation is the key. High doses of Vitamin A and E coupled with prolonged consumption can pose a health risk as these two vitamins can accumulate in our body fats over time.

A French study involving adult females published in the Journal of the National Cancer Institute³ found that smokers with high beta-carotene levels had a higher risk of lung cancer and other smoking-related cancers at 368.3 per 10 000 women than other smokers. Interestingly, it was discovered that non-smokers with high beta-carotene intake had a lower risk of lung cancer at 81.7 per 10 000 women.

What this means is that pure reliance on antioxidants is insufficient. You should also cultivate healthy social habits to reap the full benefits of antioxidants, for example, making healthy food choices and not relying on just supplements.

Vitamin A supplementation: What you need to know

Side effects: Dry skin, joint pain, vomiting, headaches, confusion

Interactions: Birth control pills, blood thinners (Warfarin), acne medicines (Accutane), cancer treatments

Caution: Pregnant ladies, people who drink heavily or have kidney / liver disease should seek their doctor's advice before starting vitamin A supplements.

Vitamin E supplementation: What you need to know

Side effects: Nausea, headache, bleeding, fatigue, and other symptoms. Topical vitamin E can irritate the skin.

Interactions: Blood thinner (Warfarin), HIV medicines, cyclosporine, statins and niacin, cancer treatments.

Caution: Excessive vitamin E supplements might be harmful when taken in early pregnancy. Pregnant ladies should seek their doctor's advice before starting on vitamin E supplements.

As a general advice, Singapore Health Promotion Board recommends the general Singapore population to include whole grains, fruit and vegetables to protect body cells from free radical damage and therefore reduce ageing and chronic lifestyle diseases risk.

References:

- ¹ Singapore Health Promotion Board, Feb 2014. Retrieved from http://www.healthhub.sg/live-healthy/192/recommended_dietary_allowances. Assessed on 19 September 2016.
- ² World Health Organization and Food and Agriculture Organization of the United Nations, 2004. Vitamin and mineral Requirements in human nutrition.
- ³ Touvier, M., Kesse, E., Clavel-Chapelon, F., & Boutron-Ruault, M.-C. (2005). Dual Association of beta-carotene with risk of tobacco-related cancers in a cohort of French women. Journal of the National Cancer Institute, 97(18), 1338–1344. <http://doi.org/10.1093/jnci/dji276>.

Reproduced with permission from HealthXchange.sg: Trusted health tips tailored for Asia, by Singapore's largest academic medical centre, SingHealth.

Terms of Use / Disclaimer

All information provided within this web and mobile application is intended for general information and is provided on the understanding that no surgical and medical advice or recommendation is being rendered. Please do not disregard the professional advice of your physician.