steel CONSTRUCTION
OFFICIAL JOURNAL OF THE SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION
Volume 40 No. 1 2016

ARCHITECTURALLY EXPOSED STEEL

VISITING ARCHITECT
Friso van der Steen

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OFFICIAL JOURNAL OF THE SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION

in **this** issue...

Join us on and YouTube

editor's note

"I am writing the last of 74 (as Spencer pointed out) editor's notes for Steel Construction. The next one will be from the new editor of the magazine, Denise Sherman.

It is probably safe now to confess that Hennie (retired CEO of the Institute) and Spencer took a chance appointing me as editor of the magazine back in 2003 (yes). I sort of knew how to write a press release and previously edited a monthly staff newsletter. And it was right before the big Steel Awards issue of that year. With their help and some rescues along the way however, I survived the first few hurdles and got to enjoy rather than fear the business of compiling a magazine from scratch (deciding what to put into it) to finish (delivery at the office – phew).

Firstly, I would like to thank Spencer, Steel Construction's sub-editor, read here - magician; stepping in when there is a crisis; technical 'demystifier'; backing up when there was a bit of slipping up etc. Thank you Spencer, this magazine would not have reached its current standard *(which from my objective point of view is quite high)* without you. Secondly my sincere appreciation for the rest of the 'production team' – Sandra Addinall the ever patient lay-out artist and my attention to detail back-up; David Stapleton from Camera Press, who pulled more than a few rabbits out of a hat; and Viv van Zyl, another magician, who despite the cyclical nature of the industry managed to always source the advertising needed to keep the magazine going and growing.

Thank you to the rest of the staff for answering my pleas for material by sending me excellent articles on relevant issues which I would never have thought of by myself. Note: There is nothing more satisfying to an editor *(generalisation)* to receive a well written, excellent article with eye catching images.

Then lastly to the advertisers who make it possible to publish Steel Construction and you, the reader. Without you it would have been meaningless to be the editor *(sort of like that guy in the factory who kept punching a hole in a metal contraption but its function has long been made redundant).*

My (as the editor) last issue features exposed architectural steelwork, my favourite part of the big steel story. Steel is indeed beautiful.

Keep on enjoying the magazine!

2016 HURDLES – ready, get set... GO!

By Paolo Trinchero, Chief Executive Officer, SAISC

The year has started with extreme volatility and renewed pressure on commodities. We have been battered with dire economic predictions but I take comfort that there is a small chance that economists can often be wrong. With this in mind we can no longer plan our way into the future. We have to knuckle down and work hard together to create the future we want to see.

So, I would like us to move from survival mode to growth all be it slow and arduous. well for the steel industry in the longer term.

Our efforts on the promotion of local fabricated structural steel continue in earnest, designation and enforcement of duties on fabricated structural steel have begun to yield some success. I believe that if we work together as an industry and all sing from the same hymn sheet we can generate sufficient momentum to encourage the positive change and mind shifts we require.

"Our efforts on the **promotion** of local fabricated structural steel continue in **earnest**, designation and enforcement of duties on fabricated structural steel have begun to yield some **SUCCESS**. I believe that if we **work together** as an industry and all sing from the same hymn sheet **WE CAN** generate sufficient momentum to **ENCOURAGE** the positive change and mind shifts we require."

From the SAISC perspective we are now a larger group with a number of very competent and successful associations and some that need to be bedded down and re-energised. This will require back-to-basics but I think we are entering an exciting time.

The first order of the day is to continue to assist our members to identify markets and opportunities going forward. Exports are often highlighted as a cure all especially when the rand dollar exchange rate is in our favour. We believe there are opportunities but dedicated export departments are required to improve our success rate. As a collective we should all lobby to ensure more projects come on stream.

Southern Africa needs a substantial investment in infrastructure which bodes

We have a great deal of work to do to ensure that we have a balanced approach to tariffs and a sustained drive towards competitiveness and innovation.

I am still confident that we can deliver and compete with the rest of the world.

- We are a can do industry.
- We have a proven track record of delivering world-class quality projects.
- Our Members have world-class facilities and have adopted the most modern technologies available today.

For our members, help us to continue helping you. Send young staff on training courses; get involved and give us your feedback. It is only through a concerted effort on skills development and innovation that we can become the world leaders that we know we can be.

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

Planning and completion of various significant and complex national and international projects on time, for commercial, industrial, mining and plant sectors, serves as testimony putting Cadcon as a leader at the cutting edge, in a rapidly growing and competitive environment. Cadcon has valuable experience in exports of steel products internationally and strong innovative contributions to the whole of Southern Africa.

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.

Cadcon operates their full production process from the delivery of raw material, fabrication, abrasive blasting, corrosion protection, erection and finishing to the proud delivery of the final product through their team of graduates and dedicated artisans. Cadcon's methodologies and processes results in their ability to provide their clients with turnkey solutions at optimum efficiency; **STRIVING FOR EXCELLENCE AND PEACE OF MIND IN STEEL CONSTRUCTION**, this being the cornerstone of Cadcon's success and competency.

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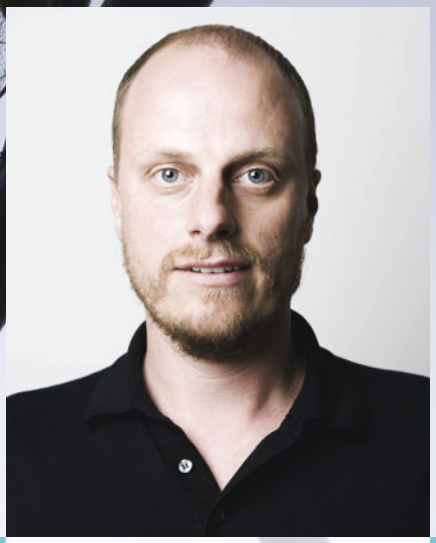

VISITING ARCHITECT: FRISO VAN DER STEEN

By Paolo Trinchero, Chief Executive Officer, SAISC

The Southern African Institute of Steel Construction and the Department of Architecture at the University of the Free State continued their tradition of bringing a prominent international architect to South Africa each year.

Everybody with an interest in architecture, structural steelwork, and how steel can be used in innovative ways was invited to attend lectures by Friso van der Steen of Mecanoo (Netherlands), in Bloemfontein, Pretoria and Cape Town.

Friso van der Steen is project manager and senior architectural engineer at Mecanoo, and has extensive experience in the preservation of historic landmarks and heritage buildings. He is involved in a broad range of cultural and theatre projects including the National Koahsiung Centre for the Arts in Taiwan with its massive and complex steel construction.

Together with Mecanoo's Taiwan office Friso has conducted regular site visits to the National Koahsiung Centre to review construction progress, quality and sustainability.

The project showed all the best attributes of steel. Delegates and students were blown away by what was achieved and left the lectures with a fresh perspective and enthusiasm for their next steel project.

Photo Harry Cock

SAISC PROFILE

Size: 141 000m²

Status: Ongoing 2006 – 2016

Address: Zhōngzhèng 1st Rd 7, Kaohsiung, Taiwan

Client: Ministry of Culture (MC)

Programme: Theatre complex in the Wei-Wu-Ying Metropolitan Park with a total capacity of 6 000 seats: Concert Hall 2 000 seats, Opera House 2 260 seats, Playhouse 1 254 seats, Recital Hall 470 seats, public library of 800m², rehearsal/education halls for music and dance, two congress halls with 100 and 200 chairs and stage building workshops.

Awards: 1st prize Cityscape Architectural Award, Dubai 2008; 3rd prize International Design Award, IDA Los Angeles 2009; Chicago Athenaeum International Architecture Award 2009.

The National Koahsiung Centre for the Arts in Taiwan showed all the best attributes of steel. Delegates and students were blown away by what was achieved and left the lectures with a fresh perspective and enthusiasm for their next steel project.

National Kaohsiung Center for the Arts (Wei-Wu-Ying), *Kaohsiung, Taiwan*

The National Kaohsiung Center for the Arts (Wei-Wu-Ying) symbolises the transformation of Kaohsiung, once a major international harbour, into a modern, diverse city with a rich cultural climate. Mecanoo designed the National Kaohsiung Center for the Arts (Wei-Wu-Ying), located on a former military terrain, as an integral part of the adjacent subtropical park to have a positive social impact on the residents of Kaohsiung whose population counts almost 3 million.

Inspired by the local Banyan trees with their iconic crowns, the vast, undulating structure is composed of a skin and roof, and connects an extensive range of functions. The curved steel structure was built in cooperation between a local and a Dutch shipbuilder. Underneath this roof is Banyan Plaza, a generous, sheltered public space. Residents can wander through here day and night, practice Tai Chi or stage street performances along walkways and in informal spaces.

