steel CONSTRUCTION

Volume 38 No. 1 2014

IN THIS ISSUE:

Exposed architectural steel

SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION

OFFICIAL JOURNAL OF THE SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION

Total process optimization

Bob (35) knows the most efficient way to design, detail, and fabricate a steel structure. His company uses Tekla to automate fabrication and project management through interfacing with MIS systems and CNC machinery. What's more important, sharing the Tekla model allows the project team members to stay in the building information loop real-time.

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EDITOR'S NOTE

The first issue of every year is always a bit of a struggle, since it gets done when the whole industry is winding down and getting ready for a well deserved holiday. One usually has plans for the magazine in the next year – improvements, exciting new features and interesting authors – that sort of thing. But not in the first issue, because of the timing you see. And then the year begins with a chaotic bang and your plans get watered down a bit or goes out the window, because other things happen.

So this year I am making a lofty statement, like Paolo in his Comment *(Issue No. 6 2013)*: Steel Construction will have a new look this year and some exciting new features and we will launch this new look with its Steel Awards Issue.

We plan to make it a collaborative approach and for that we will need our readers input. We will do a formal survey later in the year, but if you have any suggestions in the meantime, please send them to me.

This column is too short to try to give you the profile of a great magazine, but here are a few words I would like to hang onto Steel Construction in the near future – insightful content, good design and mouthpiece for the industry.

The SAISC already has a few projects in the pipeline that would assist in giving the magazine some forward thinking content as with the multi-storey building system. We plan to whet your appetite with some steel stories already.

And don't forget Steel Awards – even though this will be its 33rd year, your projects set the scene for yet another great evening. This year Steel Empowers!

steel CONSTRUCTION

Volume 38 No. 1 2014

Contents

Join us on and YouTube

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Deutsches Bergbau-Museum, Bochum by Benthem Crouwel Architects

Photographer: Jannes Linders

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SAISC COMMENT

By Paolo Trinchero,
Chief Executive Officer, SAISC

There have been many changes over the years which should enable us to make significant headway in getting more steel frames specified. The impact of modern software on steel construction has been enormous.

Old Mutual Properties steel framed multi-storey building in Johannesburg (1989/1990).

A NEW (OLD?) MARKET FOR STEEL

Those of you who have 'studied' our annual report will know that one of our key strategic objectives is the promotion of steel framed multi-storey buildings. In my early years as a Dorbyl structural engineering bursary student, I was privileged to work with Trevor Geach on the Old Mutual Properties building, a 20 storey high-rise in the centre of Johannesburg.

The building had a concrete core to resist lateral loads with the steelwork designed to resist vertical (gravity) loads only. The SAISC at the time assisted with the design of the building using Canadian software. About 1900 tons of structural steel and 25 000 square meters of Bond-Dek were used.

As a young student I spent most of my time looking for unmarked gusset plates under what seemed like mountains of mud. Shear studs were something new and we were constantly checking that they had been installed correctly. The experience of working on a steel framed building led me to develop a passion for anything steel.

There have been many changes over the years which should enable us to make significant headway in getting more steel frames specified. The impact of modern software on steel construction has been enormous. Our consulting engineers and draughtsmen have modern design and detailing systems. Our fabricators have up-to-date CNC equipment interfacing directly with the detailing software. New products have been developed specifically for steel frame applications. Look out for our digitised composite beam design software. Light steel framing can be incorporated into both the structure and the cladding to reduce costs and increase the speed of construction even further.

During 2013 the SAISC completed laboratory testing of components of its innovative patented Modular Office Floor system. We are carrying out full scale testing of the floor system at the Tass Engineering facilities in Kempton Park. Amanuel Gebremeskel of SAISC and Professor Alex Elvin of Witwatersrand University have completed the complex planning phase of the full scale testing and are poised to start testing soon.

The modules have been fabricated and are being assembled. The digging, levelling and compacting of the soil have been completed and a steel grillage foundation designed, fabricated and installed. Columns are being erected and will receive the completed modules very soon.

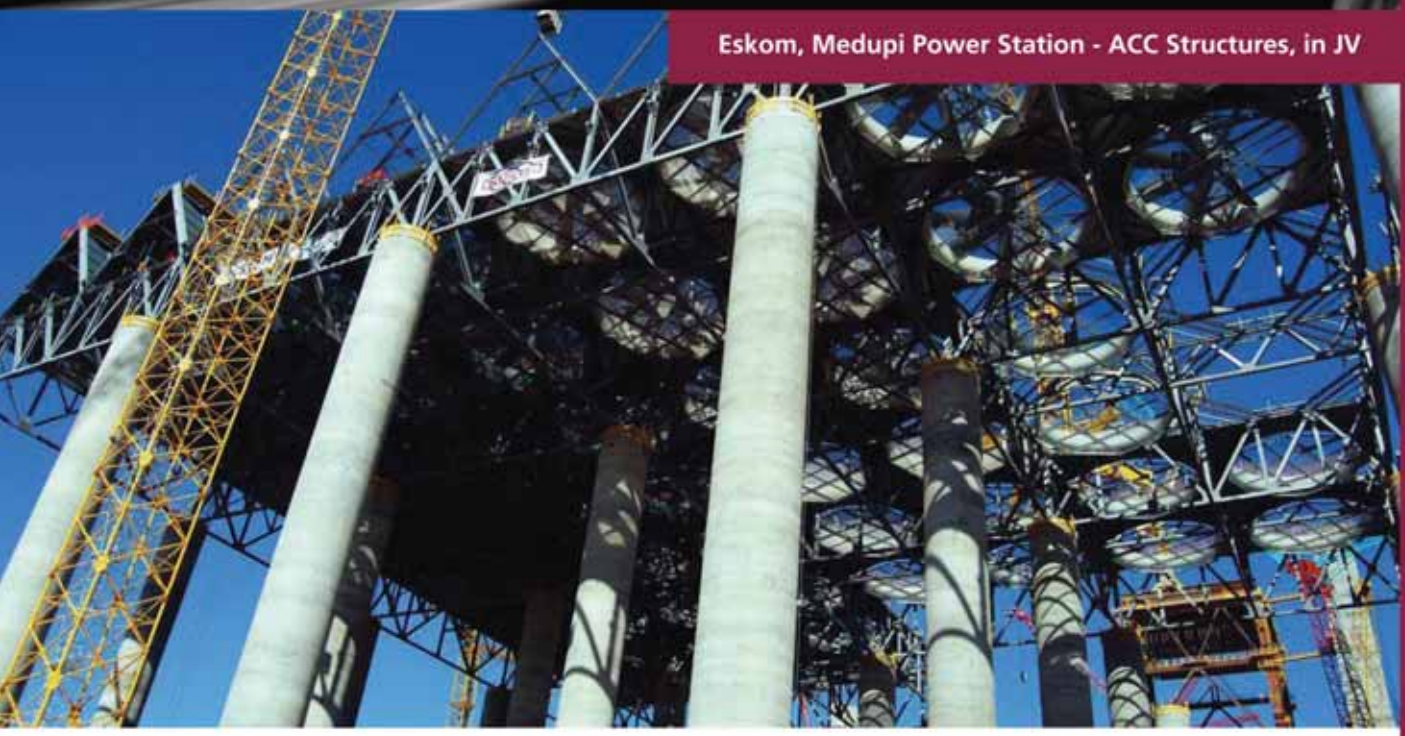
Instrumentation of the testing modules and the actual testing series are expected to take several weeks. The information and modifications gleaned from the testing will be incorporated into the patent for the technology.

It is our intention to run a series of articles on projects *(see page 18 in this issue)* and innovations so keep an eye out for new developments.

In addition to offering our expertise to any of you considering going the multi-storey, structural steel route, we would like to invite input from our readers. So please do not hesitate to comment on our initiatives. Now is the time for you to get involved so we can grow the market for steel.

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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Schiphol Departures - The structure has been left open, flooding the hall with daylight so that travellers can see where the planes are and know where they have to be without being led there.

VISITING ARCHITECT 2013: MELS CROUWEL

"30 years of experience has taught us that the most simple means are often the most effective. Design principles like compactness, good orientation, integration in the ecosystem and water cycle and the efficient use of materials have been applied by builders for centuries and have proven their worth. These low-tech design tools lead to well-organised buildings of natural beauty."

Mels Crouwel made a lightning visit to South Africa at the end of August 2013. He was this year's 'visiting architect' invited by the SAISC to show South African architects and students of architecture how they applied structural steel with wonderful effect in his Benthem Crouwel Architekten practice in Amsterdam and Aachen. This was his, and Kirsten Schipper who accompanied him, first visit to South Africa and they quickly realised that a six day visit, during which he addressed the architects in Bloemfontein, Pretoria and Cape Town and 'quickly' spent two days in the Pilansberg Nature Reserve, did not do justice at all – so they will be back.

The Bloemfontein venue was very well attended by students, professors and practicing architects. Mels quickly established a rapport with the students, partly because they enjoyed his Dutch accent trying to speak Afrikaans and mostly because of the impressive and imaginative projects he showed of work done in the Netherlands and elsewhere. An interesting series of current projects are the renewal of all major Dutch transportation hubs or Central Railway Stations. He made the point that he did not only work in steel and then went ahead to show a number of excellent structural steel examples. All who attended his presentations were very impressed and expressed appreciation to the SAISC for taking this initiative every year.

BIOGRAPHY

Mels Crouwel received his Master of Architecture degree from the Delft University of Technology in 1978 and the following year, with Jan Benthem, founded Benthem Crouwel Architects in Amsterdam. The two founding directors and their partners Marcel Blom, Joost Vos, Marten Wassmann and Markus Sporer today maintain an international practice with 70 employees located in offices in Amsterdam and Aachen (Germany).

The firm has designed a broad range of buildings, infrastructure, and interiors: museums, shopping malls, universities, music buildings, bridges,

assisted living complexes, and master plans. In all their designs, Benthem Crouwel seeks a balance between economic, social and ecological interests, with a special concern for innovation and sustainability. The firm takes pride in combining a signature style with compactness, simplicity, integrated ecosystems and an efficient use of materials.

With a personal passion for the arts and a commitment to functionality, sustainability and innovative design solutions, Mels Crouwel has worked on many internationally renowned museums, public buildings and cultural platforms. Among his notable projects are the renovation and expansion of the Stedelijk Museum Amsterdam, restoration and expansion of the Anne Frank House (Amsterdam, 1999); the adaptive re-use of the former Thomas de Beer textile mill in Tilburg as the De Pont Museum of Contemporary Art (1992/2003); Las Palmas cultural and commercial centre (Rotterdam, 2008); the award-winning Deutsches Bergbau Museum (Bochum, 2009); the Ziggo Dome (2012), a new 17 000-seat concert venue in Amsterdam's ArenA Boulevard; and the Kulturbau and Forum Mittelrhein in Koblenz (2013), a project that redevelops the city's Central Square.

In 1986 Benthem Crouwel became Master Architect for Amsterdam's Schiphol Airport, in collaboration with NACO (Netherlands Airport Consultants). Benthem Crouwel designed and has implemented the Airport

Mels Crouwel.

City master plan for the terminals, facilities, roads, offices and hotels, emphasising clarity of organisation throughout the huge project.

In 1989, Mels Crouwel became the supervising architect for Amsterdam RAI, the largest trade and convention centre in the Netherlands. Over the past

twenty years he has designed numerous plans, renovations and urban schemes for the complex, which welcomes almost two million visitors a year. From 2004 until 2008 Mels Crouwel held the position of Chief Government Architect in the Netherlands, charged with stimulating architectural excellence both in government buildings and more generally throughout the nation.

Among its major current public projects, Benthem Crouwel is architect for the construction of the north-south subway line in Amsterdam, scheduled for completion in 2017. Benthem Crouwel has received numerous prizes for its work, including the prestigious BNA kubus in 1999, awarded by the Royal Institute of Dutch Architects, as well as the Kunstpreis Berlin (1989) and Constructa Berlin (1990).

The firm is frequently successful in national and international design and innovation competitions, including the Benelux Aluminum Prize and the Dutch National Prizes for Concrete Structures and Steel Structures. Benthem Crouwel's commitment to sustainability has been recognised in projects including Etrium (the headquarters of Econcern in Cologne, 2007–08), which received the highest ranking in Certified Sustainability from the German Green Building Council (DGNB), comparable to LEED Platinum status in the U.S.

Mels Crouwel is a member of the Royal Institute of Dutch Architects and an honorary member of the Association of German Architects. He lectures frequently in cities in the Netherlands and abroad, including Berlin, Bochum, Chicago, Darmstadt, Dortmund, Hamburg, Jerusalem, Leuven, London, Munich, New York, Seattle, Stockholm, Stuttgart, Toronto and Vienna.

Q&A

For an architect (I assume) every material offers a different set of advantages and characteristics to work with. How do you feel about working with steel?

It is great to work with steel because it is light and strong at the same time. The material offers a lot of freedom in form and is easy to prefabricate and assemble. Furthermore there is an abundant choice in possible finishes for steel, so it can be used in many different designs.

(The following interview was adapted from a previously published article in Issue 33 of Details, Korea)

We have seen your more recent projects and want to know how they are different from your previous projects?

In every project, we first explore the very essence of the task, of the future use of a building of the history of its location of the sense of place, and of the meaning of these aspects to people. From this specific analysis all design processes commence. As the parameters for the analysis differ from project to project, our design approach almost inevitably leads to distinct solutions. In that sense, actually, all of our projects are unique, and are different from any predecessor. Our design approach allows evolution in our designs in architectural language, shape, choice of material, colour, day light and artificial light influence, continuously from project to project.

It is impressive that you design each project completely suitable to its purpose. Conversely, it is hard to find your own characteristics commonly shown in the projects of Benthem Crouwel Architects. Why is it so?

Even for very similar tasks our design approach leads to individual solutions. At the first glimpse, our designs for the five massive central stations that we are currently working on took a whole palette of design statements. However, we take pride in the fact that people confirm that they can easily identify these projects as our work, for their scrupulous contemporary architectural language, their clear internal organisation and logistics, as well as their high ambition in material-specific detailing.

Many of your projects show the application of eco-friendly concepts. How do you reflect these concepts in design?

At the start of any design process we initiate an assessment with representatives of the client to formulate the brief for sustainable aspects. We believe there should be a balance between ecological, economic and social interests. New technologies inspire us to devise innovative solutions. 30 years of experience has taught us that the most simple means are often the most effective. Design principles like compactness, good orientation, integration in the ecosystem and water cycle and the efficient use of materials have been applied by builders for

The shopping mall ´Forum Mittelrhein´ and the Kulturbau 'Forum Confluentes' together form the design for the redevelopment of the central square of Koblenz, Germany.

Ziggo Dome - The building is covered with nearly 120.000 LED fixtures, making the building appear like a video screen on all sides.

centuries and have proven their worth. These low-tech design tools lead to well-organised buildings of natural beauty.

However sustainable it may be, a building ultimately faces 'dismantlement' due to its deterioration. Are you thinking about this (eco-friendly) dismantlement and designing in such a way that reflects this issue?

