steel CONSTRUCTION

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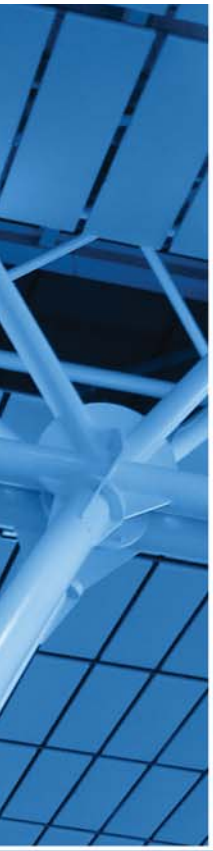

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SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION

OFFICIAL JOURNAL OF THE SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION

EDITOR'S NOTE

Imagine the human being without perceptions and preconceived ideas on life, other human beings, countries, cultures, cars, brands – just about everything. A world where everyone experiences things and moments without any pre-judgment or tainted viewpoint...

On the one hand we will probably be unable to make decisions as all the variables will have to be considered fresh with every situation. Thus nothing will get done – at least not quickly. On the other hand it will move more people to explore the 'unknown' the experiences labeled 'not done' and venture away from those things labeled "we have always done it this way".

What I am trying to say is that sometimes we just do things because our perceptions about the alternative are wrong, skewed and outdated. We often need someone brave to start the shift toward thinking differently and then doing differently. History shows that most of the time these brave ones get ridiculed, thrown into jail or asylums and even murdered. Until the rest of the world gets with the programme. Scientists and philosophers call it a paradigm shift*.

We just call it 'growing steel' – upwards – into multi-storey construction (although we will try to stay out of jail etc). Other countries, developed and developing, have done it for years. Not in South Africa. Why?

Maybe it's time to revisit those perceptions we have about multi-storey steel construction?

Read more about the discussion, the people, the projects and the development of this 'hot topic' in Steel Construction 2011.

**Paradigm shift (or revolutionary science) is the term first coined by Thomas Kuhn in his influential book The Structure of Scientific Revolutions (1962) to describe a change in basic assumptions within the ruling theory of science. It is in contrast to his idea of normal science.*

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PUBLISHED BY
Southern African Institute of Steel Construction
1st Floor, Block C
43 Empire Road, Parktown West
P O Box 291724, Melville 2109
Tel +27 11 726 6111
Fax +27 11 482 9644
E-mail: info@saisc.co.za
Web site: www.saisc.co.za

EDITOR
Reneé Pretorius
renee@saisc.co.za

ART DIRECTOR
Sandra Addinall
Tel +27 11 868 3408
Fax +27 11 900 1922
E-mail: cbtdesign@adcot.co.za

REPRO & PRINT
Camera Press
Tel +27 11 334 3815

ADVERTISING
Viv van Zyl
Tel +27 16 349 6839
Cell 082 492 8603
Fax 086 647 2788
E-mail: viv@lantic.net

SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION (SAISC)
Executive Director
Dr Hennie de Clercq, PrEng.
hennie@saisc.co.za

Education Director
Spencer Erling, PrEng.
spencer@saisc.co.za

ISF Director
Neels van Niekerk
neels@isf.co.za

SASFA Director
John Barnard
john.barnard@saol.com

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Please notify us of any changes to the mailing list.
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15 – 17 December 2010

Hong Kong

www.hku.hk/civil/ISTS13/

DEADLINE FOR STEEL AWARDS 2011 ENTRIES

6 May 2011

Contact Reneé Pretorius at 011 726 6111 or renee@saisc.co.za

SAISC GOLF DAY 2011 (GAUTENG)

11 May 2011

Houghton Golf Club

NASCC: THE STEEL CONFERENCE

11- 14 May 2011

Pittsburgh, Pennsylvania, United States

www.aisc.org

THE CANADIAN INSTITUTE OF MINING, METALLURGY AND PETROLEUM'S 2011 CONFERENCE & EXHIBITION

22 – 25 May 2011

Montreal, Quebec

www.cim.org/montreal2011

EUROSTEEL 2011

31 August – 3 September 2011

Budapest, Hungary

www.eurosteel2011.com

STEEL AWARDS 2011

15 September 2011

Gauteng: Emperors Palace, Kempton Park

Durban: TBA

Cape Town: TBA

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

SAISC COMMENT

By Dr Hennie de Clercq,
Executive Director, SAISC

But as a rule structural steel projects for the local market are not adversely affected by the price level of steel, largely because steel tends to form a small percentage of the cost of a project and the advantages of using steel outweigh the costs.

