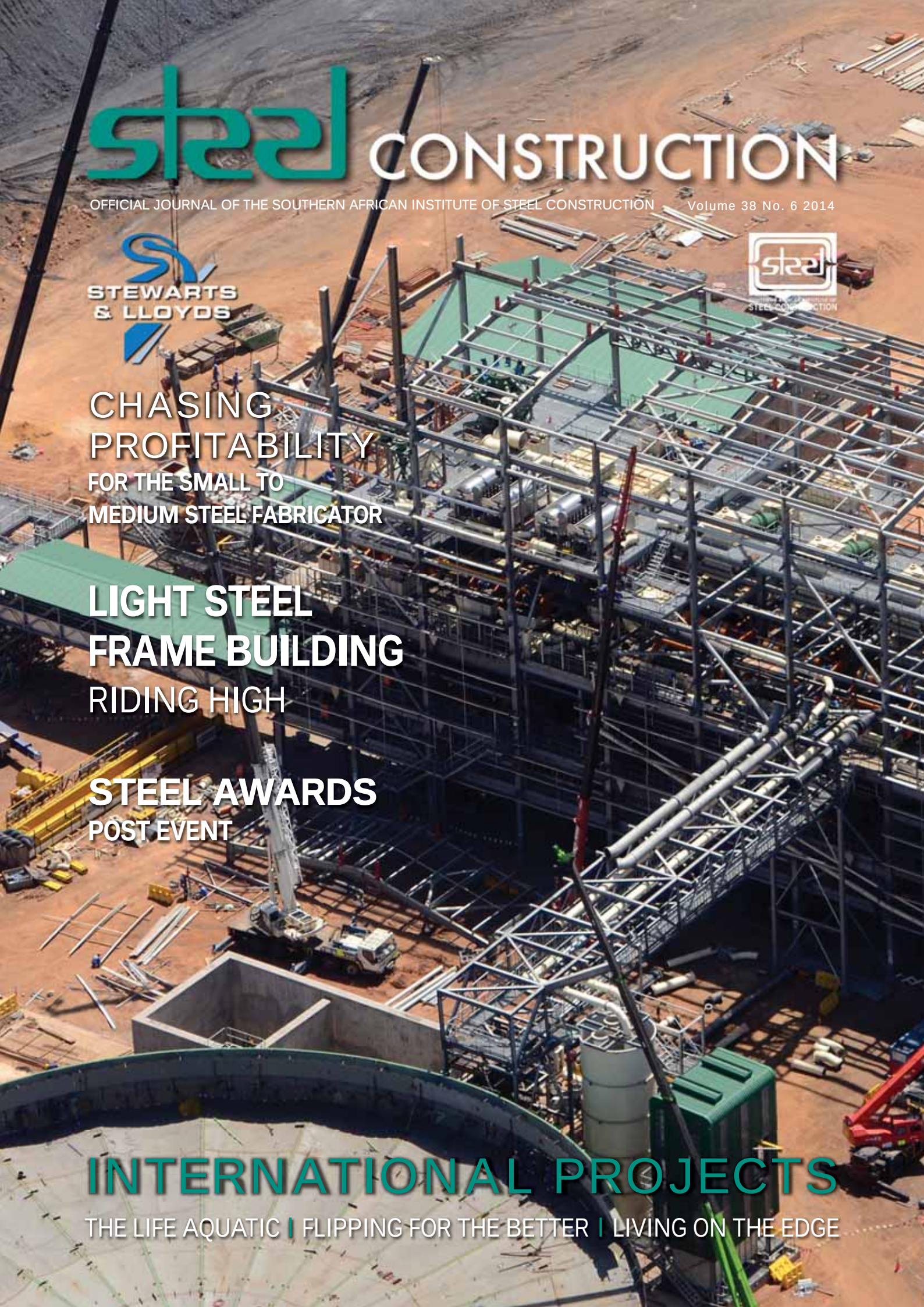

steel CONSTRUCTION

OFFICIAL JOURNAL OF THE SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION Volume 38 No. 6 2014

STEWARTS & LLOYDS

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FOR THE SMALL TO MEDIUM STEEL FABRICATOR

LIGHT STEEL FRAME BUILDING
RIDING HIGH

STEEL AWARDS
POST EVENT

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Front Cover:
Project: Tweefontein Optimisation Plant
Contractor: S.M.E.I. Projects

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Volume 38 No. 6 2014

OFFICIAL JOURNAL OF THE SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION

in this issue...

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acting editor's note

Renee is off sick, so yours truly is standing in. The SAISC team wishes Renee a speedy and full recovery and look forward to her return. Any revamp that Renee is considering as mentioned in her Editor's note, edition no. 4, will be on ice till she returns!

Apologies in advance to our readers if this "barbarian engineer's" lack of editing skills show up too badly.

The Postal strike has badly impacted upon our ability to deliver this edition (as well as Volume 38, No. 5 2014). SAISC is having a serious look at a way to go electronic in the future, but our experience with electronic journals we realise it will have to be a user friendly version. For sure, those of us who are busy can pick up a hard copy and flick through it, literally in seconds, and pick out those articles that will be of interest. So far that has proved not to be so easy with e-journals.

Another steel awards has come and gone. Feedback indicates that the Johannesburg event was one of the best ever. The overall winner was superb by any standards, but it was really Professor Lee Berger, the developer (on behalf of Wits University) who brought a new dimension to the event. Thanks Lee! He is an exceptional speaker and his positive words about steel construction was worth more than a thousand adverts.

As we wind down the year, in this edition please read Spencer's light hearted article on new theories related to the structural steel process. Thanks to his students over the years for their innovative all be it miss guided answers to test questions for the material for this article.

From the whole SAISC team we wish you a peaceful, safe and enjoyable festive season and a great new year, drive safely and come back in the new year fully refreshed to meet the challenges of the new year.

BBBEE: is training one real way forward?

By Paolo Trinchero, Chief Executive Officer, SAISC

Many of our members may know that the SAISC has been participating in the Construction Sector Charter Council and the alignment of the Construction charter with the new generic BBBEE regulations. The negotiations and codes provide significant challenges to us all. One of the most common threads however is that industry and in our case the steel industry has not been able to attract, train and retain sufficient numbers of black entrants. This is something we need to work on and change.

> "The single biggest problem in COMMUNICATION is the illusion that it has taken place"

As much as we would like, we cannot divorce politics and business in South Africa. Business relies on politicians or rather government to provide an enabling environment which encourages business to thrive and grow. But our complex history means that we are faced with the challenge of constant changes in regulation and red tape which seem to be constant barriers to business.

The SAISC is passionate about training our next generation so we can continue to take advantage of opportunities in South and Southern Africa. This is also the mechanism where we as the SAISC can make the biggest difference to transformation. We have now launched the SAISC "Steel Academy" with the first set of courses taking place on the 11th and 12th of September 2014. The student response was enthusiastic and positive due to the combination of experience, practical applications and mentoring.

The Academy will cover a range of courses and training opportunities from typical engineering design courses, to competitiveness and contractual issues through to business development.

Keep an eye out for our back to basics programme for business development, marketing and sales people. We would like to find a mechanism of working together as an industry to promote our excellent material namely "STEEL". There are a number of large construction projects out there that could benefit from using more structural steel.

During the ongoing construction sector negotiations it was brought to our attention that there are a number of black candidate engineers who require additional training opportunities and mentorship to get them professionally registered. We need to put our heads together to ensure that we assist candidates connected to the steel industry.

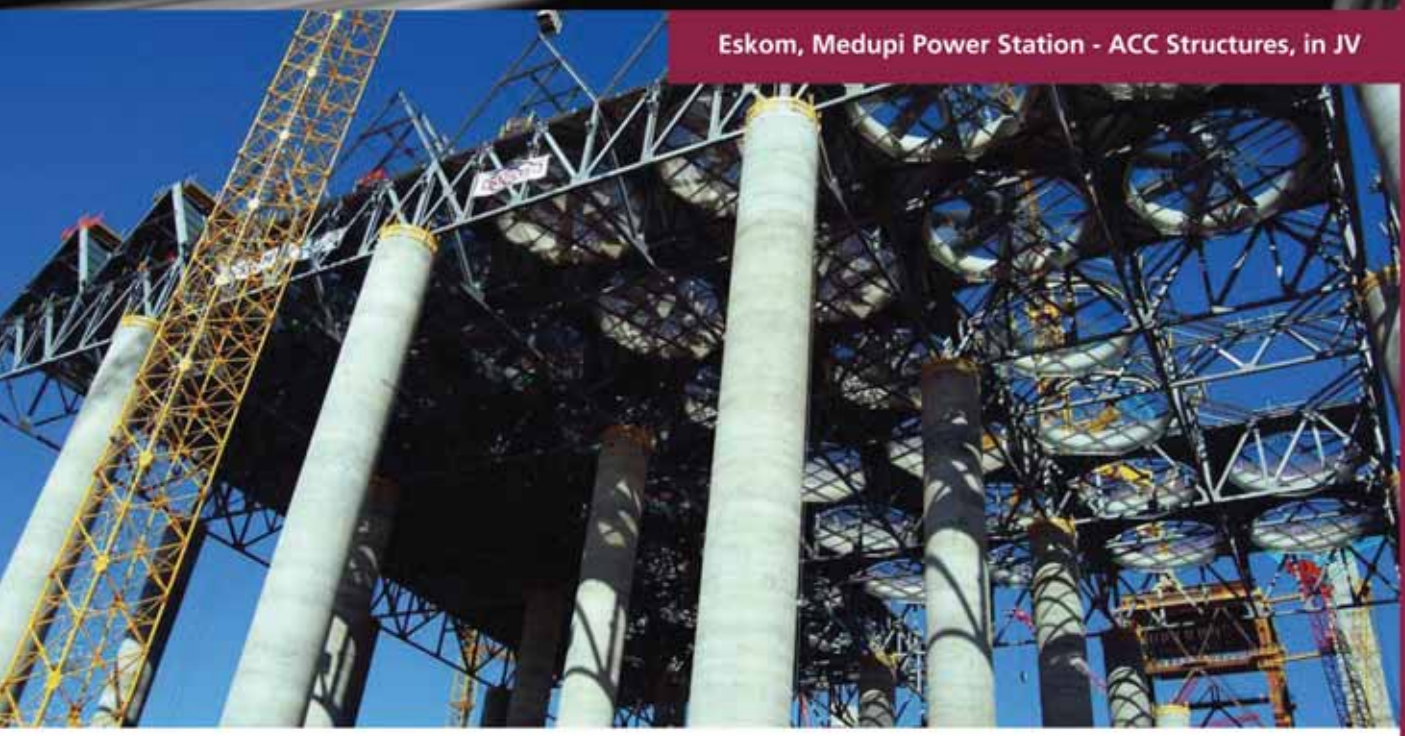
At a recent council meeting looking at competitiveness and productivity, an Eskom/POLASA workshop and the STEELDAY breakfast on Medupi, we find that there is a common thread to many of the problems we are experiencing in the construction industry. We need to devise better ways of working together and communicating as part of large project teams.