Since its humble beginnings some 30 years ago, our office has been strongly influenced by prefabrication. Repetition of modular elements can be found in most of our projects ever since. Repetition enables cost effective solutions, swift replacement after damage and simple dismantlement at the end of the life span. Additionally to the development of prefabricated building elements, we also experiment with new facade materials for special occasions, like with the continuous and almost jointless facade made of carbon and Aramid fibre reinforced composite of the new Stedelijk Museum, that has a very long life span.

What are the current architectural issues in the Netherlands and how do you reflect those issues in your buildings?

In the Netherlands the re-densification of urban areas is of crucial importance in order to limit the actual size of cities and to keep the natural green 'lungs' around and between the branches of the urban metropolis of the Western Netherlands, the so called 'Randstad'.

Firstly, many of our projects involve the reuse or revitalisation of urban fabric or building structures. The careful revitalisation is often combined with stunning contemporary architectural statements, for example the Las Palmas complex in Rotterdam where we added a prominent rooftop office penthouse to an existing warehouse that now holds the Dutch National Museum for Photography.

Secondly, with the continuous requalification of the public domain, with all its economical, cultural and recreational functions, it is essential to meet the requirements of society. Many of our projects like the Elicium RAI, the Stedelijk Museum, Ziggo Dome and the Bergbau Museum of Mining, are examples of the high ambitions that private and public initiatives put into the improvement, upgrading and refinement of public services.

Your projects are mainly located in urban central bases so have public characters that involve the use of a large number of people. Do you have any particular consideration about this?

The quality of public transport has been a major focus point of governmental projects for the past twenty years. Commuting is commonplace in a small country like the Netherlands, with a vast metropolitan area of comparatively small centres. Just taking the Randstad metropolitan district, we are now completing five central railway stations, many of them are high speed links to neighbouring countries. Locally, in Amsterdam, the construction of our design for a full new underground metropolitan railway line with seven stations is now well underway. We design these transit hubs as easy to navigate, light, transparent and welcoming structures with appealing own identities. In the future, Utrecht Central Station will accommodate 180 million passengers annually. Every one of these passengers expects full comfort, optimal functionality and a contemporary, yet timeless, aesthetic environment.

Dennis Dedwith, George Stott Group CEO.

GEORGE STOTT GROUP INCLUDING MM&G MINING AND ENGINEERING

By Viv van Zyl, SAISC Membership Consultant

In 2001 George Stott was bought by Dennis Dedwith and Rufus Maruma and became one of the first truly empowered manufacturing companies in South Africa. This partnership has been very successful for the company over the past 12 years. Since the acquisition, George Stott has grown significantly from a thirty-million-rand-turnover- per-year company to in excess of R400 million per year.

With over a hundred years of service to the steel and steel related industries, where does one start? George Stott and Company, established in 1911, is probably one of the oldest if not the oldest continuously operating steel manufacturers in South Africa.

What started as a small blacksmithing company by a young Scottish immigrant in the then new mining town, Johannesburg, stood the 'test of time' and is still operating today but much more diversified. The blacksmith was operated by the young George Stott, who recognised the need for forged steel components in the flourishing gold mines in the Witwatersrand area.

Under the leadership of three generations of Stotts, the company continued to grow through two World Wars, economic depressions and political turmoil. Over the years the company has developed from a small open die forge shop to a multifaceted manufacturing entity which is involved in several market sectors including electrical distribution, transmission and generation, transport and municipal infrastructure, railway components for electrical overhead tracks, wagon and locomotive manufacturing, telecommunications, mining products and general engineering.

The fearless entrepreneurial spirit shown by the great grandfather was inherited by those who followed. This spirit remains up until today although no longer under the leadership of the Stotts. Various product lines were introduced to and removed from George Stott's core business over the years as dictated by supply and demand. This is still a business philosophy that works in the company's favour.

In 2001 George Stott was bought by Dennis Dedwith and Rufus Maruma and became one of the first truly empowered manufacturing companies in South Africa. This partnership has been very successful for the company over the past 12 years. Since the acquisition, George Stott has grown significantly from a thirty-million-rand-turnover-per-year company to in excess of R400 million per year.

I asked Dennis what is the formula for the company's growth and success? "Just surround yourself with the best entrepreneurial young executives!"

The company today is a fully empowered business with significant HDI ownership and management and boasts a fully implemented ISO 9001:2008 management system and level 3 BBEE certification. Sectors in which this spirited company find itself active is mining, petro-chemicals, telecommunications, municipalities and state

Geroge Stott more than a 100 years ago.

GEORGE STOTT AND COMPANY (PTY) LTD

George Stott's Foundation Systems division designs innovative screw pile foundations systems for mines.

owned enterprises. Export forms a huge part of their business and some of their products are found as far as the newly developed mines in Western Australia and many of our African neighbours.

The company has the following divisions:

- Forge (Open die forgings, large diameter round bar, large forgings etc.)
- Press Shop (High volume steel pressing 3-16mm)
- Overhead Line Supplies (Light fabrication and upset forgings unit)
- Foundation Systems (Screw Piling) *(Remember the innovative Steel Awards 2013 entry – foundations for Namakwa Sands?)*
- GeoPole (Street light and traffic signal poles manufacturing unit)
- GeoSteel (Plasma cutting, bending, drilling, etc.)

And the following stand alone companies:

- MM&G Mining and Engineering (Structural steel manufacturer and erector) *(Steel Awards 2012 Overall Winner project team for the Medupi chimneys)*
- Odyssey Steel (Special Steels Distribution Business)

The acquisition of MM&G Mining and Engineering (Pty) Ltd a couple of years ago, saw the company venture into the arena of heavy steel fabrication with success. Projects in the scope of several thousand tons of fabricated structures, including

time critical projects, have proven that the company is capable of expanding and growing into new and unexplored market sectors successfully even during difficult economic situations and as a result have become strong competition for projects. Current projects are varied in nature filling the need for technically demanding structural steel fabrication on major infrastructure projects such as the Medupi Power Station, new mining developments in the Democratic Republic of Congo, gas processing plants in Mozambique and now the Kusile Power Station.

George Stott Group, as they are now known, has an expansion programme in place and will continue growing the business in the various fields of expertise. Locally they will focus on continuous productivity improvements through technology and also seek growth through their acquisition policy to enhance synergies within the group.

They have just launched Odyssey Steel, a special steel distributer on the East Rand to help distribute their forged products. This newly formed company also stocks a wide range of locally produced specialised round bar products.

NEW MANAGEMENT APPOINTMENTS FROM 1 JANUARY 2014

Johan Venter appointed as MD – George Stott

Elize Klein appointed as Financial Manager – George Stott

Deon Myburgh appointed as Division Manager – Forge

THE TOP AND SENIOR MANAGEMENT STRUCTURE OF THE GEORGE STOTT GROUP

Chairman – Neil Morris

Geo Stott board member – Pauline Maruma

Geo Stott board member – Malcolm Sheppard

Group CEO – Dennis Dedwith

CEO MM&G – Dawie Vos

Projects Director MM&G – Jurie Human

Financial Manager MM&G – Vincent Oosthuizen

MD Geo Stott – Johan Venter

MD Odyssey Steel – Logan Lofstedt

Financial Manager Geo Stott – Elize Klein

Sales & Marketing Manager Geo Stott – Ben Zentgraf

Divisional Managers Geo Stott – Rudy Scheepers, Wayne Hall and Deon Myburgh.

George Stott's neat workshop yard.

Dennis says that they will continue to play a big role in the development of black entrepreneurs in South Africa which is also aligned with the national policy of localisation and transformation.

The group is focussing more and more on opportunities on the African continent and sees itself making investments and expanding its manufacturing base into various African countries.

Where does this dynamic business man come from? Dennis was born in the small town of Parys in the Free State; at least that is what it was in 1952! In his early working years he obtained a Dip.Tech in mechanical engineering at the Vaal Technicon and a B.Com degree through Unisa. He worked at BASA (manufacturers of automotive fasteners) in Parys and was later transferred to National Bolts' head office in Boksburg where he moved up the ranks and was promoted to Managing Director in 1988. National Bolts went on to become one of the top 100 companies in SA in 1989.

Dennis sees business as part of his leisure activities and treats his hobby, American saddle horses and cattle as a business! He is a very successful farmer near his hometown, Parys. He has been married to Engela for 36 years and has two beautiful daughters, Elize and Jean and four grandchildren. Elize, who is a chartered accountant, is soon to join the ranks of Dad's successful business.

MM&G was part of the project team that won the Overall Winner award for the Medupi Chimney Steelwork at Steel Awards 2012.

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INDUSTRY NEWS IN BRIEF

BED LAUNCHES FRONIUS' NEW TPS/I WELDING PLATFORM

SAISC member company

Bolt and Engineering Distributors (BED), South Africa's Fronius' partner, recently launched Fronius' new TPS/i welding platform at their premises in Wadeville. A team of specialists from Austria were present at the launch to share their knowledge on the new system. The TPS/i welding platform is an individually customisable and upgradeable MIG/MAG welding system with intelligence and extensive communication functions.

"Intelligent systems are able to continuously adjust to meet the immediate needs of their environment. Like an intelligent human, the TPS/i system has a memory of all of the combined knowledge from its past. And incorporated into all our machines of the future, is an ability to grow, evolve and learn by adding any new knowledge that emerges," Thomas Hiesmayr, Fronius specialist explains.

In the context of welding, intelligence is also about speed, the control speed of the arc, the welding speed and communication speeds. "SpeedNet, the high-speed internal digital networking system used, is 2 000 times faster than that used in previous generation machines, which allows much faster response times to events at the arc. We are also able to process far more feedback information, so we can analyse what is happening in greater than ever detail," adds Hiesmayr.

Interoperable intelligence has been embedded into each interconnecting part of the whole welding system: the torches; the wire feeders; and the water coolers. The water coolers, for example, use variable speed drives so that the torch and wire feed motor are optimally cooled regardless of the welding current and duty cycles.

"What we have developed is a platform that is ready to weld any part, regardless of its complexity. With TPS/i, everything is about processes. We can do standard steel welding, but we have added Low Spatter Control (LSC), along with Pulse Multi Control (PMC), which is able to stabilise the stick out and arc length in a way that provides better control of penetration."

The machine has standard spray, dip transfer, pulse and synergic capabilities and, by coupling the appropriate torches and other modules, the same machine can be used for the Cold Metal Transfer (CMT) welding process.

TSP/i is the first ever system to compute the instantaneous temperature at the wire tip, which it uses to calculate the minimum necessary ignition energy and then to control the current output accordingly. This stabilises the arc much more quickly following a short circuit.

During the welding process, the TPS/i's integrated intelligence also adapts the wire feed speed to the measured contact-tip to work-piece distance (CTWD). This is possible thanks to its more advanced control circuit and its highly dynamic wire feed motor. The positive consequence for the welder is that the arc length is re-adjusted in a shorter time and that the penetration (current) is subject to fewer fluctuations. Feeding off some of its CMT functionality, the controllability of the dynamic motor allows the wire electrode to be retracted during a short circuit, while the welding current is reduced. This prevents excessive droplet formation, spatter and wire burn-back.

In keeping with the 'intelligent machine for the future' theme, the TPS/i's user interface is a 7-inch tablet-like touch screen. The sturdy pressure-sensitive 7-

The innovative MIG/MAG welding-appliance platform TPS/i from Fronius helps companies put the productivity of their manufacturing operations onto a solid long-term footing.

inch display informs the user quickly and clearly – with graphics and local-language plain text – of system status.

The TPS/i's built-in intelligence and end-to-end modularity provide a firm foundation for future innovations, ensuring high security of investment for years to come.

ASSEMBLY OF GREEN BUILDINGS WILL NOT MAKE A GREEN CITY, SAYS WSP GROUP AFRICA

SAISC Member Company

The 2013 Global Green Building Convention recently gathered in Cape Town to shed light on the latest innovations in sustainable building techniques, however, it has become paramount that an assembly of green buildings alone will not be the only deciding factor in green city developments.

As with any discussion linked to going green, sustainability or adapting to climate change, we are reminded of the South African Government's remarkable commitment to carbon reduction targets

WE WANTED TO CREATE A WELDING SYSTEM THAT TRANSCENDS EXISTING LIMITS. THE RESULT IS AN INTELLIGENT QUANTUM LEAP.

/ Newly designed from first principles, TPS/i is a MIG/MAG welding system that pushes out the boundaries of the possible. Improving communication between man and machine was a big part of what we built into this new system, but we didn't stop there: we also created the option of investing in an intelligent system that's open to new applications and is constantly being evolved.
For users, this means being able to weld faster and more accurately, with less spattering and a more stable arc. The intelligent revolution in welding technology is beginning right now.

INDUSTRY NEWS

Eric Noir, Director for WSP GREEN.

of 34% from 2010 levels by 2020. Eric Noir, Director for WSP GREEN by DESIGN, shares his thoughts on the future trends in sustainable building that will come into play in the coming years if we are to reach this target.

According to Noir, "The carbon reduction timeframe unfortunately does not allow for substantial improvements in the country's energy mix, which is still primarily coal based and carbon intensive. We also have to realise that the urban form will not rapidly and materially transform itself towards more efficient and compact cities."

The complexities to developing greener cities in South Africa is further exacerbated by constraints of inadequate infrastructure and the primary economic focus on job creation and economic survival, over energy efficiency's capital intensive measures. In this landscape, the built environment will be under renewed pressure to accomplish energy efficiencies of close to 30% across the entire built stock.

Closely linked to the refurbishment of existing buildings is the issue of productivity and space planning – particularly for office buildings. Noir explains, "In our own offices, we have experienced the advantages of adopting a more open-plan floor plate, in that we reclaimed upward of 30% of our space, reduced costs and benefitted from improvements in natural light, air movement and ventilation. The ability to do all this has to be a very appealing strategy, which I expect will mature tremendously locally within a few years from now."

The inclusion of renewable energies and biological processes in passive designs will also be a big trend in the coming years. Uses of solar energy, for instance, are becoming more understood.

Boundaries between the various professions are truly being blurred. From a sustainability point of view, this is a crucial aspect of every design endeavour - from technology specification to materials selection and labour practices. The social agenda is maturing at a rapid pace and cookie-cutter solutions of the past decade have now made way for more mature and in-depth engagement.

CTBUH NAMES BEST TALL BUILDING WORLDWIDE: CCTV HEADQUARTERS, BEIJING

The Council on Tall Buildings and Urban Habitat (CTBUH) has announced the winner of its Best Tall Building Worldwide: CCTV Headquarters, Beijing, China. As part of a nearly year long juried selection process across more than 60 entries, the Awards Jury first selected a Best Tall Building in four regions: the Americas, Middle East and Africa, Europe and Asia & Australasia. Senior representatives of each of these four winners then gave a presentation at the CTBUH Awards Symposium at the Illinois Institute of Technology, Chicago, with the jury convening immediately afterwards. The winner was announced by Wiel Arets, Dean of the School of Architecture at IIT, at the Awards Dinner following the Symposium.

The CCTV headquarters is an unusual take on the skyscraper typology. Instead of competing in the race for ultimate height and style through a traditional two dimensional tower soaring skyward, CCTV's loop poses a truly three dimensional experience, culminating in a 75 meter cantilever.

