Introduction
We are now into another year and our AGM will be just around the corner, it is therefore a good time to reflect on what we have done and to appraise our performance over the past months.

How Are We Doing
On the financial front, we continue to generate sufficient income to meet and to support our active participation, while working with the Asian Welding Federation, the IIW and also our participating at various meetings of affiliated welding societies.

PRiMOS Malaysia is moving ahead with the module for Painter and Blaster, the workflow was drafted and is currently under review. The plan is to be ready to deploy for field-testing by 1st Q 2008.

The CWQS committee is reviewing the work process and also organising the audits of test centres. Stakeholders have been invited to the review sessions and audits will be carried out as scheduled. This is an important assurance process to ensure that welders qualified under the CWQS do meet the required standard and that any gaps in meeting the requirements are addressed and closed out.

At the last Asian Welding Federation at Bali, we made significant progress in forging consensus of views on the ISO/DIS 9606 document. From the progress that we were able to make it really augurs well for Asia. There was openness and objectivity and the
general feeling was that we had achieved a significant breakthrough in our relationship and had developed greater level of trust and team spirit. There is confident that we would be able to put the final touches to this document at the next AWF meeting in Delhi in February 2008. This is indeed what I have said before; having one voice for Asia.

Membership continue to grow at a steady rate especially for corporate member, we are moving towards the 200 mark while not so long ago it was less than 100. The Membership Committee will be organising a Members Night in the early part of 2008. Again the primary objective is to provide members the opportunity to network with each other. Opportunity will also be taken for Council to tell you more about the application by SW S to be the Authorised National Body (ANB) under the IIW certification scheme. We will be providing members with more information on what this is all about and the opportunities to individual and corporate members. We would also be inviting representative from Pritchett Rummler - Brache Pte Ltd to give an introduction on some of the key aspects of “soft skills”; like managing the changing business environment, importance of continually making self improvements and the importance of building up own value and not be left behind. So be sure to keep watch of the impending announcement and join us at the Members Night for a rewarding evening.

The Technical Talks continue to be very popular with members and on a few of the events; we were over subscribed and had to turn away many late requests. This is a happy problem for us and we would be looking at how to do better and be able to anticipate your requests and arrange for appropriate facilities to accommodate every request.

As mentioned many times in previous engagements, SW S will be hosting the IIW 2009 General Assembly. Although it is still 11/2 year to go, all the committees are formed and the master plan has been developed and reviewed. However, we are still looking for members to come forward to assist in organising this big event. The more help we can get the better. Please come forward and be a part of this historic event for your Society.

**Going Forward**

We are confident that we will deliver another term of office that will meet your expectation. As mentioned above, our major preoccupation is making sure that we are able to manage and organise the 2009 General Assembly well, we have to make sure that all important aspects are well taken care of and in a timely manner. We know that the key elements for success are amongst others, being able to attract the critical number of participants and sponsorship.

Work on getting PRiMOS off the ground will also need careful attention. There are lots of change management details to be carefully worked on and the technical development has to be similarly robust. So we expect to spend some effort and energy with training and engagement over across the causeway.

For the rest it will be business as usual and we continue to ensure that courses are delivered with the same or improved quality.

**In Conclusion**

I would like to wish all our readers a safe, healthy and successful year and looking forward to another exciting and challenging year ahead.

Merry Christmas and a very happy new year.

Ang Chee Pheng
President
SW S
December 2007
S-ANB would be able to certify internationally recognized professional qualifications of welding personnel, such as IIW International Welding Engineer, International Welding Inspector, International Welding Practitioner, etc, who have undergone through structured training programmes conducted by an Authorised Training Body (ATB) approved by S-ANB and IIW.

A presentation on S-ANB and how SW S members and welding/inspection personnel could get IIW professional qualifications will be made at SW S Members' Night scheduled in April 2008. More details on the development of S-ANB and IIW activities can be found in SW S web site.