It was fascinating to gain insight into projects where the contractual, labour, safety, environment, quality control and inspection are playing a significant role in cost and time overruns. This is clearly something we need to spend more time on.

Lastly the postal strike has caused a number of problems for all of us particularly the effective distribution of our magazines. *(We apologize for not being able to get you your regular dose of steel news and are looking at alternative electronic distribution methods.)*

CADCON

STEEL CONSTRUCTION AND ENGINEERING



Eskom, Medupi Power Station - ACC Structures, in JV

Established in 1987, Cadcon, as a vibrant and reputable entity, has grown into a leading steel construction, designing and engineering organization involved in major projects in and around Southern Africa and internationally. Cadcon operates from their 15 400 m² workshop and office facilities in Centurion, Pretoria, housing state of the art machinery and latest technology CNC plate, beam, angle, cutting, drill and saw facilities serviced by 20 overhead cranes. Cadcon has also implemented the FabTrol System providing drawing management, material nesting, purchasing, inventory control, production and CNC management, shipping and more.

Eskom, Medupi Ducting Supports, Lephalale

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Overall Winner SAISC Steel Awards 2011
Sandton City - Protea Court Rooflight, in JV

Furthermore, Cadcon's unique packages include the design and supply of buildings through Mictec, Cadcon's in-house engineering design department. Additional services include crane, truck and trailer hire.

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A SUCCESS STORY *by year 5...*
S.M.E.I. PROJECTS

By Viv van Zyl, SAISC Membership Consultant and Reneé Pretorius

The active participation of Senior Management, who have personal stakes in the company, ensure that their projects receive the best attention at all times. This unyielding dedication to the successful execution of their projects ensures that safety, quality, time and cost goals are achieved.

ABOVE LEFT: Conveyor work is just one speciality.

ABOVE RIGHT: Tweefontein Optimisation Plant steelwork.

OPPOSITE PAGE LEFT: Grootgeluk Expansion Project.

OPPOSITE PAGE RIGHT: Leach plant tanks and steelwork.

Contact: Sandy Pratt
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Fax: +27 11 914 4108
Email: smei@smei.co.za:
Website: www.smei.co.za

Success seems to be the password for a company established as recently as 2002. The vision of Sandy Pratt and his co-directors, could not in their wildest dreams have predicted that after only five years in business they would be named as the first winner of the Go4Growth prize.

Go4Growth is South Africa's richest business competition with prizes worth more than R14-million.

S.M.E.I. Projects, a Boksburg-based construction firm was judged the most growth-orientated company from a shortlist of 10 finalists. The entry count was over 200 companies.

The entries came from companies that have an annual turnover ranging from start up to R500-million. 20 different industries were represented, ranging from IT, engineering, transport, industrial, retail and medical. Employee numbers from as low as a sole owner who does everything right through to companies who boast 500 or more.

Their growth record since inception obviously impressed the judges and the S.M.E.I. Projects directors were overwhelmed with this achievement.

What's next?

"Whats next?"...you ask! Well between 2008 and 2014, S.M.E.I. Projects have quadrupled their growth, and this, under real tough circumstances. This company is recognised as one of the industries leaders in their field, by their customers and their industry. S.M.E.I. Projects' growth since winning this sought after prize in November 2007 up until now (accumulated revenue in excess of R 5 Billion) – is in one word, **PHENOMENAL!**

Who are these people?

S.M.E.I. Projects is a privately owned multidisciplinary construction enterprise specialising in the supply and erection of structural, mechanical, piping, electrical and instrumental solutions.

The main focus of this highly successful company is to the medium to heavy construction in the mining and industrial sectors, with strategic plans of expanding both locally and internationally.

There is no doubt that they have the infrastructure, capacity and flexibility to successfully fulfil any project irrespective of size and/or location. They have an impressive list of projects across the face of Southern Africa which include most mining houses and EPCM contractors active in South Africa. You can have a look at their impressive list on their website at: *www.smei.co.za*

Empowerment?

S.M.E.I. was pleased to announce the conclusion of an empowerment transaction in March 2014 that sees KDI Mining and Investec participating as 25.1% Black Ownership shareholders. The management is particularly excited at the potential for new and previously un-explored opportunities that BEE empowerment brings.

KDI Mining brings a wealth of experience to S.M.E.I. Projects' board of directors with the inclusion of Kuseni Dlamini – (former head, Anglo American SA Operations) as a Non-Executive Director. Kuseni heads his own finance company KDI Holdings and has a most impressive resume after leaving The University of Kwazulu Natal with a BA (Hon (Cum laude) (Natal) MPhil (Oxford) degree in 2003.

As a socially and economically aware company, S.M.E.I. Projects are committed to redress any social and/or economic inequalities that may exist within their company. They view BEE as an integral part of South Africa's growth and development plan and must be implemented in a co-ordinated and integrated manner, as recommended by the Black Economic Empowerment commission.

Training

As they recognise that to transform their people and the society for their personal betterment and the company's, they view their Human Resources as their greatest asset. They have instituted a comprehensive training program to enhance their employee skills and develop talent that may be latent. S.M.E.I. Projects are continuously encouraging all employees to self-improvement and skills development.

What about safety?

Safety is a major priority within their organisation and their comprehensive health and safety systems ensure that all risks are identified and mitigated within their working environment. Their systems are aligned with the internationally recognised OSHAS 18001 standards. Management's continual and un-relenting focus on achieving a ZERO Lost Time Injury rate has garnered recognition from many of their appreciative customers. Again this long list of their safety awards and achievements can be viewed on their website.

To what do they attribute their success?

S.M.E.I. Projects is a well-established, and now empowered, company that contributes a wealth of experience to the construction industry.

The active participation of Senior Management, who have personal stakes in the company, ensure that their projects receive the best attention at all times. This unyielding dedication to the successful execution of their projects ensures that safety, quality, time and cost goals are achieved.

Their well established network of suppliers and sub-contractors, and their project management controls ensure that their time and delivery commitments are kept for projects of all magnitudes. Their large fleet of mobile cranes, in excess of 50, and their core competency teams ensure that projects are executed on time and to their client's satisfaction.

Their continued safety record is a source of pride, and demonstrates their commitment and dedication to ensuring a safe working environment for all of their employees.

To reiterate: S.M.E.I. Projects was formed with the vision of a specific need in the industry to look after the client's interests unconditionally and to ensure timeous completion within budget constraints by using the best quality and safety standards possible. This will ensure lasting client relationships.

This vision is achieved by the direct involvement by Senior Management, in the various projects, this involvement brings a more personalised approach not only to the various projects but also in long term relationships, something sadly lacking in our hectic business environment.

Please visit their website to see the wide array of successful projects and appreciate why they are so successful.

Great achievement, Sandy and your team.

Editor's note: *Clinton Jones, Pr Eng, a senior member of their team is an ex SAISC bursar. Those long term investments in human capital of the 1990's is having it's payback today.*

A busy year in the backroom

BUT NOT IN THE DARK

By Dennis White, Director SAMCRA

In the year since SAMCRA came into being we have concentrated our efforts on the drafting of a new standard for metal cladding as well as updating and aligning various existing standards and manuals relative to our industry. Much time was also spent lobbying for tighter control of materials sold into the informal sector with particular reference to the RDP build.

New cladding standards

We are pleased to announce that the draft of the new standard for cladding has been completed. This standard not only complies with the requirements of the National Building Regulations but also with other international standards. Subjects covered include types of material, durability of coatings, fasteners and ancillary items together with criteria for the design and installation of profiles. There is also a comprehensive procedure for the testing of profiles and the presentation of results which will assist both engineers and specifiers in the selection of cladding profiles. Future technical work will be the drafting of a standard in the SANS 2001 series to replace the largely redundant SABS 1200-HB.