Conflating expectations of what a skyscraper is, and can or should do, the CCTV Headquarters has now become embedded in the thought process of the making of tall buildings. It singlehandedly paved the way from the height obsessed, set back skyscraper of the past to the sculptural and spatial skyscraper of the present, at the scale of the urban skyline. Its stunning form, which appears both powerful and conflicted, as if pulled in several directions, symbolises the multiple functions of the programme and the dynamic positioning of its nation on the world stage. The unique architectural design contrasts significantly with historical building styles in Beijing, yet it could never be classified as a homogenising force.

As a piece of structural engineering, CCTV is also an object lesson for those who wish to push the boundaries and sweep aside the received notions of skyscraper design. The building's design violates conventions, while validating and rewarding intensive and focussed collaboration and study.

The CCTV project was led by OMA/Rem Koolhaas, former OMA partner, Ole Scheeren (until 2010), OMA partner David Gianotten and project manager Dongmei Yao, in close collaboration with partners Shohei Shigematsu, Ellen van Loon and Victor van der Chijs.

Photo by Philippe Ruault

Winner of Best Tall Building Worldwide: CCTV Headquarters, Beijing, China.

INDUSTRY NEWS

Fourth year UJ student, Jaco Jonker won the 'Best use of steel' prize with his steel building in Hilbrow.

URBAN TO DETAIL: NEXT GENERATION TOWER, HILLBROW JOHANNESBURG

By Leon Krige, Architectural Theory & Design, University of Johannesburg

The site

In the city of transition, little remains certain, normality is the exception. Immigration means dispersion, children are separated from their parents, by means of travel, work or survival. The impact of HIV-Aids has left many children fending for themselves in the inner city. This was not the jungle of choice, but from afar it appeared to be the space of opportunity. These children need a new means of establishing certainty, a different future plan.

Hillbrow was the Rosetta stone of a new dispensation in South Africa in the period from 1970 - 1990, the ultimate space of transition. Large numbers of urban or peri-urban workers, both local and foreign, moved into the highest density metropolis as previous Euro-centric dwellers moved north or abroad. The change happened both quietly and at the extreme, as building owners maximised on short term income from multiple inhabitants in each room, with absurd densities creating many problems.

Buildings became overcrowded, infrastructure collapsed, crime soared, yet there remained a remarkable sense of urbanity in this dense concrete jungle.

The brief

This is not a school, but should provide a crèche, pre-school and after school study areas, a multi-media library and playgrounds at different levels. Urban sports facilities should integrate with the building, after mapping research to determine the relevant sporting needs. Environmental design should form an integral educational theme.

The design proposal should be supported by a related theory course and project, to elaborate the reasoning behind the concept. For theory you will research and analyse a contemporary complex mixed use project in great detail, to form a precedent for your own tower project. The design of urban landscape(s) which serve both as 'private' protective play space and public interface should relate to theory and design. The final theory project will then be an essay exploring and explaining your design decisions for your own tower project.

WINNERS OF THE BEST USE OF STEEL PRIZE AT THE UNIVERSITY OF JOHANNESBURG

By Leon Krige and Eric Wright

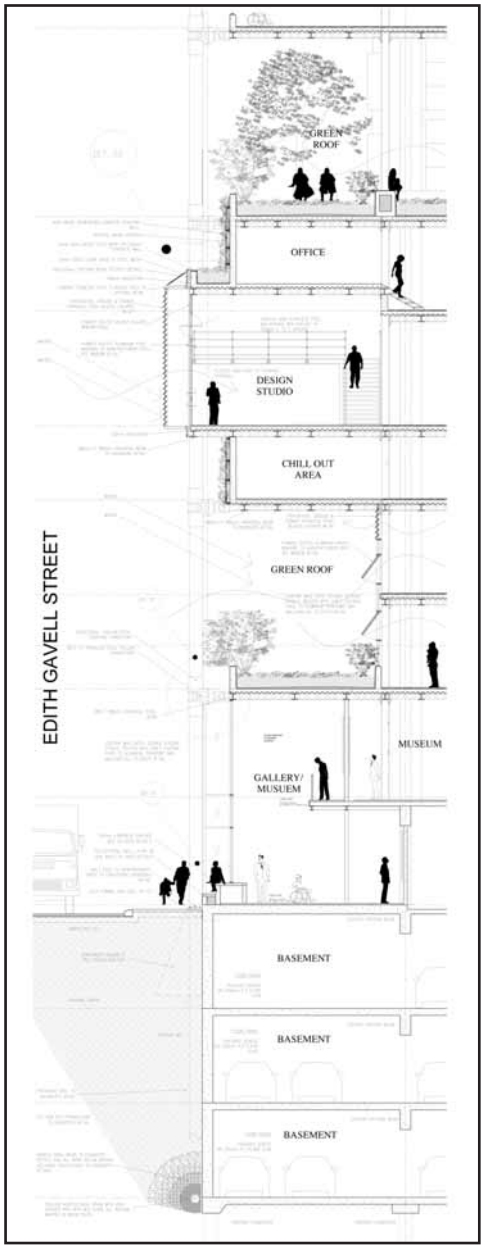
The SAISC has sponsored the 'Best use of steel' prize for UJ architecture students for some years now. This year we take a look at the winners from the fourth and third year. If you read the brief of the project for both years you would notice steel, or any other material, is not mentioned as a pre requisite for the project. So the prerogative to use steel was up to the students. Well done!

Model of Jaco Jonker's project.

Sound environmental practice, demonstrating good passive climate design and innovative low-cost alternative energy, i.e. wind, photovoltaic, solar, should be a didactic part of the building. It is critical that basic passive design, i.e. orientation, massing, solar studies and climatic response, be accurate. Furthermore, that alternative energy is totally integrated within the building, both inside and out. The building wants to demonstrate energy craftsmanship which is understated, efficient and operates effortlessly, integrated with, not added to, the project.

The project

Jaco Jonker, fourth year student of architecture at UJ, designed an eight to twelve storey tower on the site mapped along Abel Road running east–west, respecting the cultural context of the nearby urban landscape, or Claim street running north–south, with event spaces such as the boxing gym. He applied powerful cultural and passive climate context with the needs of children and their specific requirements: safety, educational stimuli, recreation, skills development, entrepreneurship etc. The building required safe spaces of recreation which relate to the city but are protected from harmful elements. Areas of recreation occur throughout the full height of the building, relating to views and urban massing.



Architectural plan for Tebogo's project.

LEFTOVER RESPONSES: URBAN PRECINCT

By Eric Wright, Third year coordinator and Design lecturer, University of Johannesburg

Introduction

The inner-city of Johannesburg continues to evolve with the ever changing needs of its transient population – as a city in flux, affording opportunity and the promise of prospect to existing communities, new arrivals and long standing organisations. Increasing interest in inner-city development from grass roots to larger economies, related communities and user groups, calls for integrated approaches to planning and design for collected and connected precincts – resulting in initial on-the-ground strategies that engage with fine grain conditions of the city (realities of people) and developing these urban strategies into mixed use contextual architectural responses.

The City of Johannesburg Municipality (COJ) through its agent Johannesburg Development Agency (JDA) has mandated the upgrading of numerous precincts to stimulate business activity, create safe zones and to accommodate the on-going and emergent needs of commerce, public activity, housing and amenity. Parallel to these top-down strategies (COJ & JDA) other 'unplanned' realities have been escalating, conceivably as a response to the unseen conditions from the city's stance. These instances include rapidly growing schools in the inner-city, informal trade hubs, taxi gathering points, privatised housing and commerce developments etc. This begins to indicate that developments / precincts in the city need to provide for the needs of more all-inclusive mixed-use user groups at varying scales of consideration (community, neighbourhood, precincts).

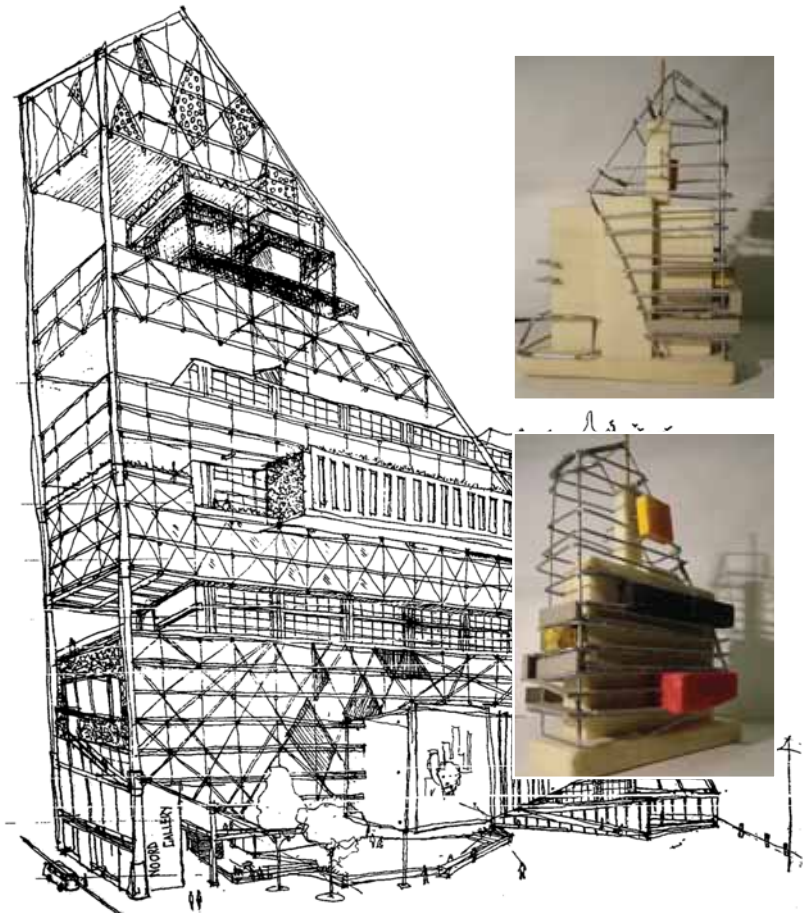
Project brief

The historic precinct of St Mary's Cathedral and Drill Hall was preselected, as space and place, for students to develop urban and architectural strategies in response to complex existing urban conditions – suggesting approaches that recognise varying needs in the inner-city, in the case of this precinct focussed towards; children, way-finding and inclusive public space.

The design challenge was to engage various functions in the city – play, safety, informal education, social interaction, creativity and stimulation of public life, culture and young minds within the precinct. By considering the condition of the site and the surrounds, imagining the city as a found object, one can identify existing cultures and networks to engage with. This dialogue with the existing fabric and community becomes a catalyst and an anchor for future growth – a progression that responds the users' needs – a city that begins to build itself.

This brief is a cumulative finale to the previous series focussing your skills and interests as a collective practice. Your task is to design a mixed-use, multi-storey building on a site of your choice within the St Mary's Cathedral and Drill Hall precinct. You may select any site through discussion with the lecturers and role players (stakeholders) in the area. Your site selection must be informed by critical urban analysis and intuitive observation.

INDUSTRY NEWS



Third year student, Tebogo Ramatlo's winning project.

The project

The winning project was submitted by Tebogo Ramatlo, third year student of architecture at UJ. His response to this brief embraces the complexity of this intricate and multi-layered part of Johannesburg. His resultant design proposal engages the urban fabric and space of the city through various systems. The expressive use of structural steel, added pragmatically at first to extend and brace the existing structure and manipulated spatially and formally to respond to orientation and urban massing, reminds of mining headgears on the horizon. Public interfaces peel the pavement into and under the building, suggesting a flexibility of negotiable appropriation and place-making. This design proposal begins to blur the connection between building (as an object) and urban fabric suggesting an 'allowed fluctuation', an intentional open endedness. In this sense the building becomes a connected system in the larger urban context – an exposed process of flexibility and adaptation for diverse user groups, at varying times, with multiple scales of inclusion.

Due to the fast track nature of the project, steel provided the optimum solution to meet the critical time demands of the project.

MULTI-STOREY BUILDINGS:

A STORY FOR STEEL

The use of structural steel and pre-cast slabs and the time advantage gained from this type of construction has been very successful. The contracting teams formed a close working relationship and have established a formula for speed and cost saving that has lead to numerous other similar projects.

Over the years the SAISC has promoted and assisted in the construction of many structural steel framed buildings. These have included high-rise and medium-rise offices, parking garages, hospitals, educational facilities and residential buildings.

Over the next few issues of Steel Construction we will showcase recent projects and tackle technical issues of relevance to clients, designers and construction professionals.

PROJECT - STELLAR WHOLESALE CITY

The construction of a multi-storey mall of approximately 50 000m² was required in the shortest possible time with tight budget constraints. This required some innovation and the use of structural steel provided all the answers.

The building consists of a basement of 15 000m², first and second floor, complete with mezzanine levels, with a lettable area of 17 500m² per floor.

Due to the fast track nature of the project, steel provided the optimum solution to meet the critical time demands of the project. The ease of constructing structural steelwork in conjunction with the use of pre-cast slabs for floors, realised the most efficient system to achieve the outcome.

The grid spacing of 7.8m x 8.5m was specifically selected to suit the parking lay-out required for the basement. Had it not been for the basement, column spacings could have been reduced resulting in lighter beam sections. The span of 7.8m is the maximum limit the current SA industry can supply pre-cast slabs in a one-way spanning system given the imposed loading for this type of development.

A total of 1 596 tons of structural steel was used with 35 000m² of pre-cast concrete slabs. This makes it one of the largest steel and pre-cast slab projects to date.

The structural steelwork frame was designed as a two-way spanning system with composite action between the structural beams and the pre-cast slabs. The steel beams have full moment connections to the columns, but successive columns have pinned connections at their bases. The frame was designed as a braced frame, with cross and K-bracings placed throughout the building.

STEEL BAND

Steel Band Construction has been established since 1985 and has a good reputation for quality, reliable service and personal attention.

Providing excellent service and quality to the industry for over 28 years

Although we are general structural steelwork contractors, we specialise in industrial buildings, factories, warehouses, sports halls and shopping centres. All structures are purpose built to suit client or developer requirements under the auspices of best architectural and engineering standards.

We also have vast experience in exporting of structural steelwork. Since 1992 we have successfully exported numerous projects to Africa and the Indian Ocean Islands.

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Transport • Erection • Quality Control • Supervision to the highest standard

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INDUSTRY NEWS

The structural steelwork frame was designed as a two-way spanning system with composite action between the structural beams and the pre-cast slabs.

To ensure composite action, particular attention was paid to the junction between the steel beams and the pre-cast slab panels in both directions. In one direction, hollow cores were filled to provide a concrete compression T-flange, and in the other direction thinner slabs were used to create a solid concrete compression zone.

Shear stud welding took place on site after erection of the steel frame and placing of the pre-cast floor panels. This was done for ease of erection of the floor panels and to avoid damage to the studs during erection of the panels.

Due to the size of the floors and the long reach required, the building was fabricated and erected in phases over two to three grids from one end, beginning at floor level and erecting right up to roof level by grid line, thus allowing the pre-cast slab contractor to install two bays of slabs. The steelwork for the next two to three bays was then erected; where after the slab contractor could then install a further two bays. This method gave each contractor sufficient reach and accessibility. Due to the complete erection of the super structure from one end, access could also be given to brickwork and other trades to access the building in a safe environment and follow the construction sequence.