THE INSTITUTE'S APPEAL TO GOVERNMENT – THE PRICE OF STEEL

In October 2010 Kobus de Beer and I testified in front of the Parliamentary Portfolio Committee for Trade and Industry on the effect of the price of steel on our industry.

Prior to us on that morning the South African Fruit & Vegetable Canners Association testified on behalf of their industry and from the tone of the discussion and the questions from the members of parliament we could assess which way the wind was blowing. The canning people ascribed their difficulties with respect to competing on international markets almost entirely to the price of the tin plate which they get from ArcelorMittal (AMSA). We had some problems with some of the statements and figures they produced, but most of the MPs took these unquestioned as confirmation of their views, which was clearly and obviously that AMSA is a highly unethical company that is having a very negative effect on South Africa's industry. To say that AMSA is not a highly admired company in those circles could pass as a gross understatement.

Our tone was quite different. Fact is, the price of steel is fairly seldom mentioned as a big issue in our industry. Just a week before the meeting at Parliament our board had a workshop to discuss the issues facing our industry and how the Institute should react to it, and it is rather interesting that the price of steel was not even mentioned once in any context; it's clearly not exercising the minds of the typical MD in the industry. What people do complain about are changes in the price of steel (up or down) because these tend to have all kinds of disruptive consequences, such as uncertainty in tendering, uncertainty about importing steel, devaluation of stock and arguments about payments. But as a rule structural steel projects for the local market are not adversely affected by the price level of steel, largely because steel tends to form a small percentage of the cost of a project and the advantages of using steel outweigh the costs.

Admittedly, if prices of erected structural steelwork remained as high as they were two years ago and those of other materials dropped, we would have problems with substitution. But then one has to also take into account that the high prices of erected steelwork could not be laid at the door of the mills alone. The effect of supply and demand theory was shown to work well in that period. The demand for steel was high, production could not cope (throughout the world) and so the price of steel went up (as did most other products). When the demand fell off, the price of steel came down.

We showed the Committee the relatively high level of exports of structural steel products from South Africa achieved and maintained over the past five years, coupled with relatively modest import volumes, which indicates that the price of steel was not so high as to make the industry uncompetitive. The value of the rand at any time may in any case be at least as important as the price of steel.

That unworked steel price levels don't seem to play a huge role in many projects is, of course, not the whole story, as we told the Parliamentary Committee. It would unquestionably be great if we could get steel very cheaply; everybody would save, and it would facilitate the Institute's task to promote the use of steel. But more to the point: the following are specific examples of areas in which a high price of steel has a direct negative affect on us:

- The export of structural steelwork is negatively affected if the price of steel is higher in one's country than in others. We provided some details of the AMSA export incentive scheme that currently applies and which is very useful to exporters of fabricated steelwork.
- Similarly, expensive steel is detrimental to our efforts to retain control of the local market by competing with imports on the basis of quality, service, reliability and price.
- In certain cases there is a real threat of substitution by other products: steel pipes can be substituted with pipes from a variety of materials, light steel trusses can be replaced with timber, steel columns can be replaced with concrete columns, etc. As a rule, however, government is not inclined to give one material preference over any other.

Our problem is that, while we would love to see vastly lower steel prices, we can't quite see what government can do about it. The problem is that any action to force AMSA's prices down is likely to have a negative impact on the smaller mills in the country, and they are already under pressure (in fact, most steel mills in the world are not doing too well these days). But at the time of writing this we can but only await an announcement of the Minister of Trade and Industry regarding the measures that will be taken.

We continued by pointing out that putting pressure on the price of steel is not the only or even the necessarily the best way of supporting the local steel construction industry. Our recommendation was that South Africa should do what our trading partners such as India and Brazil, to name two, are already doing. They have various ways of discouraging imports, import duties being the most important. At the same time, they have schemes for encouraging exports, and it is very difficult for an outsider to understand these or even prove that they exist, except by observing that the prices don't stack up. Another method by which some countries gain an 'unfair' advantage is by providing financing for a project, provided that it is supplied from the same country. The Europeans control imports by non-tariff barriers such as the high technical requirements to be met to get the CE mark.