The 9th AWF Meeting in Denpasar, Bali

Heng Keng Wah
International Affairs Sub-committee

The 9th AWF meeting was held in Denpasar, Bali on 25 October 2007. It was organised by the Indonesian Welding Society (API). The SW S delegation for the AWF meeting comprised of Mr Ang Chee Pheng and Mr Heng Keng Wah with Ms Carol Lau providing secretariat support for the AWF. Present at the AWF meeting were also delegates from CW S (China), IWS (India), JW ES (Japan), JW S (Japan), IMM (Malaysia), SIRIM (Malaysia), PW S (Philippines), TW S (Thailand) and the host, API (Indonesia). The meeting was chaired by AWF President, Mr Suchin Katavut of the TW S. In an effort to get more Asian welding representation in the AWF, assistance from current AWF members who have potential contacts in other non-AWF member countries in Asia, particularly Vietnam, was sought.

None of the delegates could fail to notice that AWF was in earnest to get moving towards what it set forth to do barely three years ago. Significant progress was made at this meeting. The greatest achievement made at this meeting was the progress and general consensus registered by the Task Force Committee on ISO 9606 chaired by Dr H Nomura of JW ES on the views, comments and recommendations. Expected to be wrapped up at the next AWF meeting in India, these responses from the AWF members will be submitted as AWF-proposed revisions of ISO 9606: 2004 (ISO standard on qualification of welders of fusion welding) for consideration by the TC 44 SC 11 of ISO. Preliminary concepts on the formation of key organisation structures in AWF and member countries for implementing and maintaining a common welder certification scheme was briefly discussed. Detailed planning for this scheme is reserved for the next AWF meeting.

Other topics covered during the meeting were the rules and regulations on the use of the AWF logo proposed by SW S, the transfer of AWF bank account to Singapore where SW S is serving as the AWF secretariat, and the support of AWF members and guidelines governing the welding research and development symposium accompanying each AWF meeting proposed by JW S (Japan). The commitment in continuing the symposium, normally well attended in each host country, was indeed very encouraging.

The next meeting is hosted by Indian Welding Society in conjunction with its International Welding Symposium & Exhibition, which will be held in New Delhi on 13 February 2008. SW S members are welcome to visit the event from 13-15 February 2008 and may contact the SW S Secretariat for more details.

Development of S-ANB Establishment

Heng Keng Wah
International Affairs Sub-committee

SW S has been a member of the IWI since 2001 and taken the decision to become an Authorised National Body (ANB) of the International Welding Institute (IIW) in Singapore. In each country, IIW normally allows only one ANB to be the sole organization responsible for ensuring welding personnel training and certification programmes, and standards of education, examination and qualifications are within the IIW guidelines and requirements.

In Singapore, SW S is in the process of applying to be an ANB of the IIW, now being in the final stage of the application. When approved by the IIW, possibly sometime in 2008, S-ANB would be able to certify internationally recognized professional qualifications of welding personnel, such as IIW International Welding Engineer, International Welding Inspector, International Welding Practitioner, etc, who have undergone through structured training programmes conducted by an Authorised Training Body (ATB) approved by S-ANB and IIW.

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A presentation on S-ANB and how SW S members and welding/inspection personnel could get IIW professional qualifications will be made at SW S Members' Night scheduled in April 2008. More details on the development of S-ANB and IIW activities can be found in SW S web site.
The combined meeting of the POCWA/PACWI member countries was held during the FABTECH International and AWS Welding Show on 13 November, 2007 in Chicago, USA. Mr. Doug Luciani from the Canadian Welding Bureau chaired the meeting. The Chairman informed the international delegates that AWS’s Director on International Business & Certification Programs Mr Walter Herrera had retired and his replacement is Ms Priti Jain.

Mr. Ho Bee Leong and Mr. Eddie Ko represented the Singapore Welding Society in the discussion groups. Other participating countries include Australia, Canada, Japan, Jamaica, USA, Trinidad and Tobago. In all the previous meetings the Minutes of the last meeting would have been circulated to all delegates well in advance but due to Mr. Herrera’s retirement this was not emailed and could be a contributing factor for the poor attendance. Notwithstanding, Mr. Ray Shook, Executive Director of the AWS welcomed the delegates to the AWS show and also expressed his appreciation at their commitment to participate in the combined POCWA/PACWI meeting.

Several major issues were proposed and discussed among the members with the objective of securing some common projects that will add value to POCWA/PACWI. Mr. Chris Smallbone (Australia) stressed the need to see POCWA/PACWI to be more involved on Regional Activities to provide projects and solutions through the applications of welding technology.