The use of structural steel and pre-cast slabs and the time advantage gained from this type of construction has been very successful. The contracting teams formed a close working relationship and have established a formula for speed and cost saving that has lead to numerous other similar projects.

There are a number of guidelines for the design of steel framed buildings in the SAISC Library. The Steel Construction Institute (UK) has a publication SCI P351 Precast Concrete Floors in Steel Framed Buildings which can be used to design these systems.

project team

Developer/Owner:
Sumali Investments

Architect:
Rescon Projects

Structural Engineer:
Rescon Projects

Quantity Surveyor:
PW Zerwick Quantity Surveyors

Project Manager:
Rescon Projects

Steelwork Contractor:
Steel Band Construction

Pre-cast Slab Contractor:
Elematic SA Pty Ltd

Due to the complete erection of the super structure from one end, access could be given to other trades to access the building in a safe environment and follow the construction sequence.

SAMCRA FOUNDER MEMBERS

Without the contribution from the Founder Members the formation of the Southern African Metal Cladding and Roofing Association would not have been possible. Following an exploratory meeting of interested parties in October 2012 these companies formed a work group to establish a representative body for the cladding industry and worked together with the SAISC to set up an association. Their funding and support helped to launch SAMCRA.

ARCELORMITTAL SA

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ArcelorMittal South Africa a subsidiary of the world's leading steel and mining company and Africa's largest steel manufacturer has a capacity of 7.8 million tons of liquid steel per annum with steel manufacturing and chemical plants in Newcastle, Pretoria, Saldanha, Vanderbijlpark and Vereeniging.

ArcelorMittal's products like Chromadek®, plate, galvanized coil and rebar are branded and/or marked to guarantee that the products are from ArcelorMittal and of the highest quality.

Chromadek® offers great versatility for various applications. South African architects use Chromadek® in a variety of roofing and cladding projects. Warrantees are given on application, subject to certain environmental / industry conditions. The African Heritage colour range of 14 exciting colours reflects the continent's unique colours and hues. Chromadek® paint coatings are designed to provide superior corrosion protection under conditions where the performance of unpainted galvanized sheeting may prove inadequate.

BLUESCOPE STEEL

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BlueScope Steel is the world's leading steel maker in coated steel technologies. Headquartered in Melbourne, Australia, the company has offices and operations in 20 countries. The modern BlueScope Steel Limited has evolved from the coming together of three pioneer companies in the steel industry (BHP Steel, John Lysaght (Australia) and Australian Iron & Steel) with the more recent acquisitions of New Zealand Steel and Butler Manufacturing.

We specialise in the production of flat steel products, including slab, hot rolled coil, cold rolled coil and value-added metallic coated and painted steels. BlueScope Steel Limited's premium brands ZINCALUME® steel and Clean COLORBOND™ steel ranges are used in the manufacture of roofing and walling sheets.

ZINCALUME® steel is a revolutionary zinc/aluminium alloy coating with superior corrosion resistance that greatly extends product life. Clean COLORBOND™ steel combines the superior strength of steel, the corrosion resistance of the ZINCALUME® steel substrate and the high performance beauty of an oven cured paint system which is remarkably resistant to chipping, cracking, peeling and fading.

BSI STEEL

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BSi Steel Limited is a South African JSE Alternative Exchange listed group of companies with strong ties to the greater Southern African market. We are specialists in sourcing, processing, stocking and distribution of mild carbon steel products across South Africa and the rest of Southern Africa.

BSi Steel is headquartered in the city of Johannesburg. Our 23 hectare distribution centre houses a coil processing facility (certified ISO 9001) as well as 30 000 square meters of warehousing from which we distribute steel. The company has branches across five African countries, DRC, Ghana, Mozambique, Zambia and Zimbabwe. In South Africa, we have a total of five branches in Gauteng and the North West province. Our KZN branch is located in Pietermaritzburg. Steel is also distributed in bulk via Bulk Sales in South Africa and Exports into Sub-Saharan Africa.

BSi Steel is fundamentally a growth company aiming to be the premier player in steel distribution in Sub-Saharan Africa.

INDUSTRY NEWS

CLOTAN STEEL

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Clotan Steel is a privately owned company known for its entrepreneurial spirit, zest and ability to do things differently – always staying true to our slogan: *Pioneers in the field of service*. Our identity, which has evolved since the company's inception in 1984, is also characterised by creativity and innovation.

We manufacture a complete range of roof sheets which includes Craft-Lock® and Rheefalz 38 concealed fix roofing, C-Tile®, IBR, Corrugated and Wide Span. We offer a wide range of supporting products and services including flashings, accessories, bull nosing and curving of roof sheets. Full technical support in the shape of design assistance, quantifying bills, and on site measurements forms an integral part of a truly professional approach to roofing.

Clotan Steel's Credo "Ora et Labora" (Pray and Work) indicates how we approach business – at all times ethical, guided by Christian norms. We invite all potential stakeholders to experience roofing the Clotan way, and build a relationship that will endure!

GLOBAL ROOFING SOLUTIONS

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Global Roofing Solutions (GRS) have the two leading South African roofing material manufacturing operations, Brownbuilt and HH Robertson, both under one roof. This has made GRS one of the largest metal roofing manufacturers in South Africa.

Brownbuilt and HH Robertson are household names and manufacture Klip-Tite™; Klip-Lok™; Brownbuilt™ as well as Zip-Tek, IBR 686 & 890 (Supa-Clad), BR7, Corrugated and Nu-Rib 762 (Pierced fix).

In addition GRS manufacture composite steel floor decking (permanent shuttering) profiles and to complement our sheeting range GRS also manufacture metal roof tiles (Armatile, Armashake, and Uni-tile).

Having branches in every region has placed GRS in a very strong position to be considered as the preferred supplier to all major projects nationwide. GRS's success is based on its people and our comprehensive product range, which allowed us to satisfy every steel roofing requirement from low-cost housing through to multi-million rand shopping centre development.

HEUNIS STEEL

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Heunis Steel (Pty) Ltd has been family owned since the late 1960s and is currently in its third generation of Heunis family management. We manufacture and supply one of the most comprehensive ranges of high quality galvanized rainwater goods, roof sheeting and ceiling products for the plumbing and building industry. The company has a well equipped, highly efficient engineering plant able to produce a wide range of specialised products to meet customers' individual needs.

Leading edge technology enables Heunis Steel to increase production capacity by streamlining its production process with most of its products. Heunis Steel is proud of the high quality products it manufactures and therefore insists on making use of only SABS-certified raw material in its production process.

In line with our business principles we want to develop and promote an orderly industry with appropriate measurable standards, ethics and a base of knowledge-able people which will enable us to continue to grow and deliver excellent products.

MACSTEEL ROOFING

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Operating from two large modern factories in Germiston and Brakpan and an additional processing facility in Queenstown, Macsteel Roofing is Southern Africa's leading supplier of metal roofing products and cold formed sections. Included in its comprehensive product offering is the manufacture of the internationally acclaimed and popular Harveytile brand of roof tiles and the Novotexi 440 range of concealed fix roofing systems, all of which provide end-to-end quality roofing solutions to the market.

An experienced technical department assists customers with every aspect of product design, from measurement of required quantities to the custom curving of roofing products, specialised cold formed sections and heavy duty rolled open sections. In addition, cold formed sections can be rolled, punched and painted inline ready for installation on site.

Macsteel Roofing's diverse product range consists of Harveytile roof tiles; roofing products: TL5, IBR, widespan and corrugated iron and recently acquired Novotexi 440 as well as cold formed open section products.

PRO ROOF STEEL MERCHANTS

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Pro Roof Steel Merchants is one of the largest and most prominent steel processors and merchants in the South African steel industry, with a national footprint and the head office located in Vereeniging. Formed over 25 years ago, our commitment to growth and our determination to succeed has translated into an ever expanding customer base as well as a constantly increasing array of capital equipment.

A great strength of Pro Roof Steel Merchants is the diversity of the economic sectors that its product range services. Pro Roof Steel Merchants entered the export market in 1998, and since then the group has been supplying numerous export markets in addition to our South African commitments.

The key to the sustained growth the group has experienced is its determination to succeed and its commitment to customers and employees alike. This commitment ensures an excellent working environment and an ever expanding customer base as we strive to offer competitive pricing and efficient service.

SAFINTRA

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Safintra roll-forms steel roofing – for the most innovative design demands and challenging structural requirements. Safintra's proven concealed fix systems include Saflok™ 700 for inland conditions and Saflok 410 for coastal and high wind load conditions. Four mobile mills cover the country and can roll form in unbroken lengths of up to 120 metres.

Pierced fix profiles include Tufdek IBR, Widedek ™, Trimflute™, Fluteline (Industrial 7), Classicorr Corrugated and the unique Versatile™ profile which combines the structural benefits of a continuous steel sheet with the aesthetic appeal of tile.

Safintra Fixtite Fasteners are sold as part of the Safintra Roofing System, which also includes: S-5 clamps, which accommodate all on-roof attachments without voiding sheeting warranties; the Metsec light gauge steel purlin system; roof spacer systems for insulation and over-roofing and multiwall Polycarbonate products are another unique Safintra offering.

Free technical advice is available at six branches countrywide.

POWER LINE ASSOCIATION OF SOUTH AFRICA – WHY IS THIS NEEDED?

By Kobus de Beer,
POLASA Secretariat and Industry Development Executive, SAISC

The completion of current projects, in the present environment where no new work is available, places the industry on a burning platform. Significant challenges within the industry are hampering or slowing the launch of new work into the market and failure to identify and properly address these challenges will result in failure to achieve the construction of transmission lines identified in the TDP and significant job losses.

Following the launch of POLASA in August 2013, we have made good progress to establish the Powerline Association of South Africa, POLASA. 25 member companies have enrolled so far and the SAISC, of which POLASA is a sub-association, is processing new applications for membership daily.

The first, well attended Annual General Meeting was held at the Country Club Johannesburg on 7 November 2013 and the following Board members were proposed and elected:

Chairman: Mr Garry Whalley (Babcock Ntuthuko Power Lines) Board members: John I Buyers (Preformed Line Products), Leon Heymans (Consolidated Power products), Marcello Lamperini (Mkhulu Electro Distribution Projects), Nick van der Mescht (Stefanutti Stocks Power), Sagren Moodley (Metpress), Vincent Kanyongolo (Dyamwini Construction)

POLASA was established because the transmission line industry in South Africa is at a critical point in its evolution in relation to the Eskom Transmission Build Programme. The industry is in crisis having suffered significant job losses in the last year and with up to 5 000 jobs at risk in the short term.

POLASA aims to analyse the challenges facing the industry and propose mechanisms to improve the industry as a viable employer, with a view to supporting the Eskom Build Programme in the short and medium term, evolving into an industry to support the transmission integration aspirations of the Southern African Power Pool and ultimately the NEPAD development goals for Africa.

POLASA Chairman, Gary Whalley led a review of the challenges posed within each sector of the industry in a bid to identify the blockages currently frustrating the roll-out of work and thus constraining the industry's ability to meet the challenges of providing the necessary infrastructure for: A reliable transmission grid; increased transmission capacity; expansion of the grid in support of "electricity for all"; unlocking identified development areas; and regional integration as defined by Eskom in its Transmission Development Plan (TDP) within the context of the Presidential Infrastructure Coordinating Committee's (PICC) defined goals contained in various Strategic Integrated Projects (SIPS).

INDUSTRY NEWS

The National Infrastructure Plan (NIP), under the guidance of the PICC has defined 18 Strategic Integrated Projects (SIPs) of which six contain elements requiring transmission (or sub-transmission) line construction. While many of Eskom's transmission line projects currently under construction support the NIP, many additional transmission lines will be required to properly address the requirements of the SIPs listed:

SIP 1 - Unlocking the northern mineral belt with Waterberg as the catalyst;

SIP 4 - Unlocking the economic opportunities in North West

SIP 6 – Municipal Infrastructure Project

SIP 8 - Green energy in support of the South African economy

SIP10 - Electricity transmission and distribution for all

SIP 17 - Regional integration for African cooperation and development

In 2010/2011 Eskom launched a significant tranche of work into the local industry. Eleven contractors were deployed to undertake approximately 1 700km of transmission line construction on 400 kV and 765 kV lines. The last of these projects was awarded in late 2011.

The most of these projects are now materially complete, with civil works on most complete, tower assembly and erection nearing completion and stringing works drawing to a close, if not complete.

With the finalisation of these projects, Eskom will have achieved its compacted target to build 837km of lines during financial year ending 31st March 2014.

However, the completion of the above projects, in the current environment where no new work is available, places the industry on a burning platform. Significant challenges within the industry are

hampering or slowing the launch of new work into the market and failure to identify and properly address these challenges will result in failure to achieve the construction of transmission lines identified in the TDP and significant job losses.

POLASA wants to create a basis for engagement between the transmission line industry, Eskom and the government to address the identified challenges in an effective and collaborative manner, thus developing a robust, competent and sustainable industry capable of delivering on the transmission requirements of the country and the region as well as protecting skills and jobs.

THE CHALLENGES

Policy framework (government controlled) challenges

Rights of Way (RoW)/Site Access: The current regulatory environment within which servitudes are identified and secured is onerous and has introduced new requirements, each adding a component of time to the project cycle. While the intent of the regulatory framework is critical and required, many of its requirements are in conflict with the ability to deliver projects for the development of the grid. Acknowledging that it is this very dynamic of balancing tension between different priorities that ensures a vigorous process, the conflicts between different priorities sometimes introduce a 'grid lock' into the project cycle resulting in extensive and sometimes costly delays.

Landowner: Landowner's resistance to accepting servitudes across their land has been bolstered by a more complex legal framework and an increasing inclination to the litigious approach to conflict resolution.

Community unrest and demands: An increasing pressure on service delivery has resulted in community pressure on line route access (access being used as a lever to focus attention on the lack of service delivery for communities). Community actions include violence toward both Eskom and contractor personnel, as well as the destruction of equipment and infrastructure.

Environmental approval: The Environment Impact Assessment/Environment Management Plan / Record of Decision process has added significant time to the project cycle. Recognising the need to ensure vigorous scrutiny and process, mechanisms to expedite the process within the various government departments will assist in shortening the project cycle.

Permitting Requirements: Evolving legislation results in unexpected requirements that are identified late in the project process and results in work stoppages or an inability to commence work. This, compounded by a variety of participating and accountable government departments, adds complexity and time to the approval process.

Requirements include but are not limited to: Water use license; permits for crossing watercourses; protected Flora Permit for relocation and or temporary removal for later replacement and rezoning requirements for construction camps.

Compact: Government signs an annual 'Compact' with Eskom, to construct a target amount of kilometers of line per annum. Yet, it is processes within the hands of government that, to a large degree, control the ability of Eskom to actually release projects for construction and thus deliver on its 'Compact'.

Supplier environment (Industry controlled) challenges

Burning platform: The transmission line construction environment is extremely challenging and has seen the liquidation and or business rescue process being invoked on six South African companies in the recent past.

The imminent completion of the twelve projects identified above, in the environment where no new work is available, has already resulted in significant job losses and the next few months will see additional job losses within the industry.

It is estimated that, based on a premise of about 300 jobs per 100km of line under construction, direct job losses that could eventuate from the drop off in volume of work being issued into the transmission industry will be between 4 500 and 5 000.