SAMCRA is also actively participating on a number of SABS technical committees which has afforded us a valuable insight into the workings of the construction industry as a whole as well as other allied industries. A further benefit is the opportunity to assess the impact of developments in other industries on that of metal cladding. The concept of making the marking of all coil used in the production of cladding with the manufacturer's name, material grade plus coating type and thickness compulsory has been widely accepted by members of the committees. Hopefully this will contribute to the eradication of the corrupt practice of substituting inferior materials (often sourced from foreign countries) for those specified.

Regulating the industry

Preliminary work on the establishment of approved test facilities for cladding profiles has yielded interest from a number of parties. It is our intention to reach an agreement for the establishment of such facilities to coincide with the introduction of the new cladding standard at the beginning of next year.

Whilst the metal cladding industry which consumes twenty two percent of all steel used for construction (which equates to about 11% of all steel used in SA) remains largely unregulated our lobbying, together with that of other parties, for tighter control of the supply of noncompliant cladding materials into the construction industry has been acknowledged by government departments who have begun an investigation into the matter. The implementation of the metal cladding standard and updated existing standards will certainly have a positive impact on the industry.

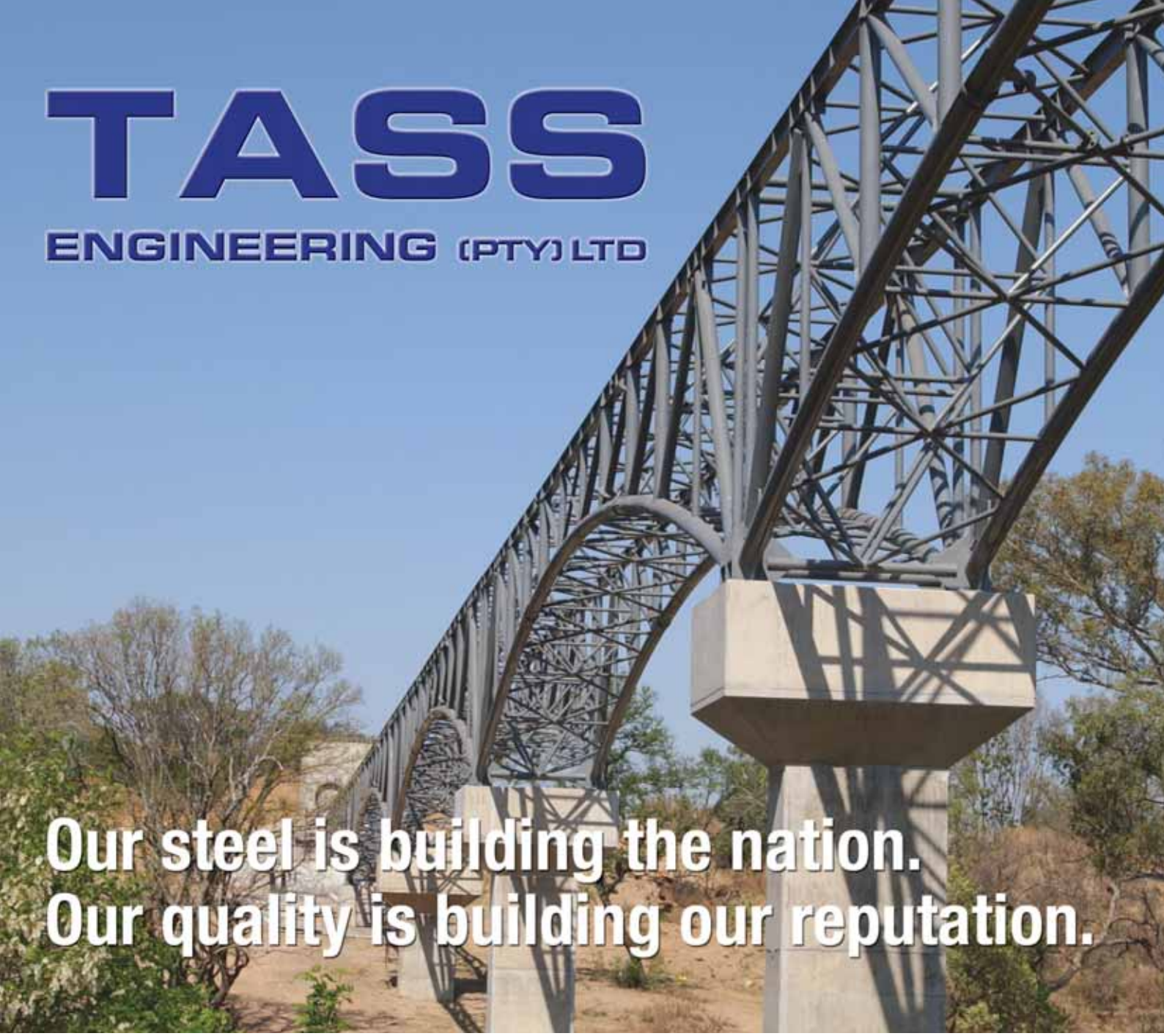
Training courses

Unfortunately the drafting of the new cladding standard took longer than anticipated which has delayed the start of our training programme. A workshop for architects and quantity surveyors, which will qualify them for CPD points, has been prepared and submitted for approval. We expect to present the first of these workshops early in 2015. A number of company specific workshops have been commissioned, the first two of which were presented during August and September, having been delayed by the recent strike action in the metal industries. We have jointly, with SASFA presented a proposal for a series of workshops, to be present in all the main centres, for building inspectors.

Like most participants in construction the cladding industry suffers from an acute shortage of skilled labour particularly in the field of installation where there is no recognized trade. It is our intention to address this matter in the future.

THE CONCEPT of making the marking of all coil used in the production of cladding with the manufacturer's name, material grade plus coating type and thickness COMPULSORY has been widely accepted by members of the committees.

SAMCRA
SOUTHERN AFRICAN METAL CLADDING AND ROOFING ASSOCIATION



TASS Engineering has been actively involved in structural and architectural steel fabrication and erection for more than four decades.

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- 1st Ave Warehouse, Longlakes (675t) - Capital Property Fund
- New Sentech Masts (650t) - Sentech
- Sandton Repositioning Phase 3 Office Tower Cladding - Liberty Properties
- Sandton Atrium on 5th Cladding - Liberty Properties
- Razomart Warehouse (350t) - Razomart
- Warehouse Columbia Pharmaceuticals (250t)
- DSTV Head Office, Randburg (100t) - Multichoice
- Sedibeng Brewery Extension (650t) - Heineken
- Frankenwald Warehouse (480t) - Capital Property Fund
- Incubation Hub (240t) - Century Property Developments (Pty) Ltd
- Sandton Office Tower, New Spire - Liberty Properties
- Menlyn Maine Central Square (250t) - Menlyn Maine Investment Holdings

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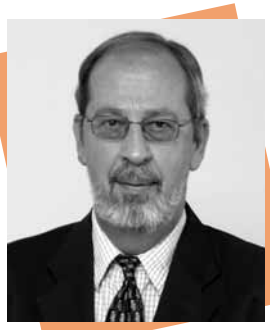

LIGHT STEEL FRAME BUILDING RIDING high

Renee held an interview with John Barnard and reports back...

The steel consumption of the Light Steel Frame Building Industry (LSFB) has grown to 25 000t per annum of high strength galvanized steel sheet, achieving double digit annual growth rates over the past five years. This is according to John Barnard director of the Southern African Light Steel Frame Building Association (SASFA). "The biggest growth of LSFB is in the cladding of multi-storey office and commercial buildings, where it is replacing heavy masonry curtain walls," Barnard says.

> "John explains that one of the central reasons for the success of the LSFB method has been the ongoing training initiatives, undertaken by SASFA with the help of the industry at large, to protect and enhance the quality of LSF buildings."

He adds that at the recent Steel Awards, 19 LSFB entries were received – almost a third of the total number of entries! The category winner was the McDonald's outlets by the Silverline Group. This range of structures highlights many of the attributes of the product. "There is no doubt that LSFB has come of age in South Africa. In the last eight years it has become a viable alternative building method for a range of low to medium rise buildings fully accepted by engineers, architects, quantity surveyors, builders and the financial institutions."

Training

John explains that one of the central reasons for the success of the LSFB method has been the ongoing training initiatives, undertaken by SASFA with the help of the industry at large, to protect and enhance the quality of LSF buildings. This year, the training, which focused on designers, building contractors and building inspectors, included:

- A 6-day LSFB training course for builders in Alberton, Windhoek, Durban and Midrand. A total of 79 people attended bringing to 245 the total number of people who have successfully completed the course. The course presented in Namibia was the first outside S.A. borders with students attending from the DRC, Zambia and Namibia.
- A lecture to University of Pretoria final year building science students, which was delivered to a full lecture room – 110 students.
- Lectures to assessors for the banks in Sandton. Some 80 assessors attended.

Codes and standards

From inception one of the most important tasks of SASFA was to develop codes and standards for the then fledgling LSFB industry, which it did successfully. John reports that this year work has started on a comprehensive revision of SANS codes and standards with the following being achieved in the process:

- Representation by SASFA on the SANS 10400L (roofs) committee of the SABS, to ensure that LSF is correctly covered in the code revisions.
- Representation by SASFA on the SABS committee SC98C, which is responsible for all standards dealing with steel or aluminium in building and construction.
- Representation by SASFA on the working group tasked with the revision of the NHBRC handbooks.
- Thorough revision of SANS 517 which should be completed by year end.

Accreditation and quality control

Another important milestone for the LSFB industry in 2014 was the assessment by the University of Stellenbosch of the three LSF

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building systems in use in South Africa, which were accredited as suitable for use in his country.