An open-air theatre nestles on the roof where the structure curves to the ground, with the surrounding park forming the stage. Designed with the subtropical climate in mind, the open structure allows the wind to blow freely through Banyan Plaza. The seamless flow between interior and exterior creates opportunities for crossovers between formal and informal performances.

Different theatres such as the 2 000-seat concert hall and 2 250-seat opera hall are located in the five cores or 'legs' of the building where the structure meets the ground. The cores connect with one another via foyers in the roof and an underground service floor which houses the backstage area of each theatre.

From a structural engineering and steel fabrication point of view the support structure is comprised of thick walled structural tubes. The interior curved walls are fabricated from 6mm steel plate.

A significant innovation was to use a ship builder for fabrication to achieve the complex geometry of the interior walls. Significant wind loads were accommodated by using special connecting rods with springs to reduce dynamic load transfer to the main skeleton. We recommend that you view the YouTube video on the link below do to justice to the complexity and ingenuity of the project.

Links

http://www.youtube.com/watch?v=LIYufMi0Kls - (17min Documentary)

http://www.mecanoo.nl/Projects/project/54/National-Kaohsiung-Center-for-the-Arts-Wei-Wu-Ying?t=0

http://www.mecanoo.nl/News/ID/77/National-Kaohsiung-Center-for-the-Arts-Wei-Wu-Ying–work-in-progress

ABOVE: The National Koahsiung Centre for the Arts was inspired by the local Banyan trees.

RIGHT AND OPPOSITE PAGE: National Kaohsiung Center for the Arts (Wei-Wu-Ying).

SPENCER PAYS A VISIT TO UITENHAGE SUPER STEEL

By Spencer Erling, Education Director, SAISC

Looking pretty with a full order book, the (economic) crash of 2008 quickly changed that, the orders were all cancelled leaving them starting the year 2009 with no work and a well-trained team with nothing to do. It was Warren Buffett who preached when it comes to investing, go against the flow, if the masses are in equities, get out. Ginkel must definitely have come from the same mind set.

I had only spoken to Ginkel once. Ginkel had called up the SAISC for some technical advice on submerged arc welding of plate girders and he was put through to me. He explained to me that he had bought the machine from Dave Scott when Scott steel closed its fabrication shop.

That of course got my mind going, back to my Speedy Welders days, when lots of people asked the same question, what on earth would a fabricator in Uitenhage want a submerged arc welding machine for?

So in October 2015 when visiting Port Elizabeth to do a lecture for 3rd year architect students at Nelson Mandela Metropolitan University (NMMU), on multi-storey steel construction using steel framing, I allowed for an extra day during the visit to the area and made my way out to visit Uitenhage Super Steel (USS) and meet Ginkel and some of his team.

For those of you who have entertained me during a visit to your works, you will surely remember that for me, a visit to a noisy workshop is music to my ears. My visit to USS was that and plenty more!

I asked Ginkel about his name and he explained to me that it came from *van Ginkel,* a name that his family had by tradition had passed down the generations to the first born son of the next generation.

The next obvious question was how did the business start? Ginkel explained that his father had an education and experience in agriculture, so quite naturally the business started manufacturing farming implements, which rapidly grew into farm sheds, the 'portal frame market', which industry they still serve to this day.

Ginkel joined the business without any formal education in structural steel. They operated out of a 600m² covered area without the luxury of overhead travelling cranes, but with a WMW metal working machine. The original shop can still be seen.

About 15 years ago, one of their biggest jobs, which put them on the structural steel fabricating map was a 5 000m² citrus packing house. So an extension was done with a fairly modest sized crane with a low clear height.

The business was growing steadily during the 2006/7 boom years leading up to the

financial crash of 2008. Looking pretty with a full order book, the crash quickly changed that, the orders were all cancelled leaving them staring the year 2009 with no work and a well-trained team with nothing to do.

It was Warren Buffett who preached when it comes to investing, go against the flow, if the masses are in equities, get out. Ginkel must definitely have come from the same mind set.

Instead of retrenching all his staff (which I am sure you all know is a very expensive exercise) and not having the cash to carry out the retrenchment he went to his bank to borrow money to build a new factory bay. Apart from calling him crazy, his bank did decide to support him.

And so his team did everything required – levelling; foundations; fabricate and erect the steel structure; the cladding; the brickwork – the lot. By the time the shop was nearing completion fresh orders started to roll in and USS has never looked back.

I was absolutely gob-smacked to visit his shop in a low key industrial area of Uitenhage and find a well-equipped modern workshop. Detailed drawings are produced using Tekla which when applicable talks directly to his NC machines. Yes, some of the machines are 'entry level NC equipment', but they are ideal for his size of shop and type of work. He bought some of them second hand from Scott Steel.

And yes, he did finish his plate girder contract using a single head submerged arc welding machine. But he was not satisfied with the productivity of the machine and has since invested in a state of the art plate girder fabrication line. All other finish welding is done using Mig/ Mag process. They do have a quality system in place and are ISO 9000 certified, and it shows when you walk through their shops and see the overall high standard of marksmanship.

USS has their own special way of making steel elements. The part mark is scribed onto a small piece of plate which is in turn welded to the element. That way the riggers will always know where to look for the mark.

USS is a classic structural steel jobbing shop, they will tackle almost any work if they think they can make a profit, from industrial projects, commercial projects, through substation work but like many fabricators USS is quite nervous when it comes to shopping mall projects.

We wish Ginkel and his team continued success.

Industry NEWS IN BRIEF

SA's construction sector faces a challenging year

"2015 has proved to be a tough year for most construction companies, with lower revenue and profit margins, and less new projects in the offing according to PwC's 'SA Construction' study," says Andries Rossouw, PwC Assurance Partner.

ABOVE: Andries Rossouw, PwC Assurance Partner.

The study's findings are based on the financial results of the leading construction companies listed on the Johannesburg Stock Exchange (JSE) for financial year ends to June 2015.

The 2015 financial year saw a decline in market capitalisation and financial performance. Eight of the nine companies reflected a decrease in market capitalisation. In aggregate for the nine companies analysed, market capitalisation decreased by 38% to R25.9bn as at 30 June 2015 and showed a further 9% decline from 30 June to 31 October 2015.

The South African Government's ongoing National Development Plan and its continued commitment to public infrastructure investment of R810bn over the next few years are still positive signs for future growth in the industry albeit that this value has decreased from prior years. This decrease in anticipated expenditure underlines the challenges experienced by the industry. With the announcement that the Commonwealth Games of 2022 will be held in Durban, the public sector is bound to invest in infrastructure.

This is the first time in five years that the secured order book decreased (4%) on the prior year. Total revenue decreased by 7% to R129.3bn on the prior year. These decreases were largely as a result of the weaker economy, in particular for commodity markets with a notable decrease in revenue from oil and gas projects.

Total operating costs decreased by 5% in response to lower revenue. Staff costs continue to represent a significant component of operating costs constituting 29% of total operating costs (2014:28%).

The construction industry adds significant value to South Africa and its people. Seven of the nine companies included in the construction industry analysis, comprise 69% of the revenue earned by all companies considered.

The value received by heavy construction employees represented 83% (2014:71%). This is a significant contribution to the labour market. According to Stats SA, more than 1.4 million people are employed by the construction industry, either on a contract or permanent basis.

The state received 10% (2014:19%) of value created in the form of direct taxes. The reality is that the state receives significantly more if one takes into account the tax on employee income deducted from employees' salaries and net indirect taxes like VAT.

Rossouw concludes: "The South African construction industry is well placed to cope with new growth requirements as well as take on large scale projects. But it will need to manage short-term liquidity requirements."

TOP: WSP | Parsons Brinckerhoff Africa won both the Gifa Public Choice Award and Special Commendation Award for the Aquatic Centre.

ABOVE: Aveng Grinaker-LTA took top honours at the Construction World Magazine's annual Best Projects Awards.

WSP | Parsons Brinckerhoff, Africa honoured at the 2015 GIfA Awards

WSP | Parsons Brinckerhoff, Africa was recently honoured at the Gauteng Institute for Architecture (GIfA) Awards. The company was part of the professional team that won both the Public Choice Award and Special Commendation Award for their work on the Aquatic Centre of the American International School of Johannesburg (AISJ).

WSP | Parsons Brinckerhoff, Africa was appointed as the civil, structural and wet services engineers of the aquatic centre, the dining commons, the fine arts building, and the amphitheatre. Additionally, the company was also integrally involved in the project management and design for the entire campus storm water management system.

According to Miguel Tavares, Regional Director for WSP | Parsons Brinckerhoff, Structures, Africa, "The Aquatic Centre was purposely designed to be an all-weather facility – one that provided sufficient shelter to protect the facility and swimming activities from all weather conditions and other environmental elements, however, while still maintaining a sense of being outdoors."

The 1 400m² Aquatic Centre features a six lane, twenty five metre pool with an additional shallow teaching pool as well as enclosed changing areas, office areas, storage space, and mechanical room.