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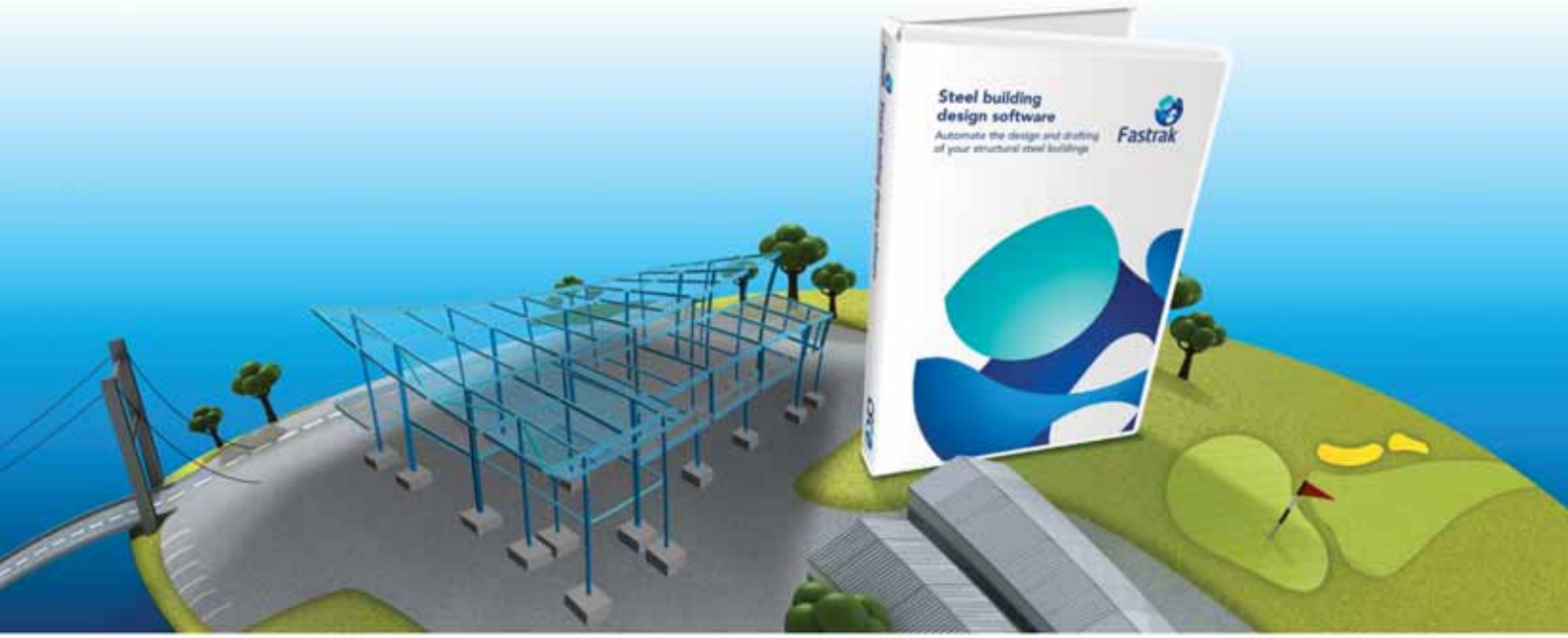

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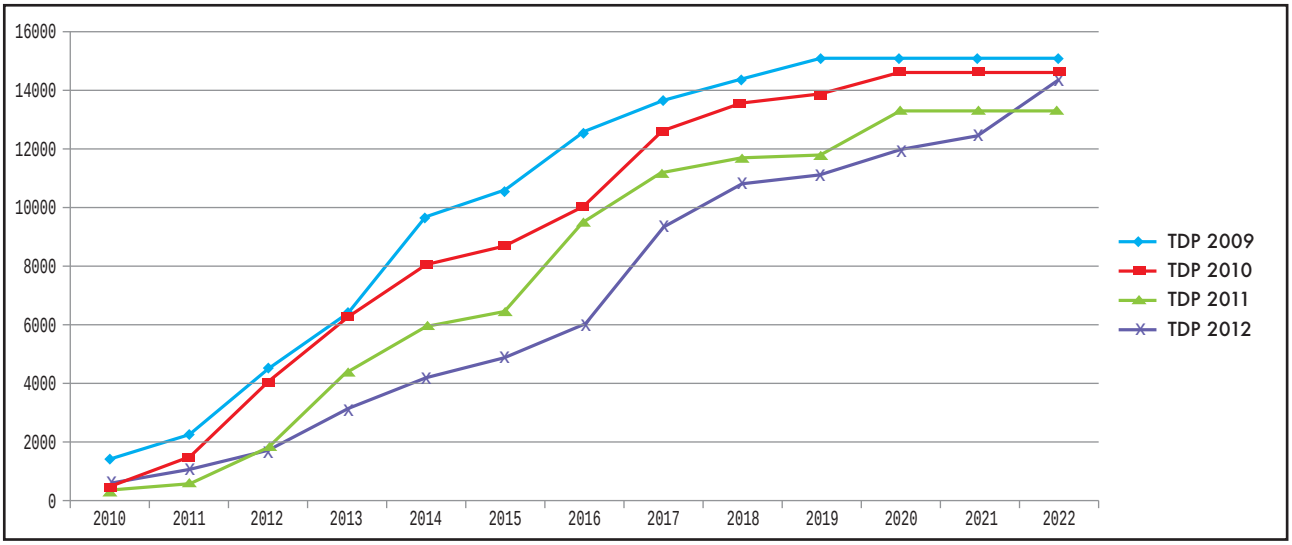
FORECAST HV TRANSMISSION LINE KILOMETRES

EXTRACTED FROM ESKOM TDP 2010/2011/2012



Associated industries such as transport, plant hire, conductor, insulator, line hardware, fuel, concrete, reinforcing and tower steel supply, are already being impacted by the lack of demand.

The limited number of projects identified for issue to the market in the next six months could well result in a loss of industry participants, either to foreign markets or, for smaller local contractors, the prospect of business failure. This eventuality would further constrain the industry's capacity to deliver the required kilometers identified in the TDP.

Bid/project pipeline certainty: The current market participants were encouraged to enter the market on the basis of an apparent firm bid pipeline that demanded an indicative 1 000km of lines be built per annum for the next ten years. A graphical analysis of the Eskom Transmission Development Plan (TDP) over time indicates that, even when the demand curve for lines has been delayed (as can be seen when comparing the 2009 TDP to the 2012 TDP), the requirement to build over 1 300km per year remains.

This demand resulted in substantial investment into the sector by incumbent participants, new entrants and multinational entrants alike.

The 2013 TDP indicates a target of 7 610km of High Voltage (HV) Transmission Lines to be built between 2013 and 2017, yielding a linear average per annum in excess of 1 500km. It further indicates a target of 5 393km of HV Transmission Lines during the 2018 to 2022 period at an average in excess of 1 000km per annum.

The stated annual demand would require a consistent roll-out of enquiries for the projects to be executed. However, since late 2011 no significant enquiries have come to market.

Eskom has urgently issued two significant projects to market recently. Based on recent past durations for tender evaluation, the industry anticipates contract awards by the end of the first quarter of 2014. Many companies are in the position that civil and erection crews have already completed activities. If one adds in the typical current start-up lead time for the projects, it is unlikely that civil crews will be deployed before mid to end second quarter of 2014. The result is no work for a period of about twelve months.

Failing the launch of a substantial number of additional enquiries into the market and their expedient adjudication and award in the near future, it is unlikely that Eskom will build more than an estimated 200km of transmission lines in the financial year ending 31st March 2015. This represents only 24% of current construction levels of 837km and 13% of the 1 500km per annum aspired to in the TDP over the next five years.

As much as business is dynamic, it requires a degree of certainty in terms of its future ability to generate returns on investments made. The recent decline in enquiries to market, compounded by the lack of work currently available, has called into question the reliability of Eskom's TDP as a forecasting tool for new build plans. Industry investors and boards of directors alike are skeptical and uncertain, resulting in a reluctance to invest and an increased appetite to exit the industry.

A number of further industry factors were identified by POLASA which will be the subject of the next article.

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- Cladding – workmanship, innovation, special solutions
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Conditions of entry – go to www.saisc.co.za/steel_awards_2014 to see if your project qualifies or send an email to Reneé Pretorius at renee@saisc.co.za

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   b. 5% discount on any size advertisement placed in Steel Construction Vol. 38 no 5 2014 (Special Steel Awards Issue)

MATERIAL TO BE SUBMITTED BY 30 APRIL 2014

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

THE SUSTAINABLE USE OF STEEL IN BUILDING:

WORKSHOPS WITH ARCHITECTS, QUANTITY SURVEYORS AND ENGINEERS

By John Barnard, SASFA director

It did not take architects long to see the potential of using LSF panels for external and internal walls of multi-storey commercial and office buildings, and some interesting buildings have appeared on the horizon. The use of LSFB is gaining more momentum due to the recently promulgated energy efficiency standard, SANS 10400 XA.

As part of its programme to inform design professionals about the benefits of using steel in buildings, the SAISC and SASFA, in collaboration with the regional professional institutes, recently presented a series of half day workshops under the banner "The sustainable use of steel in building".

Sponsored by ArcelorMittal SA (three venues) and BNC Projects (single venue - Durban), the workshops were presented in Durban, Port Elizabeth and Cape Town. Such was the interest in the Durban workshop, that the number of attendees exceeded the capacity of the venue!

Dr Hennie de Clercq, retired CEO of the Institute, started by outlining the objectives of the workshop. He sketched the characteristics of structural steel, and discussed the advantages – it is inexpensive, has a high strength:mass -ratio, it is tough and ductile, makes long spans possible with slender elements, it is robust and of assured and consistent quality, and it facilitates rapid erection.

But above all, he made the point that structural steel is sustainable with reduced environmental impact compared with other construction materials.

The next speaker, Spencer Erling, discussed the use of steel in multi-storey buildings. The process starts with the architect's drawings that defines the building dimensionally. The structural engineer is then tasked to design a structure that will resist all the loads that the building may be subject to: dead loads, wind loads, imposed or live loads and seismic loads (if applicable).

He discussed the installation of services – air conditioning, plumbing and fire control systems – as well as the benefits of composite construction, where the high tensile strength of steel combines with the compression strength of concrete to provide long span thin slabs. Castellated or cellular beams are hot-rolled I sections of which the webs have been cut in a special way so that the beam depth is increased when the two halves are staggered and rejoined. This increases the spanning capability of the beams, and provides openings for services and sprinkler systems.

The fire rating of structures is prescribed in the building code and is expressed as a time period that the structure must retain its structural integrity when

Four storey LSF apartment buildings, built by Worthington (USA) in Maputo. A total of 27 blocks of flats (100 000m² floor area) were built in less than 9 months.

exposed to fire. Structural steel loses about 70% of its strength if its temperature reaches 600˚C. Steel can be protected in different ways: using concrete or bricks, intumescent paint, sprayed vermiculite, fire boards, sprinkler systems or a combination of measures.

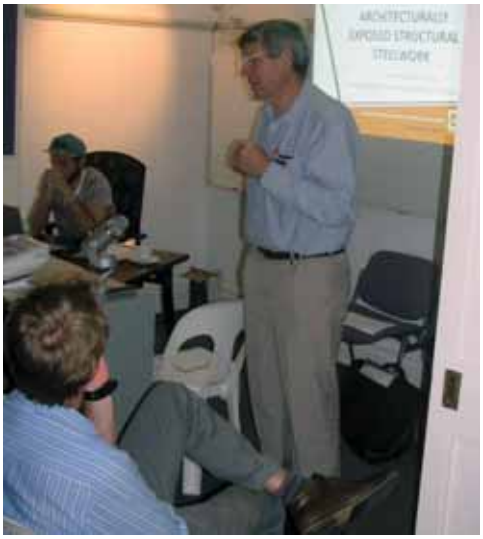
The external cladding of buildings could consist of heavy brick and mortar or pre-cast concrete panels, insulated metal panels, glass or the latest trend – light steel framing with EIFS (external insulated finishing system).

The next speaker, John Barnard (Director SASFA) introduced the audience to light steel frame building (LSFB), as well as the industry developing around this building method in South Africa, and SASFA, the industry representative association.

The process starts with the architect's plans for the building. Dimensional detail is fed into the proprietary system design software which is used to carry out the structural and geometric design of the framework. This data is then used to drive the profiling machine which forms the cold-rolled sections from high strength galvanized steel strip, punches holes for fasteners and accurately cuts the sections to the required length. Self tapping screws or steel rivets are used to assemble the sections into wall or floor panels, or roof structures. On site, these elements are erected, and fixed to the floor slab or foundation, ready to receive the external cladding (e.g. fibre cement board), insulation such as glass wool bats, and internal gypsum board lining.

Light steel frame buildings have to comply with SANS 10400, either through a rational design based on SANS 517 (LSFB building standard) or an Agrément certificate. It offers rapid building process, structurally sound buildings, excellent insulation (complies with SANS 204, which is more stringent than SANS 10400XA), logistical cost savings, dimensional accuracy, ease of installation of services and, due to the reduced thickness of walls, additional useable internal floor space. Its energy efficiency has been proven by CSIR research – a LSF house will require half the electricity needed to heat or cool a masonry built dwelling (not insulated) to comfortable temperatures. All materials used are recycled or recyclable – steel is said to be the most recycled material on earth. Another big plus is the much lower water usage on site – LSF is a dry building process.

Riverwalk Office Park, Pretoria (Boogertman & Partners). External walls consist of LSF with external insulation and finishing render.



Retired CEO, Hennie de Clercq, at the workshop in Port Elizabeth.

Even though LSFB has been in use for decades in the USA, Europe and Australia, it was introduced to South Africa only six years ago. Great strides have been made in developing this industry, and LSFB has been used in the residential market for roof trusses – replacing timber trusses – as well as complete systems consisting of wall panels, floors and roof structures. It is used for affordable housing up to luxury dwellings. It did not take architects long to see the potential of using LSF panels for external and internal walls of multi-storey commercial and office buildings, and some interesting buildings have appeared on the horizon.

The use of LSFB is gaining more momentum due to the recently promulgated energy efficiency standard, SANS 10400 XA.

As could be expected, a number of insightful questions were asked from the floor, resulting in interesting discussions and debate. The workshop attendees rated the event well above average.

The Institute plans to present this workshop in the other major centres during the course of 2014, also in collaboration with the regional architects' and QS associations.

SASFA
SOUTHERN AFRICAN
LIGHT STEEL FRAME BUILDING ASSOCIATION

YET ANOTHER BIG FIRM SEES VALUE OF LIGHT STEEL FRAME BUILDING

"I still cannot believe the speed with which the building was completed and the quality of workmanship and the fact that everything came in on budget. I believe LSFB is the future of construction in South Africa."

Internal view of CAT Motors, Delta Cradock branch.

Delta Motors has added its name to the growing list of companies that are using the light steel frame building (LSFB) method. This time it's CAT Motors, the Delta Cradock branch, which built an 1 800m² building for a new branch in less than six months, which is approximately three months faster than conventional building methods – saving on construction time of more than 30%! The project began in January 2013 and was completed on 30 June.