Our impression was that our views and recommendations had limited effect even though our industry represents a very substantial portion of the South African steel consumers; we were clearly not in line with popular thought in the room. The committee immediately referred to the rules of the WTO, seemingly unimpressed by our arguments that, for example, India has a duty on imported steelwork while having free access to our markets. They also seemed to have little time for our argument that for structural steelwork competitiveness depends on more than the price of the raw product, and that there is much that the government, and AMSA, can do to promote our competitiveness. Poor labour productivity levels at relatively high cost are a major cause of concern in this regard.

The SAISC is certainly not an apologist for AMSA, and most of our members have a vested interest in steel prices being as low as possible. If the government can devise a way of having steel prices reduced without hurting the wrong people, we would be among the first to applaud. But there can be no benefit to any downstream steel-based manufacturer if the situation were ever reached when AMSA decided to stop production in South Africa. We believe that the fight which has been raging between the DTI and AMSA for an extended period now is not to the benefit of South Africa or the broader industry; as the adage goes: 'where the big bulls fight the grass gets trampled'. In this case, the message is sent out that steel is expensive, and that the whole of the South African steel industry is uncompetitive.

We certainly hope that this issue gets killed and buried as soon as possible.

INDUSTRY NEWS IN BRIEF

STEWARTS & LLOYDS ADDS MORE TO ITS STABLE!

Stewarts & Lloyds has recently added Stewarts & Lloyds Laser Products, previously known as Global Laser Products (a 12 year old company), to its countrywide branch network, increasing the branch count to 29.

The new company will be based at 15 Waterval Road, Kliprivier, Randvaal (on the R59 highway to Vereeniging), and will be the group's 29th branch. Products and services offered include laser cutting and fabrication of all sheet metal products; CNC bending, robotic welding, tig welding and CO_2 welding.

"At Stewarts & Lloyds Laser Products we have developed a renowned customer base, both nationally and internationally," says Mark Wakeford, one of the shareholders.

Stewarts & Lloyds supplies steel and tubes, pipes and fittings, valves, pumps, steel processing services and irrigation equipment. The cash and carry outlets throughout the country sell the Stewarts & Lloyds products, as well as wire, fencing and industrial hardware.

Branches include: Alrode South, Bloemfontein, Boksburg, Booysens, Cape Town, Durban, George, Hazyview, Head Office, Kimberley, Mafikeng, Nelspruit, Polokwane, Pretoria, Robertville, Rustenburg, Springs, Vanderbijlpark, Vereeniging, Wadeville, Witbank and Wynberg.

Stewarts & Lloyds Laser Products can be contacted on (011) 903 7999.

Stewarts & Lloyds's state-of-the-art machinery.

B&T STEEL WINS INTERNATIONAL AWARD

B&T always strives to achieve nothing but the best, thus it comes as no surprise that the company achieved a five star NOSA rating in just eight months. On the 16th July 2010, they won two awards at the prestigious NOSA awards ceremony and on the 9th September 2010, B&T won a NOSHCON International Award.

"At the NOSA ceremony, B&T won awards in the categories Best Environmental Safety Programme – NOSA integrated five star system (Northern Region) and Best in Construction (Sector F) – NOSA integrated five star system (Northern Region)," says CEO Trevor van Vuuren. "At the NOSHCON banquet we won an Integrated 5 star NOSCAR award, which is the highest accolade given to companies for their commitment to occupational safety, and well as the sought after International SIC award."

The NOSCAR requirements for NOSCAR awards are that the DIFR is less or equal to 0.8 and that all other SHE severity rates fall within NOSCAR limits. Companies must also

B&T wins international safety award.

obtain a score of 95% or higher for effort.

"We are understandably proud of all our awards," concludes Trevor. "We are a company that grasps the concept of working hard, and we have done so for everything we have achieved. The NOSCAR and International awards are definitely the highlights of this year and we are very happy to receive recognition for all the hard work we have put in. It motivates us to achieve even more."