"This is a significant step forward for the industry and to keep the momentum going, final preparations are underway to roll out certification process of LSF builders throughout the country," Barnard says.

In terms of quality control, John says that SASFA is playing an increasingly important role in ensuring the highest possible standards in the industry. "For example, SASFA was recently approached by three clients who were not satisfied with their LSF buildings. The technical aspects of the projects were investigated by SASFA and remedial measures agreed with the builders. We believe that it is now clear to the industry that one of SASFA's key roles is the 'policing' of standards and that we will act swiftly and efficiently to bring into line any sub-standard service providers," added John.

Market expansion

John says that a growing number of enquiries from neighbouring countries are being received. "SASFA has signed up members in Namibia and Zambia, and is in contact with several other countries in the SADC region. From a local perspective John reports that there was a net gain of ten members, proving that the strategy formulated to expand membership is having the desired effect.

"Overall the LSFB market is growing significantly and indications are that this trend will continue well into the future," Barnard says.

The proof of the pudding is in who is using the method. "There are several high profile users including McDonald's South Africa, which is changing its building philosophy embarking on rolling out sustainable light steel frame building (LSFB) restaurants across the country. Other fast food chains are also adopting the LSFB route.

By using LSFB on their restaurants material wastage is reduced by an average of 30%, transport costs by 80% and the carbon footprint is significantly reduced. On top of this, McDonald's is able to cut back the construction period required, opening the outlet four months earlier than if more traditional building methods had been used. Currently times are down to three months from start to selling of burger number 1, that's going some!

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ISF Australian visit demonstrates market CHALLENGES, OPPORTUNITIES

By Neels van Niekerk, Director ISF

"However, **COMPETENT** project management in Africa **remains elusive** and it is here where South Africans and South African companies **excel.**"

Background

The International Steel Fabricators of South Africa (ISF) reports that there were no real surprises on its recent annual 'pilgrimage' to Australia. "As expected, the number of new mining projects remains limited and are therefore fiercely competed for by the engineering houses," says ISF director Neels van Niekerk. "The net result is that the Engineering, Procurement and Construction Management (EPCM) companies are under exceptional pressure and the shrinking and reorganising phase continues unabated."

Van Niekerk says that successful members of the ISF visit Australia – an important centre of mining and mining engineering houses - throughout the year but, in addition, every year the ISF leads a specialised delegation, limited to seven companies including structural fabricators, civil contractors, tank suppliers, etc. in order to make formal contact, as a group, with the most active Australian clients.

"This arrangement ensures that our member companies are exposed to a wider and more effective client audience including senior executives from both the engineering and procurement departments," says van Niekerk.

He adds that this also assists in demonstrating to the Australian market – and through it to other important global players – the size and quality of the South African industry as well as its willingness and ability to partner in projects and fast-track them where possible.

The main cities visited were Brisbane for soft rock mining and Perth for hard rock mining developments. As usual the visit concluded with the South African delegates as well as additional members attending the well-known Africa Down Under Conference and Exhibition where the ISF always has a stand.

Market findings

Van Niekerk emphasises that the Australian EPCM companies have been careful to ensure that their core competencies have not been affected by the shrinking and reorganisation phase as a definite optimism exists that the tough economic conditions in the mining industry have bottomed out.

"Over the years, most of the large EPCM companies invested heavily in large 'procurement' offices in China. These offices were a requirement because, firstly, some mining capital equipment today is almost exclusively supplied from China – e.g. large mining mills – and, secondly, the need to inspect quality and compliance into the end product and to maintain constant pressure to maintain schedule.

"Even when the Australian mining sector came under pressure the investment in these 'procurement offices' was maintained in order for these EPCM companies to keep a tight control on the relationships with the Chinese companies," van Niekerk says. "This policy has to a large extent worked and one of the results is that it is not easy for a new South African supplier to break into this procurement 'investment."

He adds, however, that most of these EPCMs admit that even after a decade of Chinese buying, the challenges remain and that structural steel is increasingly being sourced from elsewhere like, for example, Thailand, the Philippines and also a return to South African supply, to which many EPCMs are turning, especially for plate-work destined for Southern and Central African projects," van Niekerk says.

Another major challenge that this visit emphasised is the 'price per ton' budgeting practice in the purchasing systems. "EPCMs are, in the main, required by their clients to have, at least as an option, 'cheaper Chinese supply', "Van Niekerk says. "This often results in a specification using lower Chinese steel strength standards and profile sizes which, in turn, results in heavier structures - typically between 20% and 50%! – when compared to using the higher steel strength specifications and profile sizes used in Australia, Europe and South Africa," he explains.

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He adds that this is exacerbated by the fact that this 'per ton' procurement is mostly executed by procurement staff who are not structural engineers resulting in even more expensive (or equally priced) structures than if the goods had been supplied, for example, from Europe or South Africa.

Shift from EPCM to LSTK for new mine development

Van Niekerk says that he also saw that the shift in the market from the EPCM model to the Lump Sum Turnkey (LSTK) type models for new mine development is continuing.

"Until about two or three years ago the most common practice in the construction industry was for the client to outsource the total responsibility of the contract to EPCM companies who, in turn, outsourced various aspects of the contract to other specialist suppliers. Due to typical cost overruns of over 100 to 150% for project completion, a clear shift towards the utilisation of the LSTK type contract model developed," van Niekerk says.

"In EPCM-type arrangements the project risk is mainly borne by the client. Because the LSTK arrangement brings more of a team-like scenario to all the players involved in a contract, risk is shared more equitably and other important factors like schedule and quality will take their rightful place in the overall equation," van Niekerk says.

He adds that another shift that is occurring is the increasing number of mining houses retaining the overall control of projects including the procurement. In these cases only the engineering is procured from the EPCM companies.

"Both shifts are more favourable for our local industry as procurement is then not only based on budget "per ton" prices as is often the case in the EPCM model, but also on the more holistic approach of assessing total costs, schedule, quality, risk, etc.

Future of South African suppliers for Australian controlled African mining project development

According to van Niekerk the bottom line is that South African suppliers must realise that although they can be price-competitive and even cheaper on a completed project basis, their clients do not necessarily understand or accept that. Furthermore steel structures can today be competitively purchased for Africa from Europe, Africa, the East etc. and South Africa does not necessarily have an edge on this.

"However, competent project management in Africa remains elusive and it is here where South Africans and South African companies excel. For those South African structural steel companies that are prepared to continuously interact with their international clients through 'round-table' discussions on the above principles and which are offering more than just an ex-works or FOB service, the future in Africa remains promising," says van Niekerk.

He warns though, that for the fabricators that are not prepared to get involved in this process it will remain best to avoid the relatively expensive marketing directed at Australian companies. These South African fabricators should rather focus on the few remaining Johannesburg-based EPCM procurement offices," he concluded.

The Life AQUATIC

by Peter Olendzki, P.Eng.

BIM brings structural and visual optimization into Toronto's angular new aquarium.

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TOP: Ripley's Aquarium of Canada.

ABOVE: Peter Olendzki (peter.olendzki@entuitive.com) is a design engineer with Entuitive in Toronto.

Lake Ontario holds nearly 1 000 cubic kilometres of water. A few hundred yards north of the lake, in downtown Toronto, sits another body of water – tiny in comparison but impressive in terms of biodiversity for its size.

At 12 500 square metres – and holding 5 600 cubic metres of water and more than 13 500 marine and freshwater creatures – the recently opened Ripley's Aquarium of Canada is one of the country's largest aquariums.

Designed by local firm B+H Architects in collaboration with San Diego's RJC Architects, who developed preliminary interior design, the aquarium is open 365 days a year and is expected to draw in millions of visitors annually to its permanent and special exhibits and associated educational programming.

The building's geometric complexity and programmatic requirements called for an innovative approach to project design and documentation. Key design considerations included structural accommodation of the multi-facetted aluminumclad building envelope, large expanses of glazed façade and long column-free sightlines throughout the space.

Building information modelling (BIM) played a crucial role in the project's delivery. It served as a platform to investigate and test various structural framing solutions in a 3D environment, which ensured comprehensive capture of all complexities, and facilitated coordination and collaboration between consultants, including streamlining the overall fabrication and construction process.

Unobstructed views

The entrance lobby of the structure was designed to represent the crust of the earth breaking open to reveal an entrance to the

aquatic world. To achieve this, a 12 metre high curtain wall façade wraps the perimeter of the entrance. The need for an unobstructed view to the interior precluded the use of any vertical bracing. Alternatively, HSS 150 x 150 horizontal plan bracing was used, translating loads down to the braced main core through two horizontal V-braces with member sizes varying from HSS 150 x 150 to HSS 254 x 254 on extreme ends of the lobby for lateral stability.

The building's steel framework, incorporating 700 tons in all, provided large open spaces and long, unobstructed sightlines to the aquatic exhibitions. The placement of each steel column was carefully scrutinized, with the aesthetically optimum solution resulting in a layout of irregularly spaced columns (size optimization was performed after column locations were determined using SAP2000). To establish a vertical bracing arrangement against wind and seismic loading, the team took advantage of the architectural layout, which provided an opportunity for a braced core at an optimal location near the center of the structure. This was then augmented with carefully coordinated braces around the perimeter of the structure to address the torsional behaviour of the structure under lateral loads. HSS sections were chosen to address the high axial loads in both tension and compression loading. The long spans required to achieve column-free views within exhibit spaces were accommodated with W1000×249 (W40×149) beams reaching spans of 29 metres. The simple, crosssectional geometry of the beams ensured an even coating of the entire surface area with a three-part, anticorrosive paint system (especially important considering the high humidity and various saltwater exhibits in the building) of zinc-rich primer, epoxy and a polyurethane topcoat.