Elegantly designed, the Aquatic Centres continues to receive high praise, having previously received a commendation award in the Tubular Category, as well as first prize in the Photo Competition of Steel Awards 2014.

"We are tremendously proud to have been a part of this project - and delighted by the commendations that it has received. Together with all our partners, we managed to implement several special design features that take environmental as well as operational and economical concerns into account, and construct something that is not only beautiful to look at, but is highly functional and expressive too," concludes Tavares.

Aveng Grinaker-LTA scoops awards for excellence in the construction sector

Aveng Grinaker-LTA took top honours at the Construction World Magazine's annual Best Projects Awards Ceremony on 4 November 2015. The construction company's Majuba Incremental Launch Bridge Project was awarded first place in the Civil Engineering Contractor Category, and its Sasol Process Water Cooling Towers Project received a Special Mention.

The Majuba Vaal River Bridge is part of the larger R1.2 billion Eskom Majuba Rail Project which aims to enable the change from road to rail transportation of coal to the utility's power stations.

This award comes soon after Aveng was honoured at two other industry functions in October: Aveng was named Best Contractor of the Year at the 8th Annual South African Construction Awards (SACA) ceremony on 2 October 2015. At the SAICE-SAFCEC Awards Gala Event for the Most Outstanding Civil Engineering Achievements for 2014/2015, Aveng Grinaker-LTA's Department of Environmental Affairs Head Office project was awarded the Best Project Management and Construction Award in the SAICE Technical Division and in the Specialist Contractor Category.

"These awards seek to recognise outstanding achievement in the construction of buildings, taking into account a wide range of factors including architectural and engineering design, delivery to time and budget, and client satisfaction," says Chris Botha, Operating Group Managing Director, Aveng Grinaker-LTA. "Winning these awards is testament to the quality of our workmanship and project management capacity that is within Aveng Grinaker-LTA."

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- Menlyn Maine Central Square (250t) - Menlyn Maine Investment Holdings
- Nelson Mandela Square refurbishment - Liberty Properties
- Mall of Africa Central Skylight, Bifurcated Columns (250t) - Novum Holdings
- South African Breweries, Conveyors, Buildings, Stairs - SAB Alrode and SAB Chamdor Brewhouse (350t)
- Gautrain O.R. Tambo Platform Extension (100t) - Gauteng Provincial Government
- Rosebank Towers (130t) - Abland
- Cresta Gardens Shopping Centre (85t) - Cresta Gardens
- Waterfall Park Bridges (55t) - Atterbury Projects
- Natalspruit Hospital: Bridge and Doctors & Nurses Accommodation (250t) - Department of Infrastructure and Development
- Nelson Mandela Children's Hospital (35t) - Nelson Mandela Children's Hospital
- Government Printing Works (300t)
- Discovery Sandton (220t) - Zenprop
- Eston Brick Kiln (140t)

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SAISC Steel Awards 2016 – the 35th Event

The steel construction award for excellence in the use of structural steel

Your chance to show your 'metal' –

YOU NEED TO ENTER TO BE AWARDED!

Also celebrating SAISC's 60th Year & the 6th Steel Awards Photo Competition

SAISC Steel Awards dinner in Gauteng, KZN & the Western Cape: 15 September 2016

OVERVIEW:

Please refer to the entry form for full details on all aspects

CATEGORIES

Categories and winners vary annually according to the actual entries, but in 2016 there will definitely be awards in the following categories in addition to other that may arise:

- Overall Winner
- Tubular Category
- Light Steel Framing Category
- Factory and Warehouse Category
- Metal Cladding Category

CRITERIA

Does the project illustrate what can be achieved with steel?

Other factors to be considered:

- The importance of steel as a structural component in the project
- Benefits achieved by using steel construction
- Aesthetic appeal
- Environmental/sustainability considerations
- Innovation in design, fabrication or construction
- Technical prowess required for realising the project
- Engineering expertise
- Exceptional quality of workmanship
- Tubular content
- Cladding: workmanship, innovation, special solutions, size, speed, architectural finish...
- Export project
- Satisfaction of client's brief, particularly cost and/or time efficiency (speed of construction)
- Special details: bolted or welded connections, or the like
- Value to society/ community development
- Any other unique features

MAIN CONDITION OF ENTRY

The steelwork should essentially have been completed in 2015.

(More conditions on the entry form).

STANDARD PROJECT ENTRY FEES:

1. Projects of 10 tons or less: A fixed fee of R925.00 (including VAT) will be charged.
2. Large projects of more than 10 tons: A fixed fee of R3 600.00 (including VAT) will be charged and the nominator company will also receive these benefits:
   - One complimentary seat at the Steel Awards dinner at the venue of their choice – Johannesburg, Cape Town or Durban on the condition of booking more than one seat in total.
   - 5% discount on any size advertisement placed in the special Steel Construction Journal edition that will be released at the Steel Awards dinner.

*Early bird discount of 10% will apply for all **COMPLETE** entries received by Thursday, 14 April 2016.*

Special discount will also apply for entering more than 3 projects: 4 – 8 projects: 10%; 9+ entries: 15%

(Full details on the entry form).

MATERIAL TO BE SUBMITTED BY THE DEADLINE

1. The fully completed entry form, including full and accurate details of all project team members
2. 6 – 20 quality images, including one to consider for the Photo Competition
3. A project description and entry motivation.

***PLEASE NOTE:**

Entries that are illegible or still incomplete, missing images or motivations by the entry deadline will not be considered.

ENTRY DEADLINE: Thursday, 21 April 2016

10% EARLY BIRD DISCOUNT DEADLINE: Thursday, 14 April 2016






FOR FULL DETAILS, ENTRY FORMS, SUBMISSION and ENQUIRIES including SPONSORSHIP OPPORTUNITIES and GENERAL EVENT ENQUIRIES

please contact: Marlé Lötter Tel: +27-(0)11-726 6111 E-mail: marle@saisc.co.za

FULL DETAILS AND FORMS ARE ALSO AVAILABLE ON OUR HOME PAGE: www.saisc.co.za

NEWS FROM THE USA

A family journey through steel

By Amanuel Gebremeskel, The 'roving engineer'

I have been doing a great deal of travelling over the past six months. One of my objectives has been to study how steel has been used over time and space in various modes of transportation. I'm certainly not the first person in my family to be obsessed with steel and travel.

My grandfather, pictured here in the early 40s with his steel clad Fiat 508 Balilla, spent much of his years setting up a regional transportation network, primarily to move steel around.

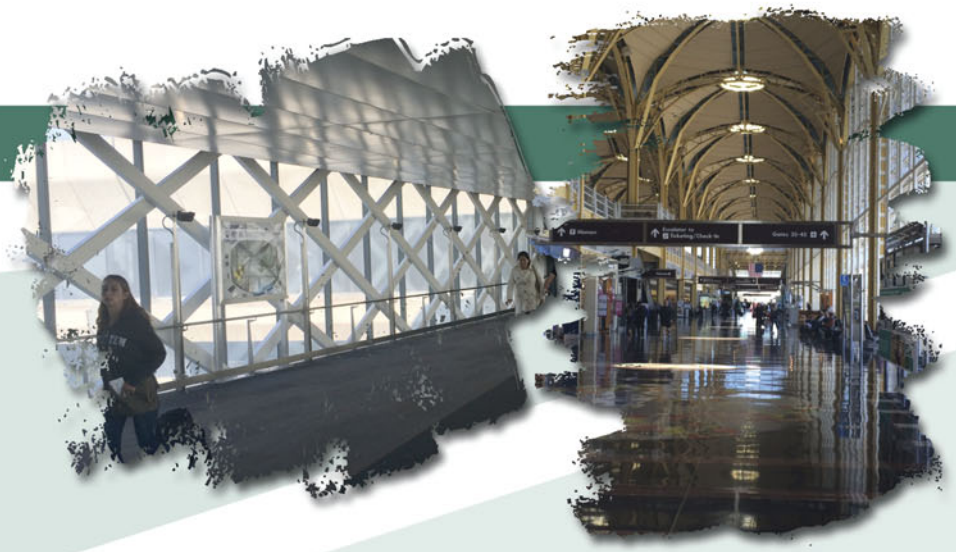
Since his time the car remains an important means of travel. The picture below is of an elaborate stainless steel framed Audi exhibit at a recent Las Vegas convention that I attended. The main distinction now is that most all of the cars on show did not require drivers. Had he been alive to witness this grandpa would be floored!

All of these driverless cars are bound to revolutionise the world in yet unforeseen ways. Not only will steel be used to frame the cars but also their housing, bridges, and ports if one day they levitate to avoid traffic. It so happens that my own role at the Institute will be to provide easy-to-use design standards and solvers – such as the SAISC eToolkit – to allow designers and engineers to freely imagine and implement novel ways of travel.