The Silverline Group, well known for its high profile LSFB projects, including the recent McDonald's restaurant in Goodwood, Cape Town, was contracted to do the construction including all the civil work, boundary walls, driveways and paving and all finishes.

The building is in essence a light steel frame steel structure cladded with fibre cement and filled with a polystyrene concrete mix. The internal walls are cavity walls with ISOVER insulation.

The building also had a requirement for a walk-in document safe which was also constructed using the solid wall concept for the walls and roof giving it a fire

The building is in essence a light steel frame steel structure cladded with fibre cement and filled with a polystyrene concrete mix.

Robor supplied the steel tube for the Melrose Arch Galleria Roof

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An external view of the completed building.

rating of no less than two hours. The roof, also built with light steel frame trusses, has a free span of 24.5 meters which is one of the longest in South Africa not using heavy steel.

The light steel frame was delivered 'flat-packed' and after assembly was erected within seven days. "With heavy winds - often 65km per hour in the Eastern Cape - the structure was designed with additional bracing which was well worth it," says Charl van Zyl, managing director of the Silverline Group.

He adds that with Cradock having extreme temperatures in both summer and winter it was imperative to give the client an energy-efficient building with limited need for air conditioning or heat pumps. "Constructing an energy efficient building saves the client the initial capital cost of purchasing air conditioners and a long-term saving of about 10% on the running costs and maintenance of these items," he says.

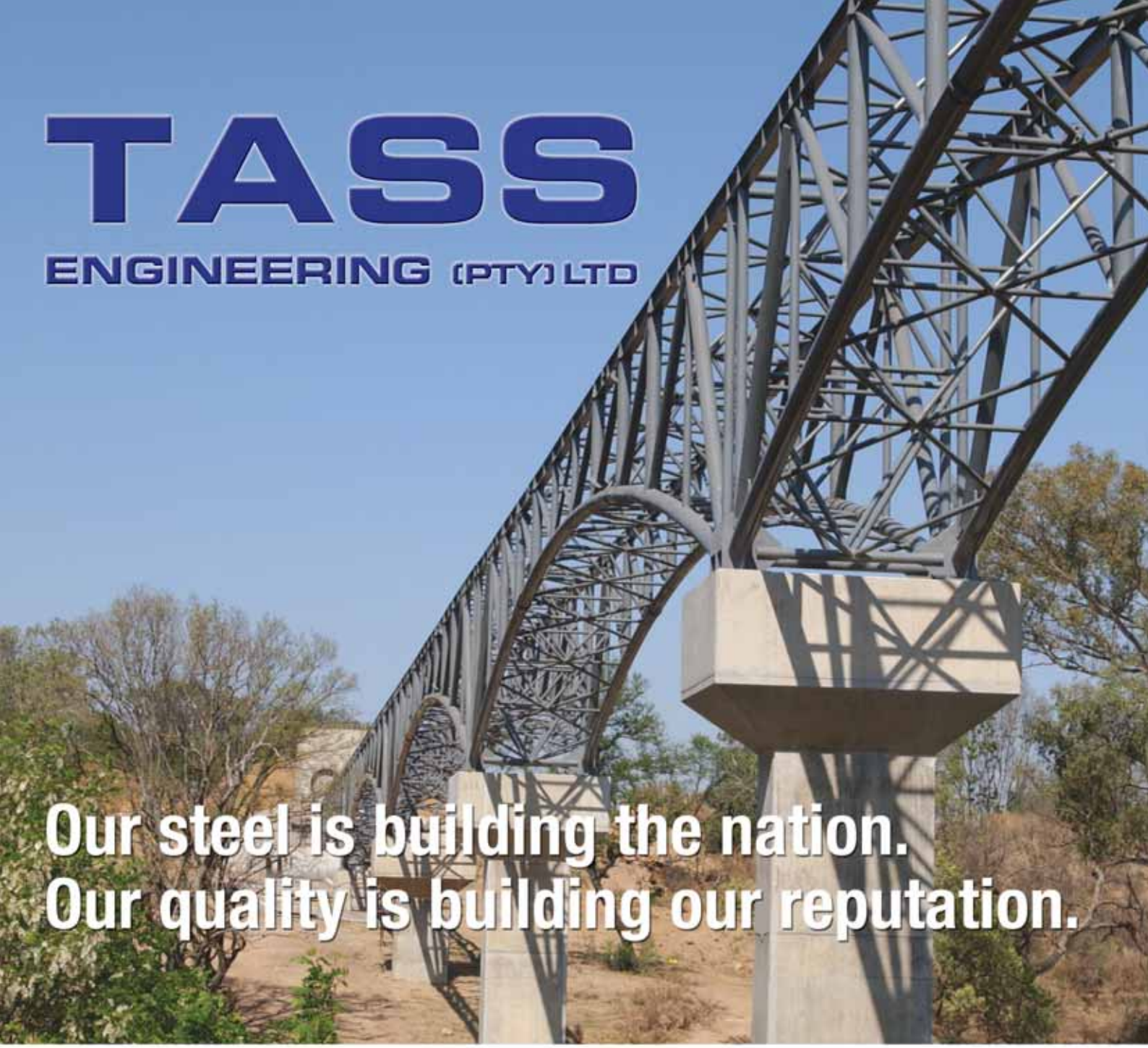
The roof, also built with light steel frame trusses, has a free span of 24.5 meters which is one of the longest in South Africa not using heavy steel.

CAT Motors owner, Jacques Jordaan, says that he is satisfied that the new building has achieved at least a 10 degree Celsius difference in comfort between the outside temperature and inside without the use of air conditioners. "We moved into the building in the middle of a very cold Eastern Cape winter and not once did we have to switch on a heater. The comfort levels are fantastic," he says.

Turning to the floor, van Zyl says that 15% of a building's energy is lost through the floor and in this case they built the floor using a Geoplast Flooring Module which consists of recycled plastic modules which raises the slab off the ground and creates a ventilation 'space', which can also be used for services. "This method is very useful in reducing energy loss but it also adds to the 'green factor' in construction that Silverline Group is known for," van Zyl says.

"I still cannot believe the speed with which the building was completed and the quality of workmanship and the fact that everything came in on budget. I believe LSFB is the future of construction in South Africa," Jordaan says.

At the launch of the new building, GM Vice President South Africa, Malcolm Gauld, commented on how pleased he was with the new building. "This is a world class structure and, given the time in which it was completed and all the obvious advantages and quality, it's really quite miraculous," he said.



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- Medupi Coal & Ash Terrace - ELB
- Cradlestone Mall - Sasol Pension Fund
- Silverstone Street Warehouse (40 000m^2, 850t) - Capital Property Fund (Pty) Ltd
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HOUSE COETZEE

Text and photography by Thomas Gouws, TG Architects + Interiors

The description - a testament to the endless possibilities of steel - says it all. The simple low angled roof construction with overhangs act as sun control. The rest of the structure provides support to the large sliding glass panels. A great structural solution supporting architectural requirements.

CLIENT BRIEF

Dr Etienne Coetzee and his wife Lara commissioned the design of this residence. They acquired a one-hectare plot in Mooikloof Glen Estate to the east of Pretoria, and wanted to build a modern and spacious family house where they could raise their three daughters. The brief called for maximised indoor-outdoor living and designated spaces where the family members could carry out their own activities.

CONCEPT AND LAYOUT

To make most of the large site, the design concept of the house focused on openness and being one with the landscape. The house, a single storey structure was designed in a simple H-plan form which inherently creates two

courtyard spaces; the first an entrance space and the second an outdoor living space with a pool. The northern wing houses the living and entertainment areas and the southern wing the more private bedroom spaces. Both wings open onto the pool courtyard.

A central walkway with a suspended steel canopy forms the structural spine that binds the separate portions of the house together. It terminates in an open-air 'boma' area on the western side. On the southern side the building cuts into the sloping site and on the northern side it hovers above it, creating the effect that it grows out of the landscape.

CHOICE OF STEEL AS STRUCTURAL MATERIAL

Steel was the obvious choice as main structural material. It allowed the architects to free the walls to be transparent and adjustable. Large sliding glass panels in the living areas allow various degrees of openness; from completely open to completely closed. In this way the house becomes adaptable to weather conditions and flexible in the use of the space, allowing the residents to fully engage with the garden and landscape all of the time.

The steel column structure also permitted the low angled mono-pitch roof to 'float' as a protective plane above the rooms of the house. It forms a very powerful and pervasive element and distinctive quality of the design.

Internally the steel structure allowed open unobstructed spaces with versatility in the programme, which gave the owners flexibility in the way they utilise the house. The steel I-beam rafters permitted two-metre protective roof overhangs, which together with suspended steel canopies provided effective sun control for the large northern glass facades.

ARTICULATING THE STEEL STRUCTURE

Instead of hiding the steel structure, its functional beauty is celebrated. It becomes the expressive aesthetic language of the building. Like an exposed skeleton, the steel columns and rafters that shape the building create a modular rhythm that runs throughout the house, producing a coherent and harmonious entirety.

This concept was continued through to the design of interior fittings; steel was used as prominent structural and architectural element in the work surfaces, cupboards, shelves and wine displays. Again the material was used in its most honest raw form expressing its functionality.

The building clearly illustrates the artistic and tectonic qualities of steel as architectural and structural element in a residential environment. It is testament to the endless possibilities of steel in this building type.

project team

Developer/Owner:
Ettienne & Lara Coetzee

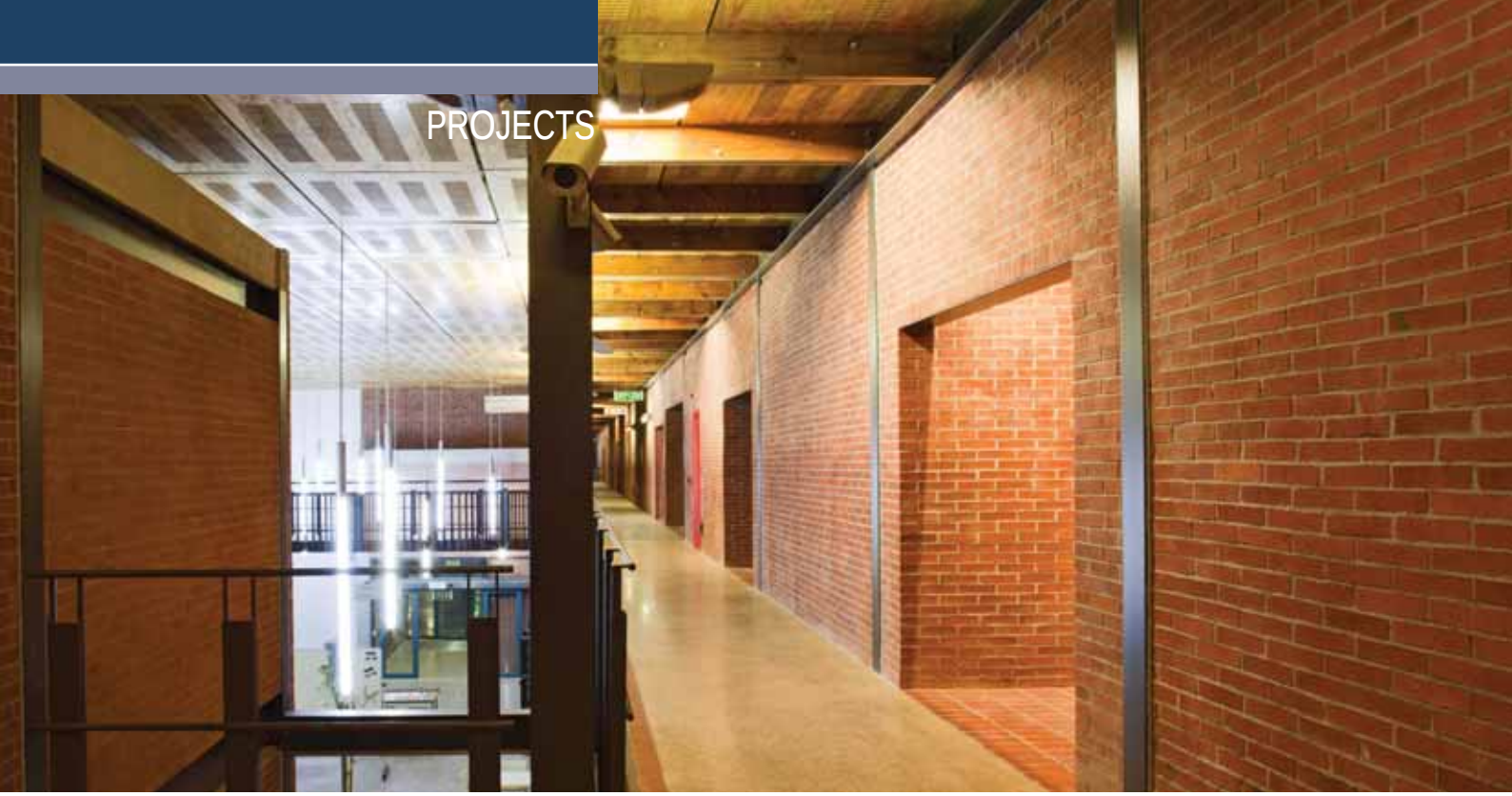
Architect:
TG Architects + Interiors

Structural Engineer:
P Design

Quantity Surveyor:
LW QS, QPC Consulting

Main Contractor:
Anrique Plant & Civil Works

Steelwork Contractor:
Steel Scheme



UNISA PAROW, PHASE 2, CAPE TOWN

By Michele Sandilands, MSa Michele Sandilands architects
Photography: Dave Southwood

What was once a drab and uninspiring environment has been transformed into a campus with a real sense of place and which additionally benefits the users through the social and environmental considerations that contribute on a level beyond the programme requirements.

Located within a light industrial urban context, the existing UNISA facilities consisted of a combination of new educational and converted industrial buildings. The increase in student numbers and subsequent burden on the facilities had forced UNISA to rent nearby factory space, resulting in a sprawling and disparate campus. UNISA then decided to assimilate all these needs back onto the main campus by constructing a significant extension to the existing building.

The design brief consisted of additional administrative space, contact classrooms and examination halls. It also included the creation of social spaces where the distance learning students can interact and sample campus life that was originally not part of this distance learning facility.

INNOVATION AND THE USE OF STEEL

On the one hand the architects and structural engineers were challenged with designing a building in line with the Green Star Rating tool and sought a system that minimised wastage and encouraged flexibility, adaptability and recyclability.

Steel frame construction with brick infil.

On the other hand, the client needed a building that was flexible and adaptable and one that could be changed with minor disruption to the often 12 month/24 hour timetables on campus.

The existing leases on the adjacent buildings were coming to an end and the building needed to be erected quickly and with minimal interruption. A steel frame was the optimum way to go, enabling the construction of the building in the quickest possible time with minimal on-site activity and with many of the components being manufactured off-site.

Steel framing and the use of the innovative Cobiax system enabled flexible, unbroken and highly adaptable teaching spaces. The combined use of the steel frame and the Cobiax slab enabled the steel to span even further. With a significant weight reduction of up to 35%, that of a standard flat slab, there was a significant decrease in the number of columns required with uninterrupted spans of 10m x 20m which could be demarcated into teaching spaces and examination halls with ease.