Simplifying complexity

Incorporating BIM into the structural design process played a crucial role in expediting the creation of the structural analysis model and accommodating changes to the framing systems. Ensuring careful modeling of the steel in Tekla allowed the engineering team to use the modeled members as part of the structural analysis model. This model was completely developed in Tekla, including fixities and preliminary loading, and was then exported via an application programming interface, API, to SAP2000 for analysis and design. Changes in the model could easily be exported throughout the project as updates were made, a process that ensured the BIM model, analysis model and contract documents were constantly in sync.

Coordination was especially challenging. In addition to the traditional architectural, mechanical, electrical and structural coordination, additional life-support systems (LSS) and electrical systems unique to the exhibits had to be integrated throughout the building. Preconstruction modeling, done in Revit and Navisworks by the consultants and contractor, ensured systems were properly in place virtually before being installed on-site.

While the primary structure created its own design complexities, the real challenge was in framing the perimeter cladding systems. The main goal was to identify a form of repetitiveness in the framing, considering the

PROJECT TEAM

Owner
Ripley Entertainment

Architects
B+H Architects, Toronto
RJC Architects, San Diego

Structural Engineer
Entuitive, Toronto

General Contractor
PCL Constructors, Inc.

Steel Team:
Fabricator
Benson Steel Ltd., Bolton, Ontario

Erector
McCormick-Campbell Steel Services, Bowmanville, Ontario

Detailer
Compusteel Detailing Services, Inc., Ft. Erie, Ontario

ABOVE: Key design considerations included structural accommodation of the multi-facetted aluminium-clad building envelope, large expanses of glazed façade and long column-free sightlines throughout the space.

BELOW LEFT: A Tekla model of the primary and secondary structural systems.

BELOW RIGHT: An overlay of the structural, mechanical and life support system models.

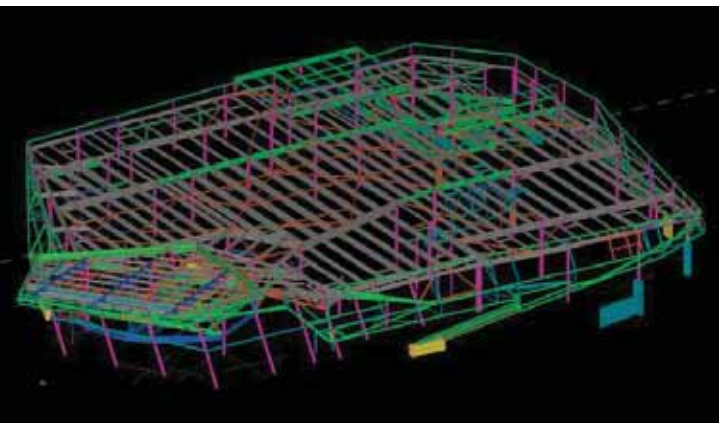
seemingly random geometry that surrounded the structure, to simplify fabrication and erection. The architectural Revit model was imported into Tekla, creating a 3D-based blank canvas for which our engineering solutions could be developed. After reviewing the position of the cladding relative to the primary structure in various areas, a framing scheme emerged in which some form of repetitiveness could be achieved. Framing for the cladding system girts was attached to the main perimeter structural columns in order to achieve the desired geometry. This scheme allowed the use of a small number of relatively similar connection details that were typical for each frame. Double angles were used for the frames to allow simpler connection back to the main structure.

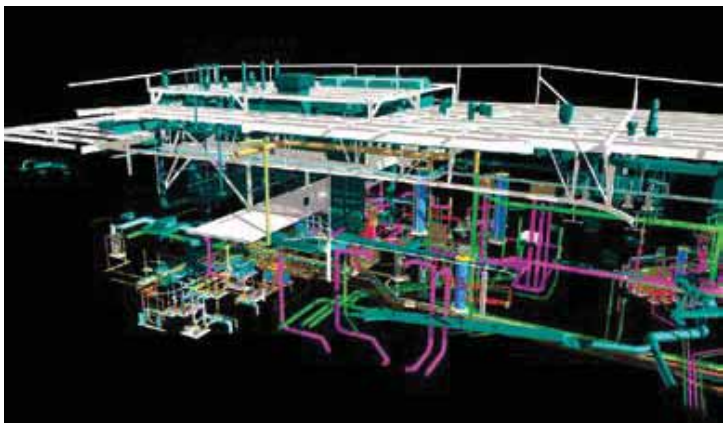
Two architectural "legs" branching off the structure, forming walkways into two separate entrances, also created unique framing challenges with their non-orthogonal geometry, providing another opportunity for BIM to facilitate development of a framing scheme. A finite-element analysis showed the legs attracted much more lateral and gravity forces than initially assumed. This was mitigated by providing sliding bearing plates at the base of both legs.

As it sits in the shadow of the CN Tower, a special design criteria for the aquarium was to ensure any ice falling from the tower would not penetrate the roof. In addition to concrete pavers on the roof, intended to break up the ice, the steel deck was specially designed to withstand the force exerted by the impact of falling ice.

BIM snapshots

An interesting structural challenge was encountered in the project at the contract documentation phase. Many months were spent developing and modeling the intricate detailing required for the cladding framing, but when the time came to translate these designs to traditional 2D sections and elevations, no number of sections could fully capture the complex geometry. Each new section cut required more sections to capture the framing in this area, which is why we chose to use isometric details throughout the project.





Initially, significant time was invested in creating various traditional 2D sections of areas with complex framing. Sections cut from Tekla were exported to AutoCAD to clean up line work, as the non-orthogonal and sloping framing was not clear. It was quickly determined this method was very ineffective for two reasons: First, trying to accommodate minor architectural tweaks in the structural framing was inefficient, as each section needed to be re-exported and cleaned up; and second, it seemed that every section called for another two sections to clearly illustrate that area.

We eventually decided to use 3D isometric detailing and elevations to present the required framing; in essence, "snapshots" were taken from our BIM model. All connection forces and additional information typically shown in 2D sections were also included. The challenge now was to communicate the geometry of the building to the fabricator.

B+H Architects developed a clever solution by documenting the 3D coordinates of all points where cladding panels met (these values were extracted from the Revit model). This allowed any trade with 3D modelling capabilities to model the planes of the cladding defined by the given coordinates. In the case of the fabricator, once the planes were modelled, a cladding thickness was provided to ensure the steel framing was offset by the proper amount. Using our drawings and the Tekla model, the fabricator was able to develop shop drawing-ready framing with minimal problems.

Pushing the envelope

The emergence of BIM as a commonplace tool for designers is leading the conversation on best practices for optimum, cost-effective and client-focused solutions. Visualizing, developing, creating and delivering projects in a 3D environment provides significant opportunities for project delivery, setting a new standard that enables rapid testing of solutions that generate the best options for project goals. Cutting-edge software and technology enable architects and engineers to envision and create design solutions that were previously unattainable, opening new doors to the imagination and pushing the envelope of what is possible in the built environment. This was certainly the case with Ripley's Aquarium of Canada.

Ensuring **CAREFUL modeling** of the steel in **TEKLA** allowed the engineering team to use the modeled members as part of the **structural analysis model.**

Flipping for the BETTER

By Anne Fougeron, Fougeron Architecture

COOL CONVERSION

What steel offered in this home was flexibility – flexibility to design a façade that can harness available and abundant natural light, and flexibility to create a structured staircase that does not dominate the space but instead blends in with it.

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Some buildings just don't jibe with their surroundings.

Like many San Francisco homes, the Potrero Hill home that eventually became the Flip House poorly integrated its many levels with each other and failed to do justice to its sloping topography. The floor plan felt enclosed despite its size. Not only that, but a bedroom blocked the unbelievable city view and there was only one miniscule deck (hardly enough for even the most modest of grills).

The challenge was redesigning this disjointed home with a new modern aesthetic, but doing so without completely tearing down the existing envelope. Light was the driving motivation for the project, which was designed by Fougeron Architecture. In order for the interior's potential to be maximized, its exposure to the outside had to be completely reconsidered. This meant recasting the solar orientation of the home and reconnecting it to its striking landscape. The new primary façade has faceted, custom-built glass walls divided into three vertical panels made of HSS. These sections push in and out, creating a dynamic prism, exploiting and animating natural light as well as the spectacular views. The HSS, measuring only 50 x 75mm, were custom-made for the project, cut and welded into one-story pieces in the shop, then assembled on-site. Glazing was applied over the HSS and custom steel stops to cover the joints and provide complete waterproofing.

The interior of the home also needed functional circulation, not only for the homeowners but also for natural light. While creating an open floor plan was intrinsic to making a more useable, more flowing space, design cannot forget how floors interact with each other. The pivot point had to be the transition from the various floors, which meant creating one rear staircase that smoothly linked all three levels and the garden below. The staircase uses a central piece of round steel as the stringer, giving the stairs an almost floating quality. The treads and risers were made of perforated steel, which provides a great deal of transparency by allowing light from the back of the home to shine through.

Above all, what steel offered in this home was flexibility— flexibility to design a façade that can harness available and abundant natural light, and flexibility to create a structured staircase that does not dominate the space but instead blends in with it.

Living on the EDGE

By Tanya Kennedy Flood, Read Jones Christoffersen

COOL WALKWAY

Glacier Skywalk is one of those engineering feats that takes your breath away – mostly because it places you 280m above Jasper National Park's (Canada) Sunwapta Valley.