We live in a thoroughly globalised world. At times this can be frightening and at other times totally exhilarating. In many ways lifestyles around the world have converged and without doubt one of these is the way in which we use steel to facilitate travel in general.

My grandfather's daughter, my own mother, continued the legacy of promoting the next generation of travel and spent three decades of her life helping to build a successful airline. As a child, travelling through airports was a familiar scene to me. However the one major change that I have witnessed in my life involves the evolution of the framing system for most airports from concrete to steel.

The magnificent use of structural steel to frame the O.R. Tambo International Airport is but one example of this incredible migration to steel to house airline passengers.



Other beautiful examples on my recent trips include The Reagan National Airport in Washington DC and the San Francisco International Airport in California. The use of structural steel in airport design is now an enduring and spectacular architectural culture.

As a child, travelling through airports was a familiar scene to me. However the one major change that I have witnessed in my life involves the evolution of the framing system for most airports from concrete to steel.

It doesn't end there. One of Pretoria's greatest gifts to the world is a man by the name of Elon Musk. Last August I took my nephew to Cape Canaveral in Florida to visit one of Musk's assembly plants. Inside a huge steel framed building Space X, his company, was building the Falcon 9 – a two stage launcher.

The way that space travel has been done to date involves throwing away the launchers after escaping earth's pull. This is the equivalent of throwing away an aircraft after each landing. This has kept space travel prohibitively expensive and generally beyond the reach of the public.

Space X completely revolutionised space travel this past December when the Falcon 9 launcher that we visited took off and landed in one piece, thereby making it re-usable. Musk claims that this can reduce the cost of launches by as much as 90%. The odds for space travel in our lifetimes have improved dramatically.

My nephew is so inspired by Musk's vision that he thought he should continue the family legacy and promote the next generation of travel by learning how to fly one such spacecraft.

I wish him the best of luck!

ARCHITECTURALLY EXPOSED STEEL

Tshwane Rapid Transit Stations

Steel played a major part to fulfil the client's vision to create a public space in which its users still feel connected to their surroundings. This is not an underground tube station but a covered communal space, filled with light and natural ventilation. The station functions as a transparent, temporary meeting place that links the history of the city to the present.

Each of the individual Tshwane BRT stations is unique but clearly recognisable as a Tshwane BRT station marker. The TRT lines are intended to make public transport easy, regenerate certain urban areas and bring people back into the city. One of the other main driving factors in the design of these stations was to make it user friendly and accessible to all, with a specific emphasis on the usability for those with disabilities.

Steel played a major part to fulfil the client's vision to create a public space in which its users still feel connected to their surroundings. This is not an underground tube station but a covered communal space, filled with light and natural ventilation. The station functions as a transparent, temporary meeting place that links the history of the city to the present.

Elements of the station such as handrails, security screens, signage, enclosing walls and platforms are designed with the potential to become artworks at stations in locations identified as having either historical, tourist or commercial value.

The vertical element (Totem) positioned at all station entrances is another defining feature of this project and acts as a branding element, signature of the TRT system, location device and another way to bring art to the public.

Retro Tram Stations

The Retro Tram station was designed to be a representation of the character and history of the Tshwane environment. In addition it draws inspiration from the historical public transport systems of Pretoria. Formalised public transport in Pretoria began in 1896 with horse-drawn trams. These were replaced by electric trams in 1910, while trams were replaced by buses in 1935. The new station was specifically inspired by the historic trams but also reminiscent of other modes of public transport such as trains and busses.

The station is essentially a single space covered by a curved roof and enclosed by a transparent glass wall system. It is designed to allow the passengers to have an uninterrupted clean view of the 'outside'.

The station finishes are selected from a palette of locally sourced, hardwearing, durable, natural and low maintenance materials including face brick, concrete, stainless or galvanized steel, energy efficient glass and powder coated or natural anodised aluminium. These materials and their colours are chosen to suite the historical context, urban environment or the natural colour pallet of the variety of station locations along the routes.

Steel is integral in the design of the Retro Tram station. The entire structural

BELOW: Retro Tram Station.

OPPOSITE PAGE: The Memory Box Station.

PROJECT TEAM

Client:
SANRAL

Architects:
Mashabane Rose Associates Architects (Retro stations)
Mathews & Associates Architects (Memory Box stations)

Structural Engineer:
Royal Haskoning DHV

Quantity Surveyor:
Equate Quantity Surveyors

Main Contractor:
Group Five Construction

Steelwork Contractor:
Khombanani Steel

Detailing Company:
3D-Struct

Hot Dip Galvanizers:
Armco Isando

Corrosion Protection:
DRAM Industrial Painters

skeleton of the station is steel. It is chosen for its durability, lightweight construction, speed of construction as well as the form it can produce in reference to the historic electric trams.

Galvanized steel is used as the roof sheeting; the ceiling is aluminium and the ticketing kiosk and disabled WC are made wholly from stainless steel. Steel is also used in rudimentary but essential public objects such as benches, handrails and waste bins.

For the structural frame, tubular steel columns are used with the radius bent to the outside to resemble the historical tram design. Columns are spaced 4 metres apart. The curved beam profile linking the two column tops complete the portal frame.

Horizontal channels run the full length of the station on either side of each column line, forming the skeleton for an element referred to as the 'weatherband'. The latter element serves as a flashed horizontal interface between the area below (wider) and above (narrower) to ensure weatherproofing of the station.

The roof is characterised by long over-hanging purlins at the gable ends, and a substantial galvanized U-shaped gutter running the full length of the station at eaves level. Downpipes are included within the steel columns to hide storm water discharge from the roof.

Memory Box Stations

The Memory Box station types were specifically chosen to be in sensitive historical locations where they are required to be 'non buildings' that blend into their sensitive historical contexts.

The Memory Box station differs from the Retro Tram stations in that they are lower in scale so as to be less intrusive in their surrounding context. Consisting primarily of glass panels running all the way up to the roof line, the intention is for the stations to reflect their surroundings while the apparent simple yet multi-layered facades consist of randomly staggered glass and steel elements which blend into the constant movement and activity of the inner city's traffic and pedestrians.

Some stations consist of two modules connected by a link. Where space allowed, these links were designed as open spaces with trees and benches. The inclusion of trees in these spaces provides welcome foliage and shading for the inner-city as well as providing a more naturally relaxing experience for commuters waiting for a connecting bus.

The main structure comprises small square hollow section columns spaced at 2 metres, connected with a horizontal I-beam to form a portal. In the longitudinal direction, the columns are connected at regular intervals with hot-rolled channels and angles, according to the architect's design. The portals are connected longitudinally with a deep channel profile running the full length of the station at eaves level. The roof is characterised by an internal gutter (behind the tie-channel) and a raised centre portion (on the ridge).

Despite the relative high density of the structural steel frame (architect's requirement), the overall impression of the station is still 'light', with all the glazed cladding. There are no vertical service ducts in the station, and all services (electrical and data) is routed through the hollow sections. The concept of a Meccano set was used to manufacture as many parts as possible off-site and to bolt them together on site.

Internally the space is 'animated' by a suspended wooden ceiling which consists of hanging wooden panels cut to form an impression of flowing waves.

Vertical elements announce each station and act as landmarks in each specific urban setting. Therefore the idea was proposed and accepted that these vertical elements should include an artwork which relates specifically to their surroundings. These art works will enhance the city with a remarkable art collection from some of our most prominent contemporary artists; brightening the day of the daily commuters and even becoming a reason to simply do an 'Art Circuit' tour of the city on the TRT system.

Working in unison with glass, the steel component in this project brings a user into a world-class public transport system.

Newtown Junction

The decision to re-use and restore the potato shed steel structure proved the least intrusive construction method with all the structural steel repairs and manufacturing taking place off-site. The existing steel structure was kept largely intact with the addition of new steel sub-elements to stiffen the trusses to suit the adaptive re-use of the sheds to that of a contemporary shopping centre.

PROJECT TEAM

Client:
Atterbury Property Developments (Pty) Ltd

Architect (Heritage):
MRA Architects (Pty) Ltd

Architect (Retail):
LPA Architects (Pty) Ltd

Architect (Principal):
DHK Architects (Pty) Ltd

Structural Engineer:
Aurecon South Africa (Pty) Ltd

Quantity Surveyor:
Norval Wentzel Steinberg (Pty) Ltd

Project Manager:
Metrum Project Management (Pty) Ltd

Main Contractor:
WBHO construction (Pty) Ltd

Steelwork Contractor:
Braam Staal

Detailing Company:
Braam Staal

Newtown Junction is situated in the cultural district of the suburb Newtown in the heart of Johannesburg, next to the Museum of Africa and the striking 1913 Edwardian building that was redeveloped into the popular Market Theatre. This multi-level development offers a vibrant 36 000m² shopping centre, 30 000m² of office space, gymnasium and four basement levels providing a total of 2 400 parking bays. Newtown Junction signals both the growth of Johannesburg's city centre as well as the renewal and revival of the city in a way that preserves its heritage and history.