The entire building is designed for adaptation. All cross walls are dry walls so they can be positioned in different combinations allowing for smaller or larger spaces. Every module has dry jointed door openings with lintels in place to enable an instantaneous knock out when required.

Added benefits meant an uninterrupted flat slab which could be left deliberately exposed for aesthetic reasons and to obtain higher ceilings. Where service routes had been planned, these are uninterrupted by downstand beams.

The architects wanted a building system that in its simplest form, devoid of artificial ornamentation, would still provide key articulation elements and rhythm to the facade. This desire for an honest and clear building system was well met with the use of steel. Important too was the way in which the building related to its semi-industrial environment.

The building was designed using a conventional steel frame system with H-section columns that were stabilised with internal brick work to reduce the effective lengths of the columns. The floor system was designed unconventionally and utilised a composite Cobiax slab steel system. Void formers were omitted over the beams to allow effective transfer of shear forces between the concrete and the steel I-beams. Shear studs were welded to the flanges of the beams in these regions to transfer the loads between the steel and concrete. Allowing the transfer of these shear forces increases the stiffness and moment capacity of the steel beams and thus decreases the section size of the beam, in turn lowering structural costs.

SUSTAINABLE CONSIDERATIONS

The design of a 'green' building for UNISA was an architect led initiative driven by the desire to do the ‘right thing’ by designing a responsible building within the criteria of a changing climate.

The use of passive design solutions in the orientation of the building along an east-west axis provided an easily controlled north and south elevation. This has had a significant impact on the comfort of the building at no additional cost to the client.

Integral to the design, the large ventilation chimneys ventilate the building naturally and also serve to illuminate the deeper areas of the classrooms.

The architects undertook to source all materials locally (where available), thereby supporting local industry, providing local employment and reducing the necessity of transporting the materials over long distances.

REDUCTION IN ENERGY LOSS AND WASTAGE

The building employs the latest technology to manage its energy efficiency with a BMS system carefully controlling the usage of electricity. Window openings along the double glazed facade are linked, via electronic sensors and remote mechanisms in the vertical wind towers which draw air through individual teaching spaces and facilitate natural ventilation through most of the academic year.

The north facade of the new south block is fully glazed with clear glass and shaded with enormous screens allowing maximum light transmission into the circulation areas. Large indigenous deciduous trees are located to the north of the glazed facade assisting in summer shading while letting through the winter sun. South windows in the classrooms and examination halls are double glazed with a clear outer pane and a low-emissive coating on the inner pane.

project team

Developer/Owner:
University of South Africa (UNISA)

Architect:
MSa michele sandilands architects

Structural Engineer:
Nadeson Consulting

Quantity Surveyor:
BTKM Quantity Surveyors

Main Contractor:
Filcon Projects

Steelwork Contractors:
Raven Steel Projects, Olympic Stainless Steel

Mechanical and Electrical Engineers:
BVI Consulting Engineers

DESIGN PROCESS, FABRICATION, TRANSPORT AND ERECTION

The entire structure was designed and detailed using Revit structural 3D. This is an innovative 3D modelling package which allows the entire structure to be modelled. The model also helped to speed up the steel detailing process as it was sent to the steel fabricators who then imported the 3D model into their detailing package.

The fabrication of the beams was done using conventional methods allowing splicing of beams. Entire steel sections were transported on trucks and hoisted into position. All columns to beam connections were designed as bolted connections to allow for easy assembly on site.

Approximately 140 tons of steel were fabricated. All steelwork was galvanized and painted on site.

What was once a drab and uninspiring environment has been transformed into a campus with a real sense of place and which additionally benefits the users through the social and environmental considerations that contribute on a level beyond the programme requirements.

















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ROOFTOP STUDIO, HIGGOVALE

By Peter John Puttick, Partner, Revel Fox & Partners

The basic conceptual notion envisaged was a simple steel, aluminium and glass pavilion, set back from the strong horizontal line of the existing major roof parapet, lightly attached to the main house, and floating in the surrounding tree canopy.

Our client runs a professional practice from his home. His workload and consequent client interaction requirements gradually outgrew and invaded the confines of his dining room and study/bedroom. The brief therefore was to provide a dedicated workplace and venue for client meetings and entertainment, which was to have independent access from the street, and which was to take maximum advantage of the view opportunities offered by the site. In addition, all external finishes where possible were to be maintenance free.

The main house, designed by Revel Fox and Partners in 1993, is located in Higgovale, high up in the Cape Town city bowl, with magnificent north-facing views through mature trees down to the city below, and beyond to Table Bay. There are equally spectacular views of Devil's Peak to the east, and most dramatically, to the south, the close-up towering ramparts of Table Mountain.

The original house is a load-bearing brick structure with a flat concrete roof. Originally, the roof deck was only partly utilised as a terrace and braai area.

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These were demolished in order to provide space for the new accommodation.

The basic conceptual notion envisaged was a simple steel, aluminium and glass pavilion, set back from the strong horizontal line of the existing major roof parapet, lightly attached to the main house, and floating in the surrounding tree canopy.

Steel was chosen for the primary structure for both practical and aesthetic reasons. The structural engineer advised that the existing structure would require strengthening to carry the proposed extra loading, and it was therefore important to keep this to a minimum. In addition as the house was to remain inhabited during the construction period, it was necessary to minimise wet construction and to expedite speed of erection through extensive off-site fabrication. The use of steel answered both these requirements. Aesthetically steel was able to provide the visual lightness and transparency consistent with maximising the view opportunities, while at the same time respecting and reflecting the simple cubic masonry forms of the main house.

The pursuit of lightness and crisp delicacy was the major design objective, not only in the overall form, but also in the detailing. The steel columns, for instance, were made up of two channel sections welded flange-to-flange in order to avoid the rounded edges of a square hollow section.

project team

Developer/Owner:
Dr. Nicolas Baumann

Architect:
Revel Fox & Partners cc

Structural Engineer:
De Villiers & Hulme

Project Manager:
Cape Project Management

Steelwork Contractor:
G&B Engineering Solutions

Stainless Steel Contractor:
HH Stainless Steel

This concern for light, clean simplicity has been made manifest in the use of stainless steel for the external staircase balustrading, the maintenance free purpose made stainless steel roof edge trim and gutter as well as the stainless steel pergola, all with design input from, and meticulous execution by, an exceptional craftsman.

The heat gain normally associated with extensive glazing was addressed in a number of ways. The roof is heavily insulated, and the glazed sliding doors and walls are all set back within the steel structure. Double glazed performance glass is used throughout and is further protected by a pergola and adjustable internal shutters. If required, the large sliding doors on three sides can be opened to admit cooling breezes.

This modest intervention demonstrates the architects' on-going interest in finding a balance between eternal human values such as stability, simplicity, and delight, on the one hand, and the immediate circumstances of the moment, on the other, in such a way that their buildings will tend to be, in the words of Louis Kahn, "timeless, but of their time."

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Python X

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GREEN BOOK ERRATA 29 NOVEMBER 2013

Please make the following corrections, noting that black line on left denotes 'new' with respect to the errata sheet dated 31 July 2013:

Page 71: At end of paragraph below figure, add as follows: ...we can say, for a single vertical line of bolts:

Page 76 and 77: Use $\varnothing_{br}$ rather than $\varnothing_b$ in equation for B_{r1} and value of $\varnothing_{br}$ should be 0,67 rather than 0,8 in calculations of B_{r2}, B_{r2y} and B_{r2x}, with corresponding changes in the answers, yielding a resistance of 306 kN.

Page 83: The right side of the equation should read: $0{,}9\ \dfrac{90 \cdot 10{,}9^2 \cdot 355}{4} = 854095\ \text{N.mm}$

Page 84: The calculations were done for a 120 x 120 x 8 angle, but the sketch shows a 100 x 100 x 8 one. Change the dimensions in the sketch: the size of the angle, 120 wide, and R equal to 13mm.

Page 85: Add to the right of the sketch: "Plate 12mm thick"

Page 141: In paragraph starting "Check this ...", swop positions of $N_1 = 10^6$ and $N = 2 \cdot 10^6$

Page 163: Second expression below sketch should read: $T_{rh} + V_{rh} = 0{,}9[35 + 2 \cdot 70 - 2{,}5 \cdot 24]10$... and sketch should be drawn with T_u acting through centre bolt.

Page 208: Equation in 4th line should be: $h - h_{nt} - t_f - r_1 = 406{,}4 - 35 - 14{,}3 - 10{,}2 = 347 > 280$ and $Z_{bg} = 233\text{mm}^3$

Pages 214 and 215: Under Check 3 replace V_u by V_r and f_u by f_y, under Check 6 replace f_u by f_y in expression for V_{v1}.

Page 221: Replace reference to Equation 7.63 with 7.60 and remove square sign behind t_s and 10 in the following two lines.

Page 250 to 252: Change column size to 533 x 210 x 82I

Equations at the top of page 251 should read:

$$F_{ufb} = \frac{210}{0{,}4536} + \frac{90}{2} = 508\ \text{kN}$$

$$F_{uft} = \frac{210}{0{,}4536} + \frac{90}{2} = 418\ \text{kN}$$

The second line below "Equation 6.18": replace 521 at the end with 418.

Fix the following line: "Resistance required per mm = $f = \dfrac{418}{380} = 1{,}10\ \text{kN/mm}$"

Second line below "Equations 6.16 and 6.17": replace <521 at the end with >418.

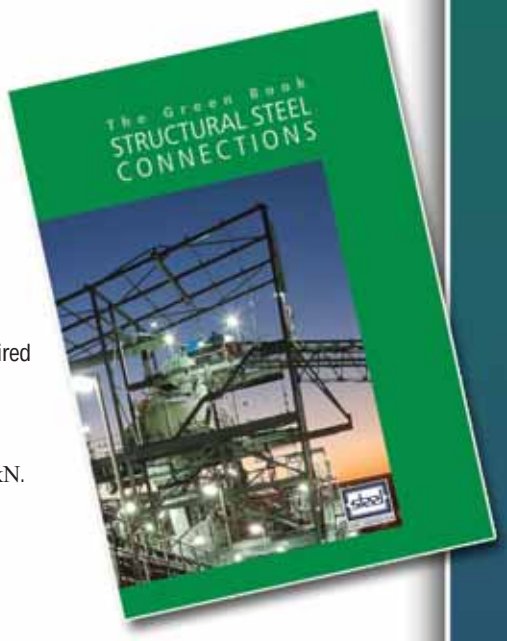
Line starting "this confirms tension ...": replace with: Thus tension stiffeners not required for web tension.

Last equation on page: replace 431 at the end with 508.

Second equation on page 252 should read: $B_r = 1{,}45 \cdot 0{,}8 \cdot 9{,}6^2\ \sqrt{35 \cdot 200000} = 901\ \text{kN}$.

The equation below that should read: $V_u = \dfrac{M_u}{h_b} = \dfrac{210}{0{,}4536} = 463\ \text{kN}$

At the end of the last equation, replace 476 with 463.



Page 290: Equation 10.49 should read: $\varepsilon = (\beta - \sqrt{\beta^2 - 4\alpha\delta}\ )/2\alpha$

Page 295: Equation above line should read: T_{r1}=...= 793 kN > 516 kN OK

Page 360: Equation 12.29: *x* should have a bar above it (the bar shifted to be on the level of Eq 12.28).

Pages 354, 362, 364 and 367: In figures, replace ☒ with ℓ.

SHOP WELDED SPLICES IN BEAMS:

IS THERE A RIGHT WAY OF DOING THEM?

By Spencer Erling,
Education Director, SAISC

The SAISC gets numerous suggestions and/or requests to supply the correct detail for a shop welded splice for beams.

The SAISC gets numerous suggestions and/or requests to supply the correct detail for a shop welded splice for beams. Some of the proposals include:

Figure 1:

Z step in the middle of the beam

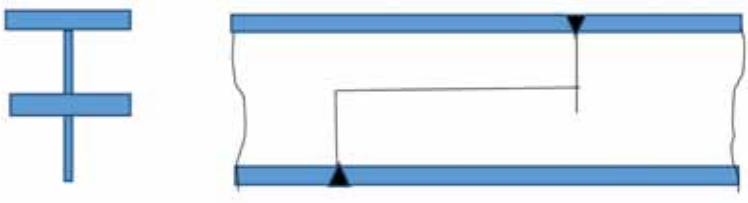


Figure 2:

Z step along the flanges

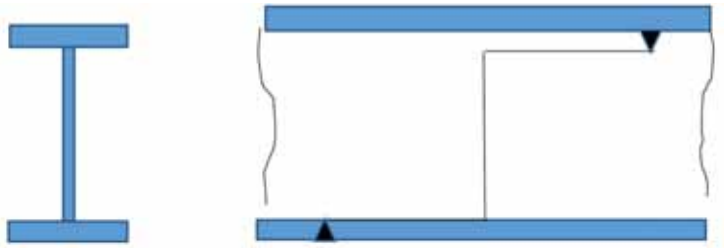
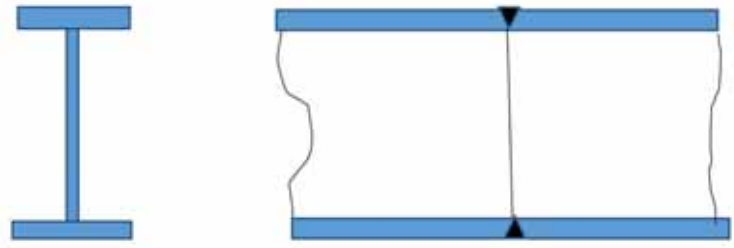


Figure 3:

No Z step



WHICH WOULD YOU CHOOSE?

In all cases we have assumed:

- That the correct weld procedure specifications are in place.
- That welders are trained and coded to work with those procedures i.e. we trust our welders.
- All welds to be complete joint penetration (CJP or full penetration butt welds as we know them).
- All welding consumables to be E70 or equivalent.
- NDT will be carried out for highly (tensile) stressed components.

Figure 1 - Why not?

1. The basis of this Z shape is that the additional welding (all be it on the neutral axis of the beam) will make the connection 'stronger'.

2. As an engineer looking at the stress distribution across the depth of the section you will expect and find that there is no stress on the neutral axis, so the weld will be of no benefit.
3. What about locked in welding stresses?
4. Which weld would you do first to minimise welding stress resulting from shrinkage when the weld pool solidifies and cools down? (weld sequence?)
5. Doing the weld C first leaving the rest of the web and flanges to follow.
6. Whatever sequence is followed the last weld will always be locked in and unable to contract during cooling resulting in (tensile) stresses in the weld. If they are large enough it will result in cracks in the welds.
7. Of the three examples this is not the worst case (see below figure 2)
8. Obviously the extra welding means extra costs.

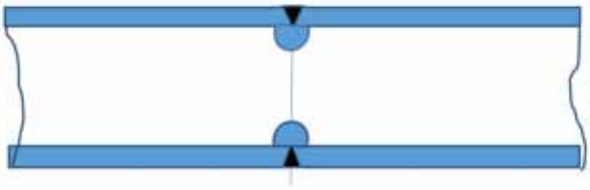
Figure 2 - Why not?