The 30m curved glass walkway extends 35m from the cliff face and features interpretive stations to engage and educate visitors about the Skywalk's glacial home in the mountains. By cantilevering the structure, prime consultant and structural engineer Read Jones Christoffersen, Ltd. (RJC), was able to give owner Brewster Travel Canada (Brewster) the thrilling experience it wanted for visitors.

Brewster wanted to create an experience that would connect guests with the natural environment and provide them with an opportunity to view the Sunwapta Falls in Canada's Rocky Mountains and enjoy the beauty of Jasper National Park. The site that they provided was the side of a cliff along the side of a highway, and it was important for the design to maximize the impact of the site while respecting the natural environment.

The project team – RJC, Sturgess Architecture and PCL Construction Management – wanted to push the sense of exposure and therefore decided that the best way to approach this would be to construct a glass-floored walk area.

When considering the best structural system to use, it was critical that it could respond to the surrounding environment, and as such the team opted not to go with a high-tech cablestayed system, but rather to cantilever the structure. This offered the advantage of not having to perform work down the face of the cliff and also minimized the amount of visible structure.

When contemplating which materials and construction methods would be most appropriate, RJC considered the local site restrictions, the importance of blending the structure into the natural surroundings, long-term durability and ongoing maintenance requirements, budgetary considerations and a rapid construction schedule.

Structural steel was identified as the best option, provided that durability and mainte-

nance concerns could be addressed. Weathering steel was selected because as it rusts, it forms a protective layer over itself, preventing further corrosion of the steel. The result is a steel product that can be left exposed to the elements – and in the case of this project the color of the weathering steel would blend in naturally with the surrounding geology.

The steel for the main structure is further enhanced by the sensitive addition of a weathering steel plate. These plates give an irregular, angular appearance to the platform and disguise the more pragmatic-looking structural girders. The steel sheets serve to further promote the Skywalk as an extension of the existing landscape as opposed to an imposition. This theme is carried along the project length and incorporated into elements along the cliff-edge walkway and throughout the interpretive stations.

Glacier Skywalk opened to the public on May 1. Visitors say that the view through the glass floor is amazing and a little scary – exactly as it was intended to be.

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HEMPEL *supplies* 170 000 litres paint for E4 SUNDSVALL BRIDGE

Work commenced in spring 2011 on the Stockvik-Skönsberg stretch of the E4 European Route project in Sweden that includes the construction of 33 different bridges. A specific Hempel sales and R+D team in Germany and Sweden came together under German leadership to design and implement the supply of 170 000 litres of coating materials for the new Sundsvall Bridge, the 2 109 metre flyover spanning the Sundsvall Fjörd at a height of 33 metres due to open to traffic in autumn 2015.

The prevailing environment in Sundsvall is DIN EN ISO 12944 classed as C5M-high marine atmosphere with wet, saline sea air, severe weather variability and sub-zero temperatures in winter. The Swedish authorities awarded the order to the joint venture "Sundsvallbroen PBM" (PBM = Arge partner: E. Pihl & Son, Max Bögl, Josef Möbius AG). For Max Bögl GmbH & Co. KG, Germany's largest private steel construction firm, this represents the company's biggest bridge construction project to date. Amongst other references for the project is Strelasund Bridge, Stralsund, which is also in the Baltic Sea and painted with Hempel.

For exposed bridge structures, the system being used is a shop-applied 3-coat system based on a zinc-rich primer of HEMPADUR PRO ZINC 1738G, followed by a two-component mineral iron oxide coat of HEMPADUR MASTIC 4588F, and finally a high-solid PUR-Topcoat of HEMPATHANE 55610 tinted to RAL 7037 dust grey. This system is NORSOK M-501 certified and provides fast-curing, high-performance, permanent protection for harsh weather-exposed steel. In accordance with Norsok standards Hempel has a proven track record for protecting offshore wind turbines and oil and gas platforms erected in similarly aggressive environments all over the world, as well as an important differentiating factor, in that the Hempel system calls for just one intermediate coat and therefore represents faster turnover in the production shop.

For inside, unexposed bridge parts, a single layer of HEMPEL'S 457DE two-component, polyurethane coating with zinc phosphate is used. A second NORSOK certified system, comprising an aluminium pigmented primer and intermediate coat of HEMPADUR MASTIC 4588W, covered by a topcoat of RAL 7037 tinted HEMPATHANE 55610, is being supplied on site in Poland and Sweden for pre-assembly and assembly parts and repairs. This two-component, polyurethane topcoat provides good gloss and colour retention to ensure that the bridge continues to display the full merits of this feat of international engineering for many years to come.

SUNDSVALL BRIDGE
REALISATION: **2011 - 2015**
COATING SYSTEM DESCRIPTION:
HEMPADUR PRO ZINC 1736G
HEMPADUR MASTIC 4588F
HEMPADUR MASTIC 4588W
HEMPATHANE 55610

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for the Small to Medium Steel Fabricator

Becoming a low cost producer has to be the single most important goal of any fabricator. And improving productivity is the only way that this goal is achieved – steadily, incrementally, and methodically. One-step at-a-time.

Story and Photos by Danny Steyn, BSC Mech Eng

About Danny Steyn

Danny Steyn is a mechanical engineering graduate from the University of Natal (Durban, South Africa) now living in the USA. Through Ocean Machinery, he and his partner Hunter Fry, have completely re-written the way that small to medium fabricators process steel.

Danny has had the privilege of visiting more than 6 000 steel fabricators around the world and with over 900 Ocean CNC machines installed worldwide, he has a rare insight into the way fabricators around the world are addressing the ever increasing issue of labor productivity.

Background

It was late 2001. The boom was over. NASDAQ and the tech sector had imploded and come crashing down just a few months earlier. The US economy was in a state of turmoil and uncertainty and fear was written on everyone's faces.

Yet there we were, a very small and relatively unknown machinery company, selling CNC automation into small mom-and-pop steel fabricating shops across the USA at a rate completely unheard of before.

How was it possible that in the midst of this drastic downturn in the economy, that we were selling more machines than in any time in our history?

At the time we were just as surprised by our success as anyone else, but with hindsight and analysis, it became clear to us that there was a strong macro trend emerging in the fabricating arena, and it was now for the first time happening at the level of the small to medium fabricator.

Let's face it, there's no way to sugar coat this; life as a small to medium steel fabricator has always been a pretty tough way to make a living. Just getting started was hard enough. You needed a bottomless pit of money, expensive machinery, a good location, patient vendors, great cash flow, steady paying customers and an expensive skilled, energetic and well-disciplined workforce. No one said it was going to be easy.

And for the most part small steel fabricating shops are either swamped with work or don't have enough work, and their owners are always too busy with the day to day pressures of satisfying customers, chasing up orders, dealing with uncooperative vendors and employees and the never-ending administration of running a business that they have built painstakingly from scratch. They seldom have the time to give much thought to how they can be making incremental productivity improvements in their operations. For the most part they just keep on doing what they have always done, and for most fabricators, productivity is an often-misunderstood term.

But unless the fabricator gets out from under this cycle, and seriously starts looking at productivity, there will be a lot of hard work, sweat and grind, and very little profit at the end of the day.

And to complicate matters, in countries where fabricators have always had access to an abundant supply of relatively cheap labor, and an ON-OFF approach to labor, they have been able to crew up when we are swamped with work, and trim down when they are short of work.

This ON-OFF approach to labor has had long-term negative effects on our understanding of how to make productivity improvements. In other countries where employees are typically very difficult to terminate, owners take a long hard look at all possible options prior to hiring a new employee who might end up being employed for the next 20 years! Two of the most commonly considered tactics are outsourcing (contracting) the work, or investing in machinery to do the work, as the machine can be paid off in a few years and it will continue to work for free for many more years, while the new employee will require a salary for as long as they are at the company.

Becoming a low cost producer

When commodity mineral prices are going through the roof, no-one cares about productivity. Mines need the steel now and are prepared to pay. But no commodity prices remain elevated indefinitely. They always come back down, and that's when you know you can't continue doing it the same old way.

Becoming a low cost producer has to be the single most important goal of any

fabricator. And improving productivity is the only way that this goal is achieved – steadily, incrementally, and methodically. One-step at-a-time.

So how do you start going about this process of becoming a low cost producer?

By and large, the costs for all fabricators with respect to their steel costs, wages, overheads, consumables etc, are all very similar. And most have very little ability to control these costs. The only real variable in the mix is how many man/hours he has in each ton of fabricated steel. By extracting man/hours per ton, the fabricator is able to dramatically lower costs, improve the bottom line, and be more competitive in the bidding market.

One of the first areas that should be addressed is any tedious repetitive manual operation that can easily and economically be extracted from the fabricating process. Throwing labor at a problem often appears on the surface to be the quick and easy solution, but experience dictates that this is often the most expensive approach in the long term.

With the ongoing improvements in steel fabricating machinery, many activities that have traditionally been done manually can now be done with some form of automation, and the cost of automating the plant has dropped to very affordable levels. And nowhere is this more apparent than in the approach to beam fabrication.

In the past, the small to medium fabricator had two options; either manually lay out and mag-drill the holes, or he could invest a tremendous amount of capital in a conventional beam drill line. For the average fabricator this was always out of his reach, but nowadays there are several options designed to increase the productivity of the hole drilling process.