The project team met with three major challenges during the refurbishment: maintaining the integrity of the 'potato sheds' structure; careful consideration of heritage structures and the inputs of multiple stakeholders; and accommodating existing steel structures. The design team adopted a hybrid approach consisting of partial restoration, partial replacement and partial additional strengthening.

An integral part of this development was the restoration of the long-neglected potato sheds and old railway pedestrian bridge. Both were granted heritage status by the SAHRA. These steel structures were originally designed and built in 1910 for the purpose of storing vegetables and fodder that were distributed to fresh produce markets across the country by rail. The integrity of these historic structures was kept intact by creating a structure that connects the past, present and future.

The decision to re-use and restore the potato shed steel structure proved the least intrusive construction method with all the structural steel repairs and manufacturing taking place off-site. The existing steel structure was kept largely intact with the addition of new steel sub-elements to stiffen the trusses to suit the adaptive re-use of the sheds to that of a contemporary shopping centre.

The building is partly situated under the elevated M1 Highway, which required a very unique geometry in order to accommodate the existing highway piers. Some sections of the structure's roof are only 3 to 4 metres below the highway.

GEMINI HD36

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MTMA

Furthermore, the floor level of the lower retail level is up to 3m below the founding levels of the highway piers and columns. This meant the construction had to be isolated while building around these existing piers and columns.

A lateral support system was designed to protect the bridge piers, to ensure that the safety of motorists was not jeopardised. A roofing system was also developed to cater for storm water flooding from the highway in these areas.

Although not so widely used on modern retail developments nowadays, the use of corrugated steel sheeting conformed and aided in capturing the heritage nature of the potato sheds by maintaining the original look and feel of the structure.

The roof structure comprises of 13m long double-pitched steel trusses covering a total of 4 600m². The reinstated old railway pedestrian bridge was adapted to serve as a fire escape for the adjacent Market Theatre.

The development feasibility demanded several levels of underground basement parking, which placed the potato sheds structures at risk. The heritage authorities approved the application to dismantle the sheds in order to construct the basement – provided they were restored and re-assembled in their precise location afterwards.

The structures were carefully surveyed on site through a complex auditing process that saw each element numbered, labelled and documented, so that it could be identified and re-installed in its correct location later. Following the dismantling process, the structures were transported to a workshop facility for storage and restoration.

An initial desk-top structural analysis revealed that most of the steel truss lacing members exceeded the slenderness requirements stated in SANS10162. The increase in live load and dead load from added required services and materials would also contribute to the structure's load tolerance requirements. To strengthen the steel structures, a stiffening procedure was implemented, which entailed the strategic positioning of flat bars welded onto the existing steel elements. These flat bars improved the structural properties of the elements without impairing the heritage nature and aesthetics of the steel trusses.

With the potato sheds being repositioned onto a reinforced concrete floor at a new level, a number of the existing steel columns had to be extended to offset the previous sloped geometry of the structure. To draw a distinction between old and new the joining connections were kept visible.

The potato sheds were originally designed as a shade structure and was not weather proof.

New down pipes were fitted strategically into the expressed structure of the old sheds trusses and steel column system.

Lightweight stiffened steel framed drywalls and glass shop-fronts were used for the vertical facades along the perimeter of the potato sheds. The facades were designed in such a manner to maximise the visual impact of the overhead potato shed trusses while ensuring a safe and weather-tight structure for its occupants.

This heritage-inspired project will make Newtown Junction a go-to destination for the people of Johannesburg as well as visitors to the city.

The facade support structure is made out of hot rolled vertical members bracketed off the exposed steel circular columns and cold rolled girts of matching depth were used to allow flush faces internally and externally which were clad with aluminium panels.

PROJECT TEAM

Client:
OT Venter Investments

Architect:
Empowered Spaces Architecture

Structural Engineer:
LS & A Consulting Engineers

Quantity Surveyor:
BTKM Quantity Surveyors

Main Contractor:
Probest Projects

Steelwork Contractor:
Central Welding Works

Detailing Company:
Segmiller Engineering services

Painters:
DRAM Industrial Painting Contractors

e Dealership

The new Pretoria Porsche dealership is the fourth facility built in South Africa in the last ten years. This showroom will be their first dealership in Pretoria with the objective to increase Porsche's footprint in South Africa. The 13 000m² dealership contains a large showroom for new and pre-owned car sales, administrative offices on the ground and mezzanine levels; a new workshop for servicing and maintenance of the vehicles; a parts store; bodyshop for the repair of damaged vehicles; valet wash bays; and stores for general purpose storage. There is also a 4 500m² basement parking area for the staff and new car storage.

The showroom's curved facade, with glass curtain walls is an architectural feature prominent in all Porsche centres. The extensive use of exposed steel is driven by Porsche's corporate identity especially the showroom's columns and exposed bottom chord to the trusses. The facade support structure is made out of hot rolled vertical members bracketed off the circular columns and cold rolled girts of matching depth were used to allow flush faces internally and externally which were clad with aluminium panels.

The steel over the workshop and bodyshop was chosen for its long span ability over the required areas. In order to satisfy deflection limits on relatively long roof spans over the workshop and bodyshop areas, options to use plate girders or conventional parallel boomed trusses were considered. The plate girders option was found to be unjustifiably heavy and prompted for the truss option. In the past raised monitor sections were placed on top of the roof structure to provide natural light and ventilation. Owing to long roof span and slope, the truss and monitor arrangement would have led to unacceptably high roof profiles.

The roof girder and monitors were then innovatively combined into a single Vierendeel truss. Unlike a conventional truss, with triangle-shaped voids and pin-joints, the Vierendeel utilises rectangular openings and rigid connections, designed to resist bending forces. This kind of truss is rarely used by engineers since it is usually less economical. However, after careful optimisation, though slightly heavier compared to the conventional system, with a very industrial appearance, the Vierendeel truss could serve both aesthetics and functionality. The straight lines and symmetrical square openings of the truss gave a clean and elegant look to the space and maximised natural lighting.

The truss was pre-cambered to eliminate all dead load deflections leaving a very straight roof line. The upper and lower purlins were aligned with the top and bottom chords of the Vierendeel, providing a neat, uncluttered appearance.

The metal sheeting to the exterior and interior is attached to the steel framed structure. The front cladding externally and internally is Hulabond aluminium panels fastened to an aluminium subframe that is in turn attached to the steel frame.

The black horizontal cladding around the workshop and bodyshop, a signature element to the Porsche 'look', posed a challenge in the Pretoria climate, and called for heavy insulation. Internal walls were also to be clad. Taking that into consideration, vertical girts were then designed to serve as fixing supports for both internal and external sheets, with insulation layers in between.

The general concept of the building was to construct a concrete core with slab-column configuration and then landing steel roofs on top. One of the challenges faced during the project was the integration of concrete and steel structures, due to discrepancies in structural tolerances between concrete and steel constructions.

The programme was tight, rain delays for the first month and industrial action in the middle of the construction process put the programme on the back foot from the get go. This was a challenge in its own right and required all parties to put in the extra work to complete the project.

What DESIGNERS *and* FABRICATORS *need to do to achieve a* QUALITY CORROSION CONTROL SYSTEM

By Spencer Erling, Education Director, SAISC

Terry Smith, a well-known face at the Institute and in the steel industry, has joined the Corrosion Institute of Southern Africa as editor of its newly found magazine, Corrosion Exclusively. Terry has an extraordinary wealth of knowledge regarding anything corrosion-related and is often called in when steelwork contractors have an issue with the right type of corrosion protection prescription for their projects. We thank him and the Corrosion Institute for allowing us to publish this article by Spencer which appeared in their first issue – *Vol. 1 Issue 1 2015.*

Background

The starting point for all coating systems is to clearly define what duty the system must perform (paint or for that matter hot dip galvanizing or any other system) which by and large include:

- Corrosion protection
- Architectural finish (decorative), or
- A combination of architectural/ corrosion protection.

When it comes to architectural/ decorative finishes, it is, I would like to believe, commonly accepted that hot dip galvanizing is a very cost effective corrosion protection system for the right applications and in more recent years has become, along with paint, the coatings of choice for architectural decorative finish to steel structures.

The importance of this definition becomes obvious once one considers (at the risk of upsetting paint manufacturers and suppliers) that in an enclosed project in Gauteng, one could get away with no paint or maybe a one coat paint or coating system. I know of several 50 year old partially open to the weather factories where 99% of original zinc chromate primer on a poorly wire brushed system is still in remarkably good condition.