MACSTEEL SERVICE CENTRES SA SPONSORED THE MACSTEEL LIFELINE GOLF CLASSIC 2010

The tough economic climate and the shrinking donor pool have significantly impacted on the funding of South African non-profit organisations. The Macsteel LifeLine Golf Classic 2010 – LifeLine Johannesburg's biggest annual fund raising event – is welcomed as a funding 'LifeLine' to the organisation.

The golf day was held at the Country Club Johannesburg – Woodmead, "the considerable funds raised at the 9th Macsteel LifeLine Golf Classic are a valuable contribution towards the continuing sustainability of LifeLine Johannesburg and its Community engagement initiatives", said Lauren Jankelowitz, new Executive Director, LifeLine Johannesburg. She continued, "We are sincerely grateful to Macsteel Service Centres SA for its ongoing financial support, and to the participating golfers for their loyalty and support of our organisation".

This event has grown in popularity over the past nine years and has many corporate companies participating annually. The Macsteel Life-Line Golf Classic attracts the captains of industry, especially from the engineering and construction sector. A full field of golfers (33 four-balls) enjoyed a professionally run day of golf, followed by an entertaining evening function comprising: a speech by the Patron of the event – Morné du Plessis, Master-of-Ceremonies – Comedian Trevor Gumbi, prizes for every golfer, entertainment by violinist Christina Rodriguez and an auction by Barney Girnun of MSC Auctioneers.

Macsteel Head Office four ball: (left to right) Dave Dawkshas – Group Marketing Director, Macsteel Service Centres SA; Ivor Galaun; Morné du Plessis – Patron of the Macsteel LifeLine Golf Classic and Hilton Zetzer.

LifeLine Johannesburg was established in 1969 (41 years ago). As a non-profit organisation, it exists to facilitate the emotional wellness of individuals and communities – and to make a difference in the Johannesburg community that it serves.

HURLINGHAM RETAIL COMPLEX AND SUPERMARKET EPITOMISE NEW 'GREEN' DESIGN TRENDS

A new Pick 'n Pay supermarket is nearing completion in Hurlingham, Sandton. Designed by Bentel Associates International (BAI), it will be the third Pick 'n Pay store to incorporate a significant number of sustainable elements including the use of natural refrigerants.

The development at the intersection of William Nicol and Republic Roads consists of a multi-level complex with a receiving basement, a level for staff facilities, trading and mezzanine levels and a 300-bay basement parking area. The complex includes the 5 600m^2 Pick 'n Pay supermarket, 750m^2 of adjoining line shops, a Pick 'n Pay liquor store and a Pick 'n Pay cooking school. Construction of the R160-million complex started in August 2009 and completion is planned for October 2010.

In terms of the design brief and recognising that the higher costs of 'greening' a building are outweighed by the medium to long-term savings that come with energy efficiency, BAI has incorporated several green elements into the supermarket and overall complex design by utilising appropriate 'green' design elements, materials and systems. In particular, they sought to incorporate viable initiatives that would enhance the overall aesthetics of the building while significantly reducing its carbon footprint.

INDUSTRY NEWS

BAI points out that a multi-disciplinary team designed and refined the available design technology as the project progressed, focussing on issues such as payback, ease of maintenance and product availability. A circumspect approach was also taken with regard to the learning curve. BAI say that the design is not the conventional inverted type of architecture normally used for retail complexes. The inclusion of contemporary full height glass facades, together with numerous skylights in the roofscape and a dimmable light system, allows for considerable daylight harvesting and adds to the natural ambience of the interior of the complex. The large facades also allow exposure to the interior from the main intersection and the entrance.

The new store will use almost 40 percent less energy than a comparable conventionally designed store due to the utilisation of high performance refrigeration, lighting and HVAC systems. The store also uses renewable energy sources to help light, warm and cool the site. No VOC (Volatile Organic Compound) paints have been used and solar panels are used to power external signage at night.

Pick 'n Pay is installing 100 kilowatts of photovoltaic capacity that will generate between 8–20% of the store's power when in operation. This system is expected to reduce energy consumption by at least 30% compared to a similar sized store using synthetic refrigerants. The refrigeration plant also incorporates a heat recovery system, which is used to provide the entire store's hot water requirements.