But if you just focus on the cost of layout alone, the most expensive person on the shop floor, your layout man (also known as the marker in SA terminology), has to repetitively layout a variety of parts including, beams, base plates, angles, channels etc., and yet, the actual process of laying out adds ZERO value to the steel. It is only the subsequent processes of drilling / punching / welding etc., that actually transform the profile and add value. So here we are with this conundrum – our most expensive man adds no value.

So from purely a cost perspective, layout has to be the area we focus on first. So how do we remove the layout activity from the process of fabricating steel?

Extracting man hours per ton

Today there are fortunately many affordable solutions on the market and all of them embrace some form of automation, essentially CNC fabrication. In the realm of beam fabrication, the proven solution for the small to medium fabricator doing less than 400 tons per month, is the single-spindle beam line like the Ocean Avenger. With more than 600 of these machines installed in 60 countries worldwide, it is this machine that has literally transformed fabrication for steel fabricators that would never otherwise be able to afford larger and more expensive multi-spindle beam lines.

And the flexibility of the single spindle drill to process the entire spectrum of profiles including angles, base plates, channels, stair stringers etc. has made it very attractive to even the smallest of fabricators who do miscellaneous metals and just a hint of structural steel. Moreover, the ability to tackle the heaviest jumbo columns, as well as large tonnage projects, has allowed the steel fabricator to cast the net to a far wider range of jobs than he had traditionally gone after, and because of this we have seen many small fabricators with exceptional tonnage and revenue figures for relatively small shops.

Furthermore, with the advent of the 3-D detailing software that has become so prevalent and more affordable, the ability to import data from the detail drawings, directly to the CNC machine, essentially eliminating the unnecessary costly and potentially inaccurate step of laying out the steel, has made additional improvements in productivity, speed and accuracy.

Workflow and material handling are also two of the most overlooked areas in small fabricating shops. Steel is heavy and it takes expensive labor to move it. Those fabricators who have taken the initiative and studied the material handling aspect of the structural steel business, using standard time and motion studies, are horrified to find out that as much as 50% of their labor costs go into moving the steel out of raw material storage, through the various processes on the shop floor, and finally to finished goods.

Obviously any process that reduces material handling goes a long way to improve profitability. Good overhead cranes, conveyors, beam flippers and other simple-to-introduce systems will greatly reduce the double and triple handling that robs companies of their profits.

The future

Going back to our first ventures into CNC automation back in 2001, our original feelings were that we would expect that around 10% of the small to medium fabricators would adopt some form of CNC fabrication. Today the picture is significantly clearer. Except for the smallest of shops, 100% of ALL small to medium fabricators will HAVE to make the transition to CNC fabrication, in order to remain in business. They have NO option. It's no different to the way we had to embrace the fax, cell phone, internet and email, despite how much we might have resisted at the beginning.

It is absolutely crystal clear. It is no longer possible to throw labor at this work, and expect to see any profits left at the end of the day. Making an investment in your company, its employees and its future will reward you handsomely. And as we all know, the sooner you do it, the sooner you perfect its use and the sooner you start getting the gains.

They say it's "the early bird that catches the worm" and this holds true in embracing change. Putting off the inevitable is delusional, and moreover it's robbing you of precious time to become competitive and highly profitable.

We wish you an enlightening journey on this quest to become more efficient and profitable. Don't hesitate to contact me if you want to learn more about how we have changes the lives of hundreds of fabricators around the world.

Danny Steyn
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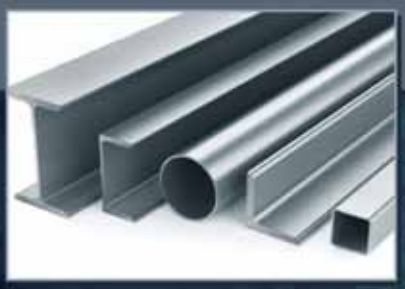

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NEW THEORIES RELATED TO THE STRUCTURAL STEEL PROCESS

By Spencer Erling, Education Director, SAISC

It is just three and a half years since the first article in the series was written, *(see Volume 35 No. 2 2011, Some gems from Spencer's Steel Enlightenment Course for Wits students)*, a whole bunch of courses later we have enough material for a follow up article. Our grateful thanks goes out to our "innovative but somewhat misguided students" usually in the form of (incorrect) answers to test papers

Background

The courses are usually offered in the last week of the student's vacation, either at year end or mid-year breaks. You would think that some of the students were working under extreme pressure or round the clock before attending the program (during vacation huh?) but more likely extreme partying because some of them walk in (quite often late) sit down and fall asleep even before they have to listen to one word of my, apparently to them at least, boring subject and delivery.

So it is no surprise that we do get the really garbage answers to straight forward questions from some of our not so good candidates. Of course as the lecturer you begin to question yourself and your (in) ability to get the message across... fortunately with experience you learn who these wonderful answers are coming from and can ignore their poor, sleep driven, performance.

The course is an attempt to introduce second year civil engineering students to the whole structural steel process literally from digging iron ore out of the ground to handing over the proverbial front door key. Part of the course is dedicated to field visits to tube makers, fabricators and to erection sites. Some of the questions are aimed at finding out if they have learnt something from these visits in addition to the lectures. All of the questions are straight forward multiple choice or one line answer type. There are no trick questions but we would like to know if the students can think broadly enough to "join some of the dots"

New welding theories

We spend a good two hours covering weld processes, types (fillet / groove), sizes, positions (flat, vertical up etc), defects and how to find those defects (NDT) but the emphasis is on the fact that we use either flux around or in the rod to create a gas shield to keep the nasty's in the air away from the molten pool (SMAW or FCAW) or we deliver a gas shield to point of welding (GMAW).

Upon being asked a question to which we would expect an answer along the lines just described some of the proposed new methods would be (sic)

- The use of Airtight welders *(a pity about his need to breath...)*
- Use a gun which has the ability to remove the gases from the welding pool *(should we try a 45 magnum...???)*
- Using a (paint) primer or other protective *(paint protective to welding?)* coating
- Submerging in water... and along similar lines
- Add water to the weld (to cool off the heat/ melt) *(now that should keep the welder guessing just who in the process has gone crazy)*

When asked to describe some common weld defects (expecting an answer like cracks, lack of fusion, shape and or size of the weld, distortion) the latest defect is...

- Ingots *(yup I guess an ingot could do some real damage to a weld...)*

When asked to explain how the welding up of tubes along their length in a tube mill differs from normal (SMAW, GMAW, FCAW, SAW) methods we expect an answer along the lines that induction welding using heat and pressure only and no filler wire is used in tube mills. Tube makers here is new one for you to try (sic)

- The hollow section is fed with carbon from within the tube and melted by heated arc to form the weld

Bolt issues

Yes we all know there a lots and lots of issues around bolts, bolt grades, new bolt specifications and, and, and of course tightening of bolts correctly. The SAISC has for a long time now followed North American methods of tightening HSFG and other preloaded bolts (rather than the torqueing methods adopted by European specifications). Clearly this is an important subject and receives it fair share during the (limited) time available. The turn of the nut method is described carefully and emphasised several times. So sure, one of the questions is to describe the method.

Now pay attention all of you involved in the process of pre-loading bolts. Stop wasting your time and energy you can just (sic)

- Weld the HSFG nuts

Fire protection issues

Why we need to passively fire protect steel and how we do it is the subject of one of the talks. The reason why is ascribed to the fact that at 600°C temperatures steel has lost 70% of it's yield strength, something that usually leads to collapse. One of my favourite questions is why we passively protect our steel expecting the above explanation as an answer.

Readers in the opinion of one of our budding geniuses we have our theory totally wrong because (sic)

- The greater / higher the temperature degree, the higher the yield strength of steel.

We have been missing out on some readily available easy to apply materials for passive fire protection. The latest suggestions are...

- Plastic
- Glass
- Vinyl
- Paper
- Timber
- Using a layer of copper around the structure since copper is a bad conductor of heat

And the winner by far...

- Galvanizing and mixing it with alloy to make it more brittle *(shoo! I am clearly confusing them... must remember to try not to confuse them so much in future)*

Painting issues

Some time is spent on the fact that steel rusts and that we need to prepare the steel suitably removing rust and other not desirables (i.e. wire brush, shot blast, acid dip etc) to receive paint, the role of prime coats etc.

We have lost out on a very common building material to assist with rust removal

- Concrete encasement

Metallurgists who might read these words of wisdom, did you know that the new role for prime paint is (sic)

- To get to know the quality of the steel

Cladding materials

Naturally any good course on the structural steel process will cover how we enclose our structures (clad) and we cover metal, fibre cement, precast elements, glass and high density polystyrene (LSFB) methods but sadly we have been missing out on two readily available products (with apologies to our recycling industry...)

- Recycled cans
- Motor cars

Steel and concrete interfacing

Finally the course covers the interface between steel structures and concrete foundations and the need to create the ability to adjust the steelwork to suit the (often) incorrect holding down bolts.

I emphasise the need for our steel to be adjustable. That is the answer I expect to the question I have occasionally set.

They get full marks for the one word "adjustment"

The following treatise received no marks... but does highlight how easily the students can confuse and mix the different parts of the course (sic)

- Transferring the loads through the base plate into the foundation by a method that wont allow the bolts and the base plate to easily corrode the concrete and create spaces in these connections. Adding a flux between the plate and concrete can do a lot to spread the load uniformly *(at a guess he meant grout not flux...)*

Disclaimer.

Finally a serious word of warning, do not apply or use any of the above theories or methods without extensive research and testing which I think would be a whole waste of time and effort. If you do, it is at your own risk.