Specifications

Having made up our mind what the purpose of our coating system is, it becomes necessary to specify the system using technically correct language, which should reference SABS (or other international) specifications, codes of practise and/or paint manufacturer's data sheets.

Sadly, many specifiers do not compile a performance specification using national reference standards such as SANS 1200HC, which is still based on sound reasoning. However, SABS have adopted ISO 12944, now as SANS 12944, which is a far more comprehensive standard on which to base their specific project performance specification.

I therefore suggest that one has three choices on which to compile a performance specification:

1. Follow the guidelines of SANS 1200 HC and/or SANS/ISO 12944.
2. Approach a 'friendly' paint manufacturer and
3. Make use of a reputable corrosion consultant.

To this end we usually approach either our friendly paint manufacturer or a corrosion consultant for their advice as to what system to use for what environments. The paint manufacturer recovers the cost of this consultation in the selling price of his paint. This could lead to the temptation to over specify systems with a view to profit for the company. On the other hand a corrosion consultant will charge for his advice.

When it comes to seeking advice about what steps to take when applying the paint system to ensure a good quality end product, both SANS 1200 HC and SANS 12944 are useful standards. These documents are full of useful "do's and don'ts" such as not painting in humid conditions, very cold weather or for that matter on very hot steel and so on.

After that we need to rely on the paint manufacturer's instructions to get a good quality coating. If asked to do so the manufacturers will do a quality overview of the application and will also provide guarantees for the life of the system.

Make sure any offered guarantee is specific to the needs of what the project team


Photo 1

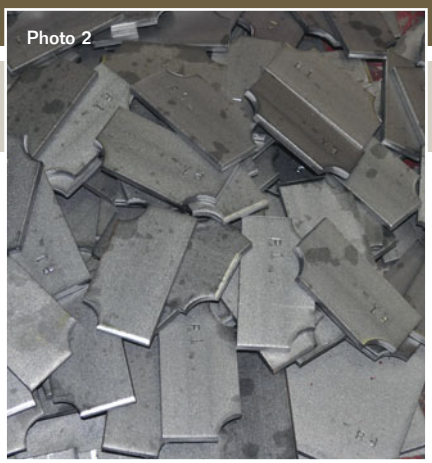


Photo 2

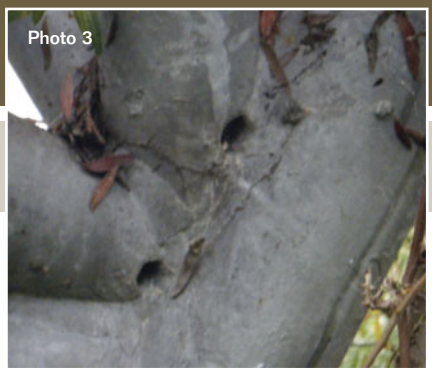


Photo 3

LEFT TO RIGHT: Photos 1 – 3.

requires, e.g. failure of entire coating system to a specific RI condition? Many times the client says he has a guarantee but does not know what is guaranteed? (Also get a guarantee for the colour not breaking down due to UV exposure)

Preparation for the system, preparation and more preparation

Those were very wise words my first boss after graduation taught me about corrosion protection. The success of the system will always be totally dependent upon how well the preparation of the steel surface has been done. By preparation we could include the following separated into those falling under the planning stage and those during the fabrication process.

1. Plan the steelwork at design and detailing stage to suit the chosen process.

a. Before a draughtsman puts a finger to "the proverbial key board" to commence the production of structural steel detail drawings he needs to understand:

i. Is this an architectural finish project where 'spit and polish' and high quality finishes are required?

ii. What corrosion protection or decorative system has been chosen for the project?

iii. Will the steelwork be accessible for future maintenance work if necessary? If not, then a more comprehensive specification may be necessary.

iv. Other specified requirements.

b. Is continuous welding (all be it seal welds in some cases) a corrosion protection requirement, or conversely should welding be kept to an absolute minimum to prevent possible distortion which could impact on the finished product? Always remember the 6 metre rule: if a part of structure is 6 metres or more away from any seeing eye then that eye will not pick up imperfections in the finish, so it is not necessary to go crazy with the 'spit and polish routine'.

c. If a paint system is chosen for corrosion protection, one would try to avoid welded double angle construction with a small gap between the heels of the angles because it is impossible to paint properly between these angles. This could be solved by using bolted construction and doing the full paint system before doubling up the angles or by using a 'Tee' bar profile to emulate the double angles. The latter is obviously preferable when future coating maintenance is required.

d. This form of construction with hot dip galvanizing can present a similar problem. Providing there is at least a 2mm gap between the two surfaces, cleaning and subsequent galvanizing will not present any problems, however, with smaller than 2mm gaps (not recommended), sealing with molten zinc may not necessarily occur and the crevice may lead to weeping of acid salts (from the previous cleaning processes) from the crevices following water quenching and cooling. Weeping of acid salts can be cleaned and if necessary after cleaning, sealed by some sealant or product such as Galvpatch or Zincfix recommended by HDGASA.

e. Specifically for architectural finish hot dip galvanized steelwork requires some additional up front planning.

i. It is important to ensure that the steel ordered for this purpose falls into an ideal range of so called silicon killed steel. Certain alloying elements found in steel, in particular silicon and phosphorus, depending on their percentage presence can lead to very thick coatings when hot dip galvanized. In theory from a corrosion point of view, thick coatings will have a proportionally longer life, but in practise these thick coatings can damage easily (which for technical reasons is not detrimental to the life of the system) but more importantly from a decorative point of view these thick coatings also do not oxidise their surfaces into that delightful patina (spangle finish) that architects so love. The Hot Dip Galvanizers Association of SA (HDGASA) have good advice available in this regard.

ii. In the galvanizing process, steel components get dipped into various solutions as well as molten zinc. It is important not to have any enclosures in the steel component where air can be trapped preventing the liquids from doing their intended work or to trap molten zinc on withdrawal. To prevent this it becomes necessary to add suitable drain/breather holes into corners where such air entrapment can occur. This should be done by showing holes on steel detailed drawings. Once again HDGASA has good information on the subject.

iii. If in doubt ask you friendly galvanizer or HDGASA to come around and advise you!


Photo 4


Photo 5

By just taking a short cut bypassing any one of the preparation steps, your selected corrosion control systems could end up fatally flawed.

ABOVE FROM LEFT TO RIGHT: Photos 4 and 5.

BELOW FROM LEFT TO RIGHT: Photos 6 and 7.

2. During the fabrication process

a. Cutting those breather/drain holes

i. It is preferable to drill these holes, and 3D detailing packages talking directly to NC controlled drilling machines will insert holes into their exact position. See photo 1.

ii. With the advent of oxy-fuel and plasma plate centres, it is now possible to cut part holes to an inordinately high standard. See photo 2.

iii. Oxy fuel hand cut holes should be avoided at all costs. They are usually poorly done and are unsightly as example photo 3, taken at the high profile Eden project in England indicates. These hand cut holes are perfectly placed at eye level for all to see, what a shame! Photo 4 shows an inappropriate air pocket leading to an uncoated area and photo 5 solidified zinc traps as a result of inadequate or non-existent coping holes or snipes.

b. Removal of sharp edges and corners

i. We know that neither paint nor molten zinc will stick to sharp edges.

ii. This process falls under the generic name of fettling which the Oxford dictionary defines (amongst other definitions) as to "make ready, put in order, to scour".

iii. The Oxford dictionary defines scour (amongst many others) as cleanse or polish by hard rubbing.

iv. In our workshops we commonly use the term grinding to describe how we remove the sharp edges and corners.

v. Do not forget to remove sharp edges or burrs for safety reasons. Photo 6 clearly covers all of these points.

c. Remove substances that will be harmful to the process that follows:

i. Paint and wax will prevent molten zinc from reacting/alloying with the surface of the steel in those areas.

ii. Removal of oil based paint marks will have to be removed for hot dip protection.

iii. Boilermakers' yellow wax crayons should never be used on steelwork intended to be hot dip galvanized, grinding just spreads the wax over a greater area.

iv. Hydrocarbons (oils and grease) and other dirt are usually chemically removed by dipping in the case of the hot dip process into caustic and acid solutions, or by using water based grease removers for painting systems (shot or sand blasting will only spread the hydrocarbons over a greater area with sometimes disastrous results with paint not adhering to these areas).

v. Welding spatter and slag fall under this subject and are usually removed mechanically.

d. The glaze like silicon slag layer from the Mig/Mag welding process also needs to be mechanically removed (using a needle scabbler machine) *Photo 7 refers.*

e. Prepare the surface to receive the system.

i. This will always include remove mill scale and rust which process can be done by wire brushing, sand or shot blasting and/or acid dipping.

ii. Paints that are suitable for corrosion protection do not stick to smooth


Photo 6


Photo 7

surfaces, so mechanical wire brushing which tends to polish the steel is not great for preparation for corrosion protection systems.