Mr. Eddie Ko together with other delegates felt the need for POCWA/PACWI to address and find possible solutions to the current shortage of welding engineers, technicians, NDT personnel and welders. This is indeed a challenge to several countries with major engineering projects that would require qualified welding personnel.

The meeting concluded with a proposal to establish a discussion forum on the internet to review the important issues affecting individual member country. These relevant issues will then be brought up for the Group to act upon at the next FABTECH International and AWS Welding show.
The FABTECH International & AWS Welding Show is by far the largest event in North America that showcased a full spectrum of welding equipment and technology, metal forming, fabricating, and tube & pipe. This year the event was held at McCormick Place Convention Centre in Chicago, Illinois from 11 to 14 November 2007.

There were over 1000 exhibitors and over 4000 pieces of equipment displayed on the show floor, up from last year’s 2000 number of equipment. Exhibitors were from all over the world, including Taiwan and China; and the number of registrants was of record high of over 11,000.

Similar to last year, one of the main crowd drawers of the show was the Innovation Theater that provided over 25 exhibitor-led product and technology demonstrations that were free-of-charge and located right within the exhibition. The Leadership Summit, addressing on the skills shortage in U.S. Manufacturing, was also held in this Theater. It had attracted an audience of over 200 people. Anticipated to be the crunching concern in the industries, the one-hour session proved to be insufficient time for the moderator and group of panelists to address the numerous questions from the floor. The panelists consisted of representatives from the Department of Labor, Mayor’s office of Chicago and a director of Manufacturing R&D Caterpillar. An interesting fact from the worldwide demographics presented is that in 5 to 10 years time, about 76 million of skilled workers will retire and there are only about 46 million people ready to replenish this shortage. Majority of these skilled workers are made up of welders, carpenters and plumbers.

The AWS Opening Session and Annual Business Meeting similarly touched on the severe shortage of skilled welders as current key concern in the USA. There are about 500,000 welders residing in USA this year, out of which about 50,000 will leave the industry or retire. The number of welding students is far fewer than the number of welders leaving and it is envisaged that by 2010, there will be a shortage of about 200,000 “skilled welders”. Apparently, this phenomenon is globally recognized too.

Some approach that AWS had put forth and worth noted here include having a creative scholarship program to motivate high school students into joining the welding profession and conducting talks in schools. Other proposed approaches included outreach initiatives to the local levels and attracting more women into this profession. Lastly and most essential issue was to raise the image of welding. Welding has often been associated as a ‘dirty’ profession, and one suggestion put across was to clean up the welding shops. There has also seen much improvement in terms of comfort and re-design or appeal (to look futuristic) with regards to the welder’s gear, particularly the welding mask/helmet, as can be seen from some of the exhibitors’ products.
A two-day international conference “China Shipbuilding Summit 2007” was successfully organised by Merisis Consulting in Shanghai, China between 18 and 19 October 2007. The conference provided a platform on the topics of industry trend, technology, and management for technical experts and senior managers of shipyards.

The 140 participants came from China, Greece, India, Norway, Philippines, Russia, Singapore, South Korea, Turkey, UAE, UK and USA. Professor Zhou Wei, Chairman of Welding Technology Committee of Singapore Welding Society, was invited to give a presentation on “Applying Advanced Welding Technology to Shipbuilding”. He provided an overall picture on applications of welding technology to shipbuilding industry and highlighted the latest technological development in friction stir welding and laser welding.

Talk on Welding at China Shipbuilding Summit 2007

W. Zhou*  
Nanyang Technological University  
*E-mail: wzhou@cantab.net

Photo taken by Mr Hanley Varghese showing Professor Zhou Wei of Singapore Welding Society making a speech on advanced welding technology at China Shipbuilding Summit 2007.
We have the pleasure to have Mr Lesley Wandelrup from Avesta Welding AB to present a talk on “Stainless Is Not Always Stainless”, a talk which interest many. Despite the wet weather, we have 52 members attending this talk.