SOCIAL SNIPPETS

By Marlé Lötter, Events Manager, SAISC

STEEL AWARDS 2014 – POST EVENT

18 SEPTEMBER 2014

RIGHT: Prof Lee Berger (left) receives the Steel Awards 2014 ASTPM Tubular Category award from Colin Shaw, director of the Association of Steel Tube and Pipe Manufacturers of South Africa, on behalf of the Malapa Fossil Excavation site project team.

ABOVE: The Light Steel Frame Category award for 2014 was awarded in Cape Town to the project team of McDonalds Outlets.

ABOVE: Members of the Tugela River Pedestrian Bridge (KwaJolwayo) receive the Steel Awards 2014 Bridge Category award at Docklands Hotel, Durban.

RIGHT: John Swallow of CadexSA Systems, sponsor of the 2014 Photo Competition, presents a cash reward of R10 000 to Stephen O'Raw for his winning picture of the Aquatic Centre of the American International School of Johannesburg.

ABOVE: Proud members of the Malapa Fossil Excavation Site project team receiving awards for the overall winning project.

1st row (from left to right): Peter Fellows (Fellows Consulting), Lakshmi Murthy (Crane QS), Zak Mudau (Mzekiseki Painters).
2nd row: Dave van Asche (Omnistruct Nkosi), Colin Kirkland (Spiral Engineering), Johan Strauss (KRU).
3rd row: Krynauw Nel (architect), Prof Lee Berger (University of Witwatersrand), Johnny Venter (SAISC Chairman), Hercu Aucamp (AVENG Steel – main sponsor).
4th row: Spencer Erling (SAISC Education Director).

ABOVE: The first ever B&T Steel Factory and Warehouse Award was presented by Ben van Vuuren (2nd from right) of B&T Steel to Fred Krenz (middle) of Krenz Consulting Engineers for the storage and loading facility in Luderitz Harbour. Also in the picture from left: Johnny Venter, Al Prodgers (MC) and Spencer Erling.

HAVING A GOOD TIME AT ALL THREE VENUES

POLASA INDUSTRY MEETING

14 JULY 2014

LEFT AND ABOVE: The POLASA (Powerline Association of SA) had a well attended industry meeting on Monday 14th July 2014. We have received excellent feedback on the presentations made by Mr Bob Naraghi of ESKOM on their cost saving drive and Mr Bob Wilmot of the Hot Dip Galvanizers Association Southern Africa.

This was an excellent prelude for the POLASA-ESKOM WORKSHOP which was held on Monday 22 September 2014 from 11h00 to 17h00 at the JCC in Auckland Park with the aim of reducing the cost of power line construction by 20%!

SAISC School of Draughting

TOP STUDENTS FOR 2014 ANNOUNCED

ABOVE LEFT: Eric Petzer-Moore (centre), top student of the SAISC School of Draughting for 2014 with Roelf Lizemore (left), Head of the School, and Mike Borello, Managing Director of Genrec Engineering. Awarded at Steel Awards 2014, 18 September, Emperors Palace.

ABOVE RIGHT: Mike Borello of Genrec Engineering (far right) with all three top students of the SAISC School of Draughting for 2014. From left: Kevin Harris – best 1st year, Christopher Blomstrand – runner-up 2nd year, Eric Petzer-Moore – best 2nd year and best student.

The SAISC School of Draughting was founded in 2007 to offer school leavers the opportunity of a two year programme to become well qualified draughtsmen, equipped with all the knowledge and skills to make them successful structural steel detailing draughtsmen.

The school recently moved to Wadeville to the premises of GENREC Engineering (a division of Murray & Roberts). GENREC Engineering has also initiated awards for the three top students of the School, who were selected in respect of the following criteria: Marks / Detailing Skills / Communication / Ownership / Respect / Integrity / Job Excellence & Professionalism / Teamwork / Student votes.

At the Steel Awards 2014 dinner in Johannesburg award certificates were presented by Mike Borello, Managing Director of Genrec Engineering, and Roelf Lizemore, Head of the SAISC School of Draughting, to the following top students:

Kevin Harris – best 1st year student of 2014

Christopher Blomstrand – runner-up 2nd year student

Eric Petzer-Moore – top award for the best 2nd year and best student of 2014

Well done guys!

STEEL AWARDS 2014 SUPPLIERS

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Framing of awards certificates:
Omni Arts & Crafts – Viv van Zyl, Mobile: 082 492 8603, viv@lantic.net

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ABOVE FROM LEFT TO RIGHT:
MCs Aaron McIlroy, Wolfgang Riebe and Al Prodgers

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Steel Awards 2014
NEW GENERATION PROGRAMME

By Marlé Lötter, Events Manager, SAISC

"...a captivating & inspiring experience."

ABOVE: The New Generation group at Steel Awards 2014, Gauteng – 18 September, Emperors Palace.

BELOW LEFT: Top students of Stellenbosch University at Steel Awards 2014, Cape Town: Michael Solms and Willem Stolk.

BELOW RIGHT: At Steel Awards 2014, Durban – Musi Nxumalo (left), top student of the Durban University of Technology, with Christina McLeod (mentor), and Roxanne Mans, both of the University of KwaZulu Natal.

The SAISC hosted 17 top structural engineering students and mentors on an all-expenses-paid full day programme on 18 September 2014 in Gauteng. Represented were the Universities of Cape Town (1), Stellenbosch (3), Witwatersrand (2), Johannesburg (3), Pretoria (3) and KwaZulu Natal (2), including the top student of the SAISC School of Draughting and two SAISC interns.

For the participants from outside of Gauteng the day started as early as 04:00 to fit in a flight, visits to Tass Engineering, the SAISC flooring system research site and Kusile Power Station, as well as attending the Steel Awards 2014 dinner.

Post-event feedback revealed some interesting information about this year's participants:

Reading is dedicated largely to study programme or research related content, but some are also able to fit in biographies (e.g. of Nicola Tesla / Steve Jobs) and even the Steel Construction Journal (apart from the Red Book, of course!)

Music preferences vary greatly from classical and gospel through rock, reggae, RNB, Led Zeppelin, Tupac, Indie-rock and 'anything that does not put me to sleep' (and for most of these someone else would have indicated 'any music but just not that').

Industry and other heroes include Leonhard, Tesla, Eiffel, Steve Jobs, Mimar Sinan, Holm Jordaan, Gerhard Moerdijk, Morris Chang, mentors including Professors Dunaiski, Elvin and Van Zijl and Dr Lotol – even Bob Dylan count among them.

Comments about the industry exposure on the day and whether the programme should be continued were very positive:

'It gives the opportunity... to see the bigger picture. Visiting Kusile was a captivating and inspiring experience.'

'The interaction with other students was very insightful... The fabrication workshop visit inspired me... to be part of large scale projects.'

'It showed me a glimpse of an industry that I would like to be part of one day.'

'It opened our eyes to the quality and scale of the engineering work conducted in South Africa... I have not ever seen a construction site like Kusile.'

'I wish my entire structural design class could participate. During the awards evening it was impressive to see what our local engineers are capable of.'

Feedback confirmed that participants understand the value of industry interaction and the need for more such opportunities (even outside of Steel Awards) was expressed. A possible improvement to the current programme was suggested that more site visits could be included on the morning after the dinner perhaps including visits to actual awards entries/winners. The SAISC will consider all such constructive suggestions within the limitations of time and budget.

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Steel empowers regional community CAUSES

By Marlé Lötter, Events Manager, SAISC

ABOVE: Centre piece decorations sponsored by Macsteel.

BELOW LEFT: Baby Grace from Baby Moses Baby & Child Sanctuary who was found left on a pavement in 2013.

BELOW CENTRE: Aminah from The Bumble Bee Fund who suffers from spina bifida.

BELOW RIGHT: The Quad Para Association of KwaZulu-Natal need equipment for a capacity training centre.

The SAISC is very proud of the funds that could be raised for three very charitable causes at Steel Awards 2014. This year a R50 portion of all attendance fees were set aside and in addition guests in Johannesburg and Cape Town made donations and pledges at the event to their own discretion.

Some pledge amounts are still coming in, but these are the figures so far:

Gauteng:
R45 674 raised for the Baby Moses Baby & Child Sanctuary, a non-profit organisation caring for abused, abandoned and orphaned children in Gauteng and Northwest Province by providing comprehensive support in a nearly normal family home set-up. The funds will be used for medication (including blood and HIV tests), school fees and transport and food for children like Baby Grace, who was found left on a pavement in 2013. *www.babymoses.co.za*

Western Cape:
R20 874 raised for the Bumble Bee Fund to buy a specialised wheel chair for the 5 year old Aminah who suffers from spina bifida. This amount may in fact stretch to help more children with mobility challenges to be like a bumble bee that should aerodynamically not be able to fly, but does anyway. *www.bumblebee.co.za*

KwaZulu-Natal:
R7 900 raised for the Quad Para Association of KwaZulu-Natal to buy equipment for a capacity training centre – vital equipment for strengthening muscles and maintaining muscle tone for these people, who are masters of working with what they have instead of pining about what they don't. *www.qak.org.za*

Thank you to everyone who contributed. We urge all readers to support and find out more about these worthy causes.

As in previous year a lucky draw for winning the centre piece decorations sponsored by Macsteel formed part of the fund raising feature. This year Macsteel created decorative trays and tubular candle holders and just for fun they added stress balls and a set of very functional bookends as individual gifts. Thank you Macsteel!

Baby Moses BABY & CHILD SANCTUARY

The Bumble Bee Fund FLYING AGAINST THE ODDS

The QuadPara Association of KwaZulu-Natal

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