iii. *Sand/shot blasting does roughen the surface, we are looking for a profile of between 40 and 80 microns to get a good paint adhesion.*

iv. *Fortunately sand/shot blasting is well specified in internationally accepted specifications. Swedish specification SIS05 59 00-1967 "Pictorial surface preparation standards for painting steel surfaces" was the original document in this regard. An updated version has been released in the form of ISO 8501-1:2007. These documents have a series of full colour pictures that show what the various defined levels of cleanliness of the steel after preparation will look like based on the degree of surface rust before the cleaning process begins. ST specifications cover wire brushing, SA specifications cover sand/shot blasting.*

v. *These documents do not touch on surface roughness requirements. (The guidelines for the profile requirements comes from the paint manufacturers). Refer to ISO8503 which covers "Surface roughness characteristics of blast cleaned substrates".*

f. Quality assurance requirements.

i. *There are a few simple steps that if followed could implement a quality assurance programme for painted surfaces.*

ii. *As the SAISC always does, we recommend that the contractor set up a quality control plan (QCP) which covers every step in the preparation, cleaning and painting process based on:*

1. *Engineers/architects specifications*
2. *Do's and don'ts from SANS 1200HC and SANS/ISO 12944*
3. *Paint manufacturers recommendations*
4. *Blast/wire brush requirements*
5. *Record measurements taken at relatively close centres on each piece of steel being treated such as visual inspection for removal of hydrocarbons etc, surface roughness, visual inspection of grade of cleanliness (arguments in this regard can be settled by making sample pieces before work commences of what is agreed to be (say SA2.5, one kept by the applicator, one kept by the inspector), wet film and dry film thicknesses, etc.*
6. *Overview records of temperature and humidity read (say hourly).*

Conclusion

There is no doubt that whatever corrosion protection system you choose to use, good preparation is basic to a long lasting life of the system.

This means attention to detail at every stage from detailed drawings, through cutting shaping and holing the steel right through to welding and final fabrication inspection, followed by hot dip galvanizing and/or painting with intermediate and/or final inspection.

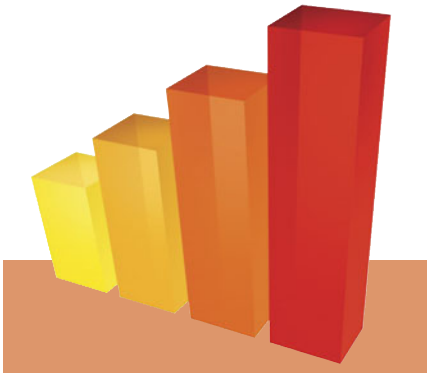
By just taking a short cut bypassing any one of the preparation steps, your selected corrosion control systems could end up fatally flawed.

ANNUAL REVIEW
OF LSFB ACTIVITY DURING 2015

By John Barnard, SASFA Director

SOUTHERN AFRICAN LIGHT STEEL FRAME BUILDING ASSOCIATION
www.sasfa.co.za

BELOW RIGHT AND NEXT PAGE: LSFB is increasingly being used for external (and internal) walling of multi-storey office and commercial buildings



The total LSF market (local and export, trusses and complete buildings) is forecast by the manufacturers to grow by more than 10% during 2016, compared with 2015. The SASFA manufacturing members report good demand for middle and upper income housing, schools and classrooms, and roofing structures for low cost housing projects.

Building industry statistics (Statistics South Africa)

The floor area of all buildings completed in South Africa during 2014/15, including additions and alterations, is reported to be 9.2 million square metres – showing a decline of 8% compared with the performance of the previous year. New **residential buildings** (including alterations) made up 68% of the area of all buildings completed. The largest sector in the residential market was dwellings of more than 80m², followed by flats and townhouses.

A significant 17% of all buildings (residential and non-residential) completed, comprised of **'additions and alterations'**.

Industrial buildings and warehousing formed the major sector in the non-residential market, with 45% of the floor area, followed by office and bank buildings (26%).

Based on building plans approved, we can look forward to a 11% growth in residential building activity during the next 12 to 18 months, unfortunately offset by a 12% decline in non-residential building, keeping in mind that there is a lag of some 9 months between plans approved and buildings completed.

Light steel frame building performance

SASFA's annual survey, which aims at quantifying the level of light steel frame building (LSFB) activity in the market, was carried out during December 2015. As in the past, SASFA approached the South African manufacturers of light steel framing to determine the volume of thin gauge high strength galvanized steel sheet they had processed during the past year, as a measure of the building activity in the industry.

The manufacturers reported throughput of 21 500 tons of high strength galvanized steel sheet, reflecting 14% growth compared with production in the previous year. Supply into the local market increased by 13%, while exports from South Africa into Sub-Saharan Africa grew by 20%.

Some 50% of LSF was supplied into the residential market, with 30% going to office, industrial and commercial buildings and 20% to schools, hospitals, clinics and other community buildings.

During 2015, 66% of locally sold LSF was used for roof trusses for buildings with masonry walls or in industrial buildings. Roof structures covering a total floor area of 1.55 million m² was produced, some

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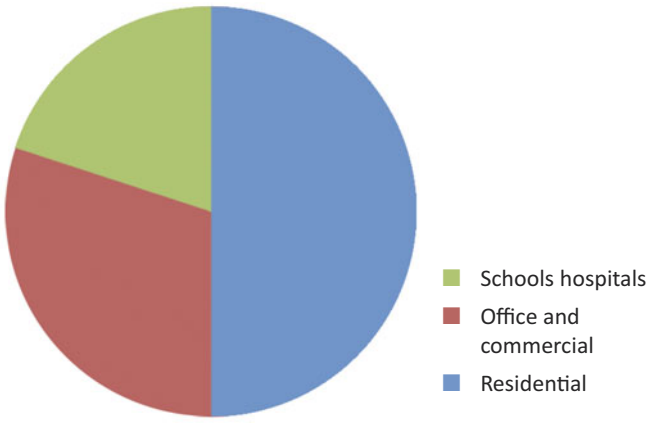

LSF building market split, 2015

30% higher than the previous year. Stats SA figures for buildings completed in 2014/15 (excluding low cost housing) shows that light steel roof trusses captured 20% market share during the period.

Based on industry feedback, complete buildings (wall panels with roof structures), covering a total floor area in excess of 400 000m² were built using LSF in South Africa during 2015, marginally down on the previous year's figure.

This is largely in line with the official national building statistics supplied by Stats SA, which indicate no growth in total floor area of new buildings completed during 2014/15. It confirms the acceptance of LSFB by architects, engineers, builders and clients, notwithstanding the best efforts of the clay brick industry to bring the proven attributes of LSFB into question.

But LSFB does not only consist of steel. Based on average ratios of wall area to floor area, LSF has in 2015 resulted in a demand for

- 0.4 million m² of external cladding (typically fibre cement board),
- 0.67 million m² of bulk insulation (typically glasswool),
- 0.9 million m² of internal lining or gypsum board, and
- 0.4 million m² of vapour permeable membrane used in external walls.

The total LSF market (local and export, trusses and complete buildings) is forecast by the manufacturers to grow by more than 10% during 2016, compared with 2015. The SASFA manufacturing members report good demand for middle and upper income housing, schools and classrooms, and roofing structures for low cost housing projects.

LSFB is increasingly being used for external (and internal) walling of multi-storey office and commercial buildings, such as the 20 000m² external cladding of the Mall of Africa, currently being built in Midrand.

The decision by government to in future increasingly use innovative building technologies, such as LSFB, for new schools, clinics and student accommodation, has added additional growth potential.

In view of all the above, the forecast 10% growth in the use of LSFB in 2016 may in time prove to be conservative.

CALENDAR OF *Courses* and *Events*

FEBRUARY – MARCH

February 29 – 5 March
SASFA Training Course for Building Contractors of LSF Buildings (Gauteng)

APRIL

14 Early Bird Steel Awards Entry Deadline
20 SAISC Golf Day – Gauteng, Bryanston Country Club
21 Steel Awards Entry Deadline

SEPTEMBER

15 Steel Awards

NOVEMBER

3 SAISC AGM, Country Club Johannesburg
7 POLASA AGM, Country Club Johannesburg

OTHER EVENTS/COURSES PLANNED FOR 2016:

International Speaker

Steel Academy Courses for young engineers

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SAMCRA: dennis@saisc.co.za

STRUCTURAL HOLLOW SECTIONS
an attractive alternative for your structures

ASTPM

By Franco Mordini, Committee Member ASTPM

Structural Hollow Section remains very popular especially for aesthetically pleasing structures, bracing members and slender compression members that are typically used for elevated canopies. In many other cases the structural tube remains the preferred material of choice for applications where tube is subjected to bi-axial bending and high compression loads. Examples are frames to support industrial equipment, highly loaded mechanical applications, poles, satellite dishes etc.