In this paper, the characteristics of stainless steels and the various treatment to retain the stainless characteristic of austenitic and duplex stainless is described. The effect of various chemical and mechanical treatments like picking, passivation and other treatments were discussed.
Effect of Various Factors on Toughness in P92 SAW Weld Metal
C.Chovet,E.Galand,B.Leduey
AIRLIQUE - CTA5,SaintOuenl'Aumône,FRANCE

Effect of creep enhancers

Influence of Boron
Although the effect of B has already been proved, we tried to precise its influence. A baseline wire containing 13 ppm Boron was compared to a modified wire in which B has been removed from the formula. Figure 3 shows the two transition curves. The 50J transition temperature is decreased by about 25°C for the weld metal without Boron. 50J level was chosen to have a safety margin versus usual requirements (27J at room temperature).

As B is added in the parent material for creep purpose, we considered that it cannot be removed from the formula, despite its detrimental influence on toughness. The B range of the weld metal has been chosen in the lower range of the base metal.

Figure 3: Effect of B on Charpy transition curve.

Influence of Nitrogen
Due to its strong austenite former effect and its ability to form precipitates, Nitrogen is highly susceptible to play a role on toughness. Effect of Nitrogen amount in weld metal has thus been investigated as a potential way to improve toughness values at room temperature. Nitrogen has been kept comfortably over the minimum level of the base material to safely guarantee creep resistance. As can be seen on Figure 4, in a narrow range 400-500 ppm included in the base material range, Nitrogen is rapidly deteriorating toughness values. The deterioration is particularly sensible above 450 PPM.

Nitrogen is prone to combine with B to form Boron nitrides BN. At these levels of B and N, coarse BN are likely to form. These Boron nitrides may be the reason for deteriorated toughness values. On the other hand, very low N levels will certainly induce an increase of delta ferrite content. We thus considered that N level should be kept below 450 ppm but above 400 ppm.

Influence of Tungsten
Tungsten is added in P92 steel to give improved creep resistance and high temperature strength. It has been shown that W-containing welds have a consistently worse toughness than W-free welds.

However, in the 1.2-1.8% Tungsten range, no clear effect of Tungsten increase on room temperature toughness appears (Figure 5). Data have been split in two sets considering previous observations of Nitrogen effect. Again, effect of Nitrogen on toughness level is important, even if one must note that the range of Tungsten in which two data sets are overlapping is quite small (1.35-1.5%).

Tungsten being a ferrite stabilizer, it seems anyway judicious not to increase too much Tungsten in the weld metal deposit even if up to 1.8% no adverse effect is seen on toughness level.

Figure 4: Influence of Nitrogen on toughness at room temperature.

Figure 5: Influence of %W on toughness at room temperature, for different N levels.
Effect of Carbon and Chromium

C and Cr content were also varied, as they were expected to influence toughness level. Carbon varied from 0.07% to 0.12% and Chromium from 8.0% to 9.6%. Figure 7 and 8 illustrate the effect of Cr and C respectively, for two Nitrogen levels. It appears that variation of Cr through the range 8.0 - 9.6% has no influence on toughness level. The main impact on toughness level in Figure 7 is Nitrogen. Figure 8 in turn shows that Nitrogen has a greater effect than Carbon. However a slight decrease of toughness at room temperature can be observed as C content increases, for higher N contents.

Influence of Titanium

Titanium addition to the weld metal deposit has proven to be a good creep enhancer but detrimental on toughness. In order to assess this behaviour, a level of 160 ppm has been targeted in the weld metal, base level being 40 ppm. Toughness level is deteriorated by this small addition of Titanium (Figure 6). 50 J toughness level is obtained at -20°C for the deposit bearing 40 ppm Ti and +35°C for the deposit containing 160 ppm Ti.

Tensile properties are greatly increased by a 160 ppm Titanium addition, UTS from 730 MPa to 818 MPa, YS from 588 MPa to 699 MPa, elongation decreasing from 22.3% to 16.3%. This increase in tensile properties has obviously an adverse effect on toughness values. However the effect of Titanium on microstructure has not been investigated during this study.