1. In this case, the extra welding does increase the connection strength. But what for? Having a weld strength exceeding the section strength is the same as having a strong link and otherwise weaker links elsewhere in the chain - it does not make the beam stronger.
2. The CJP welds under the flange will be very difficult to achieve.
3. The locked in stresses will be the worst for the three methods shown.

Figure 3 - Why yes, but what else do we need?

1. As the E70 welding consumables have an ultimate tensile strength that matches the strength of our S355JR steel, a CJP weld will be the same strength as the beam (all links in the chains are the same strength!)
2. The CJP needs the addition of mouse holes under the flange to make it possible to do the full penetration to the welds in the flanges (USA call them rat holes). AWS D 1.1 gives dimensions for the mouse holes (at least 25 mm radius). The mouse holes make it possible to do the back grind into the root weld which is required to achieve CJP welds.

Figure 3a - Mouse holes shown



3. With the presence of the mouse holes, the shrinkage locked in weld stresses are minimised.

In summary, the only method that the SAISC advocates is the method shown in Figure 3a always subject to the following and all being correctly used:

1. Weld procedure specifications in place
2. Qualified welders
3. E70 consumables
4. Mouse holes
5. ND testing to highly stressed

CALENDAR OF EVENTS

MEMBERSHIP BREAKFAST TALK
30 January 2014
Venue TBA

STEEL AWARDS – SPONSORSHIP LUNCH
14 March 2014
Venue TBA
For more info contact marle@saisc.co.za

SAISC KZN GOLF DAY
14 March 2014
Venue TBA

NASCC (NORTH AMERICAN STEEL CONSTRUCTION CONFERENCE)
26 – 28 March 2014
Toronto
For more info visit www.aisc.org

STEEL AWARDS – ENTRY DEADLINE
30 April 2014
For more info contact renee@saisc.co.za

SAISC GOLF DAY
8 May 2014
Royal Johannesburg Golf Club

STEEL AWARDS 2014
18 September 2014
Johannesburg – Emperors Palace
Cape Town and Durban – Venues TBA

SAISC AND SUBSIDIARY AGM
13 November 2014
Country Club Johannesburg, Auckland Park

FOR MORE INFORMATION ON EVENTS VISIT OUR WEBSITE – www.saisc.co.za

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SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION

Steel leaves a legacy.

SOCIAL SNIPPETS

By Marlé Lötter, Events Manager, SAISC

Steel Construction 2013 No. 5 and 6 mainly featured Steel Awards activities, so just to show that the Institute was not only preoccupied with Steel Awards 2013, but were presenting courses and other events too – here is a snapshot of those other activities in the last part of 2013.

INDUSTRIAL BUILDINGS COURSE

5 - 7 August 2013, Johannesburg

BELOW: Dr Geoff Krige was a presenter at the Industrial Buildings Course of 5 - 7 August 2013 in Johannesburg along with Bruce Maltby, Dr Hennie de Clercq and Amanuel Gebremeskel.

POLASA INDUSTRY MEETING 21 October 2013, CCJ

TOP AND ABOVE: Guests at the first ever POLASA Industry Feedback Meeting of 21 October 2013 at the Country Club Johannesburg following the launch of the Power Line Association of South Africa in August 2013.

VISITING ARCHITECT 2 & 3 September 2013

ABOVE: Visiting architect, Mels Crouwel, delivered lectures in September 2013 in Pretoria and Cape Town hosted by SAISC in conjunction with the Pretoria and Cape Institutes of Architecture. *(Read more about him on page 4)*

STEEL AWARDS 2013 GAUTENG – COMMUNITY SUPPORT

Special delivery to the beneficiary, Ry-Ma-In Self Help Centre for Quadriplegics, Randburg

LEFT: SAISC staff members visited the Ry-Ma-In Selfhelp Centre for Quadriplegics at 40 on 5TH Street, Linden with a surprise delivery of cake and gift bags for the 11 residents and 17 carers following the transfer of R31 000 raised with the Steel Awards 2013 Gauteng lucky draw for table decor created by Macsteel. In picture here are from left Ruby John, Kobus de Beer and Patricia Khunou of SAISC with Elize Oelofse, Chairperson of this inspirational centre.

At the Steel Awards 2013 dinner in Durban an amount of R6 800 was raised for the Action for blind and disabled children – this amount could cover the tuition fee of one student for a full year. At the dinner in Cape Town R8 000 was collected in aid of the Hout Bay Music Project which very successfully brings the joy and art of music to children in the poor township area.

www.facebook.com/Ry.Ma.In
www.action4.org.za
www.houtbaymusic.org

SAISC BREAKFAST TALK WITH DR DENIS WORRALL

24 October 2013, Country Club Johannesburg

LEFT: Dr Dennis Worrall , Chairman of Omega Investments and SAISC guest speaker of the breakfast hosted on 24 October 2013 at the Country Club Johannesburg in conversation with Kobus de Beer of SAISC.

BELOW: Also seen at the SAISC breakfast of 24 October.

SAISC AGM

7 November 2013 Country Club Johannesburg

ABOVE: The Southern African Institute of Steel Construction (SAISC) held its Annual General Meeting on 7 November 2013 at the Country Club Johannesburg. The event was also the formal farewell to Dr Hennie de Clercq, retiring after his second term as SAISC CEO, 2000-2013. (He also served as Executive Director of SAISC between 1976 and 1981.) In picture here are several SAISC Council Members appointed for 2014 with Dr De Clercq.

From left: Gary Whalley, Jim Guild, Paolo Trinchero (new SAISC CEO), Sunil Kumar, John Barnard (SASFA Director), Johnny Venter (new SAISC Chairman), Bridget Lenwabe, Dr Hennie de Clercq (outgoing SAISC CEO), Spencer Erling, Kobus de Beer, Mike Lomas (outgoing SAISC Chairman), Andrew Kirkland, Tim Tasioulas, Mike Borello

ABOVE LEFT: Upon his retirement as CEO of SAISC Dr Hennie de Clercq was awarded Honorary Membership of the American Institute of Steel Construction in recognition of the positive role he played over many years in the global structural steel industry. A recognition certificate was presented to Hennie at the SAISC AGM of 7 November 2013 by Amanuel Gebremeskel, SAISC Development Engineer and also a member and previous employee of the AISC.

ABOVE RIGHT: The SAISC AGM of 2013 in session.

SAISC STAFF YEAR END 2013

27 November 2013

RIGHT TOP AND CENTRE: Staff of the Institute and the SAISC School of Draughting ended the formal activities of 2013 on 27 November 2013 with a very interesting walk to the Swartkrans excavation site in the Cradle of Humankind area, guided by scientist Morris Sutton. This was followed by a culinary experience at the award-winning Roots Restaurant of Hotel Forum Homini.

(Venue information: www.maropeng.co.za (Search: Swartkrans) / www.forumhomini.com)

BELOW RIGHT: At this last event as member of the SAISC staff, retiring CEO, Dr Hennie de Clercq and his wife Helena, were 'saluted' by all the other staff members who wore special bow ties as a tribute to Hennie's signature fashion statement during many of his early years at the helm of the Institute. The editor of the Steel Construction Journal, Renee Pretorius, was also surprised with a stork tea complete with cup cakes, balloons and interesting parenting 'wisdom' in celebration of a baby boy expected early in 2014!

SASFA COMMITTEE MEMBER'S LUNCH

5 December 2013

LEFT: At the lunch for SASFA committee members held on 5 December 2013 at The View Boutique Hotel in Auckland Park, SASFA Director, John Barnard, reflected on the challenges and development of the SA light steel frame industry and thanked committee members for their contribution.

Dr Jeffrey Mahachi Pr.Eng.

THIRD EDITION OF THE STRUCTURAL STEEL DESIGN GUIDE NOW AVAILABLE

By Dr Jeffrey Mahachi Pr.Eng, NHBRC

The book has been carefully revised in line with the current revisions and provides engineers and students in structural engineering with the fundamental theory of practical design rules, based on the principles of limit-states philosophy.

WHY A THIRD EDITION?

- The revision of SANS 10162 (2005) to the current standard SANS 10162 (2011) led to the publishing of the third edition of the guide Design of Structural Steelwork to SANS 10162.
- The book has been carefully revised in line with the current revisions and provides engineers and students in structural engineering with the fundamental theory of practical design rules, based on the principles of limit-states philosophy.
- Recent developments and the new provisions of the Loading Code SANS 10160 (2010) have been included in the book.
- SANS 10162 Part 2, Design of cold-formed steel has been aligned to the Australian Standard. This book provides details of the new standard with detailed worked examples.

WHAT IS INCLUDED IN THE BOOK?

- A practical approach has been adopted throughout the text, with a number of realistic examples of useful applications to assist the reader in understanding design methodologies.
- All design examples have been structured in such a manner that the reader can easily follow the methodology and cross check the necessary clauses in the Standards. The book concentrates on the design of structural elements, beam-columns, composite beams, plate girders and connections. Important aspects of fire-engineering design, plastic design, structural loading, trusses and lattice-girder design and bracings are also covered.
- Where SANS 10162 does not give a comprehensive design methodology, this guide provides references to and details of other international codes particularly the Eurocode 3. The theories stipulated in the Eurocode are well laid out so that the reader does not need to refer to that code.
- The design of thin, cold-formed steel is dealt with in Part 2 of SANS 10162. The theory and fundamental design aspects are discussed comprehensively in this book.
- An example of a complete industrial building that incorporates most of the design aspects of structural steel design, with references to the relevant design standards, is well presented.

WHO WILL BENEFIT FROM THE BOOK?

- Structural and civil engineering students at Universities and Universities of Technology - reading the book requires no prior knowledge of the subject, other than of elementary structural and stress analysis techniques;
- Graduate engineers who may be coming across the subject for the first time, or engineers who need to know and understand the philosophy behind the current changes to SANS 10162 (2005); and
- Students studying architecture, construction technology and quantity surveying can use selected chapters of this book.

The publication is available from the SAISC Bookshop for R940.50 (VAT inclusive). The student price is R855 (VAT inclusive). Visit our website or contact Debbie Allcock at our offices at debbie@saisc.co.za.

Technical Enquiries: Dr Jeffrey Mahachi Pr.Eng, Email: tinashe.mahachi@gmail.com
General Enquiries: Lucia L Mpofu, Email: xsitek@iburst.co.za

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- Tubing
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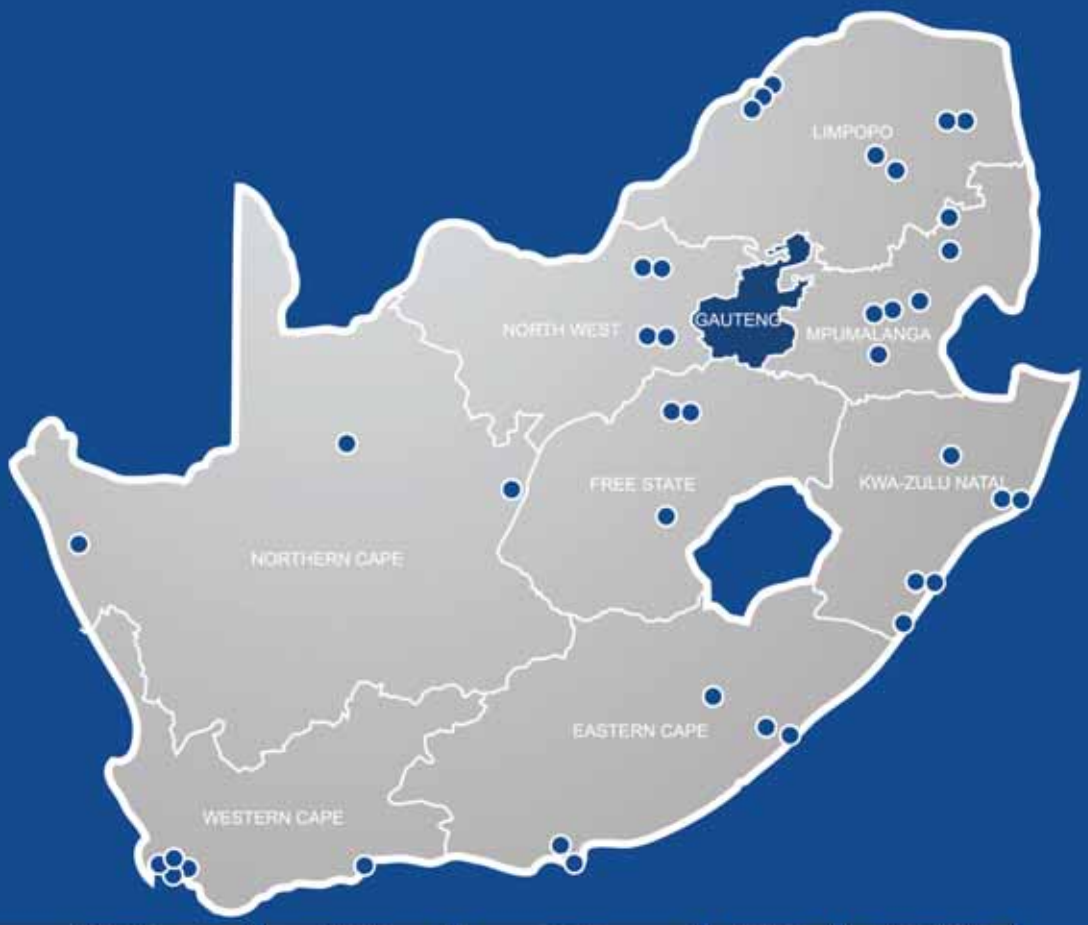
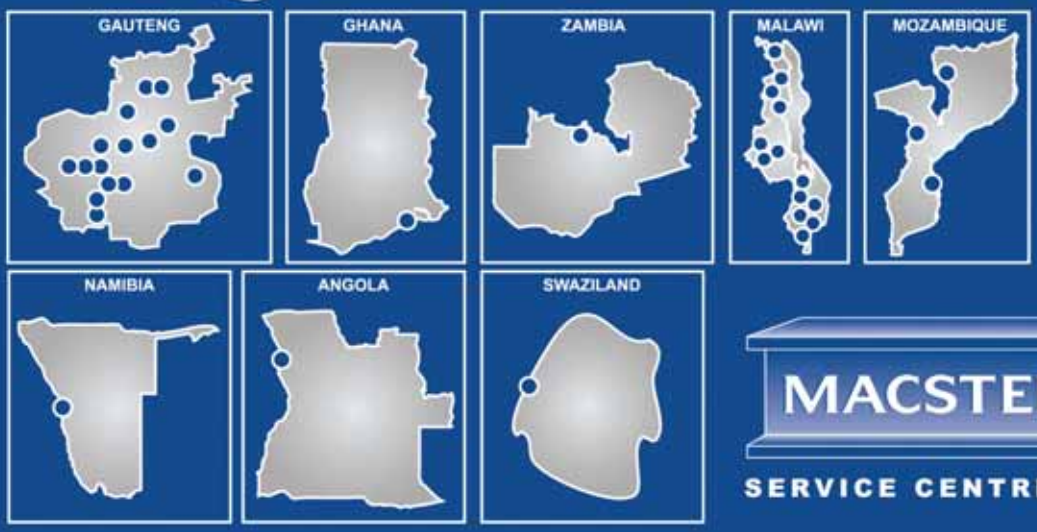
- Wear Resistant Steels
- Zincalume Roof Sheets





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