Tubular steel continues to be the material of choice in many architectural applications such as atriums, facades, pedestrian bridges, trusses and other exposed steelwork. Recent successful examples of these structures are the Standard Bank Head office in Rosebank, Multichoice City (DSTV) head office in Randburg, Sandton City refurbishment, the new elevated bridge/ walkway at Kirstenbosch garden etc. where the clean lines and slender tubular sections make these structures very efficient and aesthetically pleasing.

Tubular steel continues to be popular in many architectural applications such as atriums, facades, pedestrian bridges, trusses and other exposed steelwork.

A suggestion to specifiers: Keep to standard sizes recommended by the SAISC's Red Book. The section sizes are chosen to come directly out of a mother tube without the need for further cold working which, when badly done, has led to cracking of corners of squares and rectangles. In most cases this will avoid unnecessary costs and provide the users with good quality products. It is always recommended to check availability with the tube manufacturers to ensure timeous execution of the fabrication.

Where quantities are high enough for a specific product (by size), mills can run special lengths that will avoid the high cost of off-cuts or shop welded splices to reduce waste. For high quantities of same sizes it is key to discuss other alternatives with the tube manufacturers. In order to minimise costs, where possible, rationalise the design by reducing number of different sizes specified. Try to avoid same dimensional sizes with different thicknesses as they could in error be interchanged during the fabrication process leading to possible failure.

The standard grade of steel for structural tube remains 355 (guaranteed minimum yield strength of the steel). The grade of 355 is readily available in circular hollow sections (CHS - Rounds) up to 356mm diameter and also in derivatives in squares and rectangles formed from these circular hollow sections. Some South African producers will identify the material as such on the tube. If in doubt request a material certificate to ensure that the correct grade of steel has been supplied.

Where possible avoid the use of commercial quality grade (generally 60 diameter and smaller with 2.5mm wall thickness and thinner but also some imported sections) and use a grade with guaranteed properties or at the very least with controlled chemistry.

Another positive development in tubular fabrication is the availability of various tube laser services in the industry. These specialised machines make tubular fabrication easy. In many instances of CHS to CHS connections, development of the end cuts can be very tricky to produce. For these specialised machines it is a walk in the park. The primary benefits are high accuracy, speed and repeatability. The analogy of cutting through steel like a knife through the proverbial butter holds very true for this service. Check what your friendly tube and pipe maker can offer you in this regard.

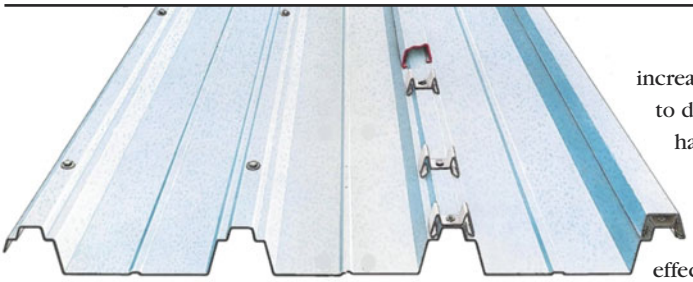
In order to offer your customer attractive cost effective solutions always consider the benefits of tube when designing and building your structures. You may well be pleasantly surprised.

Concealed-Fix, Secret-Fix and Standing Seam Cladding

By Dennis White, Director SAMCRA

Technical journals, manufacturers' data sheets and brochures regularly make reference to these three titles and often mix them in a single sentence which has resulted in a certain amount of confusion and begs the question – what is the difference?

When metal cladding was first introduced into Europe it was in the form of flat sheets which formed a weatherproof cover over a timber sub-structure (supported cladding). The side and end laps of individual sheets were folded over on themselves and then flattened to form a weatherproof seal as seen on metal clad domes etc. Over time it was found that if the longitudinal seams were left upright and the depth of upstands increased, it was possible to double fold the top half of the upstands over on themselves and thereby achieving a more effective weatherproof seal and control of rainwater runoff. Hence the name standing seam. With the transition from supported to self-supporting cladding, corrugations were introduced to provide the structural properties of the cladding. Following the development of the continuous rolling process, trapezoidal ribs were introduced which resulted in stronger and more efficient profiles. The side laps in all modern cladding profiles are technically standing seams.



There are numerous manufacturers in Europe and North America producing traditional standing seam profiles i.e. single pan with narrow upright longitudinal seams, most of which are mechanically seamed. In South Africa there are supported standing seam profiles produced regionally by a number of specialist contractors plus two self-supporting profiles sold nationally. In essence a standing seam profile comprises a broad pan with narrow upright mechanically seamed side laps that encapsulate an anchor cleat or halter.

In the broad sense concealed-fix(ed) or secret-fix(ed) cladding is any type of cladding where the means of anchoring the cladding to the supporting structure are not visible from the outside. Profiles range from a conventional pierced-fix box rib profile with a clip-on cover strip that conceals the heads of the fasteners, direct fixing through a concealed flange, a spring action clip through to an encapsulated clip-over cleat or halter.

In the broad sense concealed-fix(ed) or secret-fix(ed) cladding is any type of cladding where the means of anchoring the cladding to the supporting structure are not visible from the outside. Profiles range from a conventional pierced-fix box rib profile with a clip-on cover strip that conceals the heads of the fasteners, direct fixing through a concealed flange, a spring action clip through to an encapsulated clip-over cleat or halter.

In essence, except for some minor variations, it is a case of 'a rose by any other name…'

The current everyday understanding of these titles is:

1. Concealed-fix or secret-fix is any profile where the anchoring system is not visible, which provides unrestrained thermal expansion or contraction and does not require any form of mechanical seaming.
2. Standing seam is any profile where the anchoring system is not visible, which may or may not provide unrestrained thermal expansion or contraction and does require mechanical seaming.
3. On an historical point Secret Fix was a patented system marketed by H.H. Robertson (Africa) (Pty) Ltd circa 1980 which comprised a pierced-fix deep box rib profile with a clip-on cover strip that concealed the heads of the fasteners.

SAMCRA
SOUTHERN AFRICAN METAL CLADDING AND ROOFING ASSOCIATION
www.samcra.co.za

SOCIAL SNIPPETS:

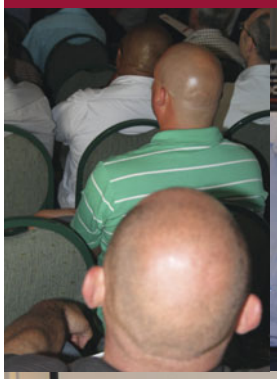
By Marlé Lötter, Events Manager, SAISC

BELOW LEFT: Clearly this industry demands more hair on your teeth than on your head!

SAISC AGM 2015

Country Club Johannesburg, 12 November 2015

The SAISC AGM 2015 was hosted on 12 November 2015 at Country Club Johannesburg – lead by Paolo Trinchero (CEO), John Swallow (acting Chairman) and Spencer Erling (Secretary) – offering a networking opportunity for members of all the SAISC divisions.



POLASA AGM 2015

Country Club Johannesburg, 9 November 2015

The POLASA Board as selected at the POLASA AGM of 9 November 2015 at Country Club Johannesburg

LEFT: (*From left)* Kobus de Beer (POLASA Secretariat), Mduduzi Mabaso (Consolidated Power Projects), Paolo Trinchero (CEO SAISC), Vincent Kanyongolo – Chairman (Dyambwini Construction), Sagren Moodley – Vice Chairman (Metpress), Marcello Lamperini (Mkhulu Electro Distribution Projects), Peter Ramaite (Ramagale Holdings), Robin Page (Trans Design cc), Nick van der Mescht (Tricom/Robor), Gary Whalley (Babcock Ntuthuku Powerlines).

SASFA EXCO

RIGHT: (*From left)* Clarence Catchipande (Gifa), Mike Bywater (Global Innovative Building Systems), Stewart Murray (MiTek), John Barnard (SASFA), David van Zyl (Kwikspace), Reitze Hylkema (Kare), Garry Powell (Saint-Gobain), Annemarie Robertson (Marley Building Systems), Mulder Kruger (Trumod, Chairman SASFA), Melvin Hickers (ArcelorMittal) and Chris Smith (Razorbill).

Exco members not in the picture: Andrew de Klerk (Everite), Paolo Trinchero (SAISC), Ashley Fransman (Framecad).

SAISC STAFF YEAR-END FUNCTION

2 December 2015

LEFT: The staff of SAISC said goodbye to 2015 on a 'high note' at the Play at Height Bungee Tower followed by lunch at the Chief's Boma in Fourways...

ABOVE: ...we finally also drove Director Kobus de Beer *up the wall!*

SASFA COMMITTEE'S LUNCH

3 December 2015, Sunnyside Park Hotel

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