Microstructural examination

The variation of chemical elements as performed during this study is likely to have an effect on microstructure. In particular, Cr as a strong ferrite former will tend to increase delta ferrite. On the contrary N will act as austenite former and a decrease in N will increase delta ferrite. Chromium equivalent parameter \( C_{req} \) (Equ. 1) can be used as an indicator of the susceptibility of the chemical composition to form delta ferrite. Values of \( C_{req} \) were then determined for each deposit and microstructural examination were performed for different \( C_{req} \) values.

\[
C_{req} = \%Cr + 6\%Si + 4\%Mo + 1.5\%W + 11\%V + 5\%Al + 8\%Ti - 40\%C - 2\%Mn - 4\%Ni - 2\%Co - 30\%N - \%Cu
\]  

Equ. 1

Cross sections were cut in the all-weld-metal deposits in as-welded conditions and prepared by metallography. The samples were etched with Vilella’s reagent and examined by optical microscopy. Microstructures in as-solidified zones are presented on Figure 9. All deposits show a predominantly martensitic structure. In the case of high Cr, below 8, almost no delta ferrite can be observed. The deposit having a \( C_{req} \) of8.8 shows a high quantity of blocky delta ferrite. These observations confirm that almost no delta ferrite develops for \( C_{req} <8 \).

In reheated zones (Figure 10), the microstructure is also martensitic, with carbides at prior austenite grain boundaries. In the case of high Cr deposit, narrow bands of delta ferrite can be observed at austenite grain boundaries and triple points.
Figure 9: Examples of microstructures obtained in as-solidified zones in as-welded conditions for weld metal showing various C<sub>req</sub> level. Vilella’s reagent.

Figure 10: Examples of microstructures obtained in reheated zones in as-welded conditions for weld metal showing various C<sub>req</sub> level. Vilella’s reagent.
Change Comes Bearing Gifts
-an excerpt from Dr Price Pritchett's New Work Habits for a Radically Changing World

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http://www.asia-pritchett.com

Work is getting global. Jobs are going virtual. Business is being conducted in ways that were simply impossible a few short years ago. The economy is shifting more and more toward services, and toward knowledge work. Before long, top management absolutely won’t be able to run things the old way, even if it desperately wants to.

New technologies – especially computers and telecommunications – have already created intense, worldwide competition for business. Soon, competition for your very own job could come from practically anywhere on earth.

Careers have already quit working like they used to. That’s not really anybody’s fault. But employees and organizations are very much at fault if they, too, don’t change in order to adapt.

It does us no good whatsoever to complain or be bitter about what’s happening. In fact, such behavior can only do us harm.

We waste precious energy if we resist, get angry, or give in to grief over all that’s being lost. We jeopardize our future if we cling to old assumptions and expectations about how careers should operate.

Frankly, the world doesn’t care about our opinions. Or our feelings. The world rewards only those of us who catch on to what’s happening, who invest our energy in finding and seizing the opportunities brought about by change.

And change always comes bearing gifts.

Considering the scope and speed of change these days, there will be precious gifts – many priceless opportunities – for those of us who lay by the new rules, position ourselves right, and take personal responsibility for our future.

Meet the challenge.
Hypertherm’s sole focus has always been on superior metal cutting solutions; and nowhere is that focus clearer than in our full line of Powermax portable plasma cutting systems. They’re designed, engineered, rigorously lab and field tested to be the best and have set industry benchmarks for consumable life, cut speed and reliability.

Each Powermax system utilizes leading-edge, patented features and consumables for unmatched metal cutting from gauge to 1-3/4”. Each delivers exceptional performance and reliability while offering high duty cycles for mechanized applications. Hypertherm’s 3-year warranty assures top performance in the harshest environments.

Talk to your Hypertherm distributor about optimizing your metal cutting with Powermax; or get more information on the web at www.hypertherm.com.
**Technical Bulletin**

The following articles are extracted from AWS Welding Journal, Cinde Journal (Canada), Welding in the World (IIW).

1. **Comparison Radiographic and Automated Ultrasonic Inspection of Pipeline Tie-in Welds.**

   Automated Ultrasonic Inspection is replacing conventional radiography on pipeline projects for two primary reasons: accurate flaw sizing capabilities and speed of inspection...
   
   - Connelly and B Gross  Cinde Vol 28 No 2

2. **Portable Phased Array Girth Weld Scanner**

   Since the arrival of portable phased array instruments in the last few years, one of the main attractions has been more cost-effective weld inspections. Phased arrays generally offer the following potential...
   
   - M Moles & S Labbe, Olympus NDT Canada  Cinde Vol 28 No 2

3. **Improvement of Fatigue Life of Welded Structural Components by Grinding**

   To improve quality and reduce lead-time in production of large two-stroke diesel engines, several producers have requested welded steel constructions to substitute cast iron structures...
   
   - Hansen, H Agerskov and J Bjornbak-Hansen  Welding in the World Vol 51 No 3/4

4. **GMAW Shielding Gas Flow Control Systems**

   Typical changes in shielding gas flow restrictions caused by spatter in the welding gun nozzle, spatter clogging some of the welding gun gas diffuser ports, bends in the welding cable...
   
   - G D Uttrachi  Welding Journal  Apr 2007

5. **Assuring Accurate Preheat Temperature**

   Accurate preheating prior to welding reduces the changes of cracking and other problems...
   
   - R Hornberger  Welding Journal  Apr 2007

6. **Equations for Estimating the Direct Costs of Arc Welding**

   The table below presents suggested formulas for estimating arc welding costs. Cost factors of weldments for a proposed project or product should be researched and verified to assure actual costs...
   

7. **Arc Cutting and Gouging**

   Fumes and Gases: Arc cutting and gouging produce fumes and gases that may be hazardous to your health. The fume and gas byproducts usually consist of the oxides or the metal being cut...
   
   - Excerpt from Welding Handbook Vol 2  Welding Processes Part 1

8. **Effects of Sheet Surface Conditions on Electrode Life in Resistance Welding Aluminium**

   The surface of aluminium sheet was cleaned with three different methods, then each surface was tested as to its effect on electrode life...
   
   - Z Li, C Hao, J Zhang and H Zhang  Welding Journal  Apr 2007

9. **A Wavelet Transform-Based Approach for Joint Tracking in Gas Metal Arc Welding**

   A new system was developed for joint tracking and control of the GMA welding process based on CCD sensors without an external light source...
   

10. **Examination of Crater Crack Formation in Nitrogen-Containing Austenitic Stainless Steel Welds**

    Cracking sensitivity in 317L and 904L was evaluated for welds introduced with nitrogen up to 5 vol-%.
    
    - D Nage and V S Raja  Welding Journal  Apr 2007

11. **Fabrication of a Carbon Steel-to-Stainless Steel Transition Joint Using Direct Laser Deposition - A Feasibility Study**

    Results indicated a graded joint with a smooth microstructural transition is possible...
    
    - J D Farren, J N DuPont and F F Noecker II

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**A Face-Lift for SWS Website**

**SWS Website New Look**

We have launched a new look to our website. Visit us at [www.sws.org.sg](http://www.sws.org.sg) now!
SWS Membership for the months of September, October & November 2007

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<th>September 2007</th>
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<td><strong>Corporate Membership</strong></td>
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<tr>
<th>November 2007</th>
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<tbody>
<tr>
<td><strong>Corporate Membership</strong></td>
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<tr>
<td>Chow Phui Leong</td>
<td>Director</td>
<td>Tanklink Engineering &amp; Construction Pte Ltd</td>
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<tr>
<td>Lee Hwee Leng</td>
<td>Manager</td>
<td>Long Wei Construction &amp; Engineering Works</td>
<td></td>
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<tr>
<td>Kelly Goh</td>
<td>Director</td>
<td>JKM Technologies Pte Ltd</td>
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<tr>
<td><strong>Full Membership</strong></td>
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<tr>
<td>Dr Shashi Bhushan Kuamr</td>
<td>Sr Materials/Integrity Engineer</td>
<td>Det Norske Veritas</td>
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Exclusive Benefit for SWS Members

The SWS Jacket is available exclusively to its members! Made from top quality micro fabric materials, the jacket provides superior warmth without adding extra weight to the user. Coupled with its versatile reversible design, the heavy-duty zip-up on the front and the elasticised wrist cuff guarantee comfort without sacrificing style; perfect for everyday wear!

Members may now purchase the jacket at $45 per piece. Interested parties, please contact Ms Carol Lau (Secretariat of iMOS) at (65) 6779 7706 for more details.
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