In addition, a rainwater harvesting system has been installed to be used as irrigation for the largely indigenous landscaping and back up for the air conditioning system. Careful consideration has also been given to the restoration and enhancement of the substantial reserve between the building and the Braamfontein Spruit that forms part of the surrounding urban greenbelt.

Artist impression of the Hurlingham retail complex and supermarket.

BINNINGTON COPELAND CELEBRATES IT'S 25th ANNIVERSARY AS GLOBAL PLAYER

Construction and contract consultants, Binnington Copeland & Associates has celebrated its 25th anniversary having grown from a local claims consultant into a global player advising clients both locally and those operating outside the country as well as international companies embarking on contracts in South Africa.

The company was established in 1985 by Chris Binnington, an experienced project manager and claims resolution specialist and Bill Copeland, a civil engineer and subsequently a senior executive in the concrete and steel industry. The two joined forces following a successful dispute resolution in which they were both involved on opposite sides of the table as they recognised the need for a specialist company with the ability to resolve disputes through mediation, adjudication and arbitration.

From the outset, Binnington Copeland has helped clients develop, agree and draft contracts which are clear, unambiguous and which define accurately, the rights and obligations of the parties so as to avoid the unnecessary expenditure of management and consultant time and cost in making or defending claims and resolving disputes.

The extended services provided by Binnington Copeland have grown to the extent that the company has been involved in most of the major projects undertaken in southern Africa over the last few years, ranging from the contracts for the World Cup stadiums to complex contracts for engineering and petrochemical plants. This has involved working in countries as diverse as the Democratic Republic of the Congo, Zambia, Mozambique, Madagascar and further afield in countries such as China, India and Kazakstan which has called for extensive knowledge of the legal processes of those countries.

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Website: www.btsteel.co.za

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Tel: +27 (0) 11 824 7500
Fax: +27 (0) 11 827 2314
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Cosira Group
Contact: John da Silva
P.O BOX 1390, Dowerglen, 1610
Tel: +27 (0) 11 817 6600 or +27 (0) 861 COSIRA
Fax: +27 (0) 11 817 6850 or +27 (0) 86 537 1730
Email: info@cosiragroup.com
Website: www.cosiragroup.com

Group Five
Contact: Wendy Grainger
PO Box 3951, Rivonia, 2128
Tel: +27 (0) 11 899 4600
Fax: +27 (0) 11 918 2902
Email: wgrainger@groupfive.co.za
Website: www.groupfive.co.za

Kulungile Metals Group
Contact: Vicus Meyburg
PO Box 995, Isando, 1600
Tel: +27 (0) 11 929 5000 or 0860 086 911
Fax: +27 (0) 11 929 5062
Email: Isando@kmg.co.za
Website: www.kmg.co.za

Macsteel Service Centres SA
Contact: Dave Dawkshas
PO Box 7729, Johannesburg, 2000
Tel: +27 (0) 11 871 0000
Fax: +27 (0) 11 827 1580
Email: Dave.Dawkshas@macsteel.co.za
Website: www.macsteel.co.za

Robor
Contact: Franco Mordini
PO Box 263, Isando 1600
Tel: +27 (0) 11 971 1600
Fax: +27 (0) 11 392 4435
Email: francom@robor.co.za
Website: www.robor.co.za

Tubular Holdings
Contact: Jorge Bonifacio
PO Box 1342, Bedfordview, 2007
Tel: +27 (0) 11 553 2000
Fax: +27 (0) 11 450 2160
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VISITING ARCHITECT

ANDREW TYLEY OF ROGERS STIRK HARBOUR AND PARTNERS

"The great property of steel is that you can do a lot with very little. We use steel in various different forms and wonderful aesthetics grow from the basic property of the material. We enjoy the material, it helps us to construct buildings intelligently and we also love it because it expresses clearly what it is doing."

INTRODUCTION

Each year, the Institute participates in bringing to South Africa a noteworthy architect. This year, we brought Andrew Tyley of Rogers Stirk Harbour and Partners (RSH+P) famous for their work on iconic structures including: The Millennium Dome (O2), Centre Pompidou, Lloyd's of London, Terminal 5 Heathrow Airport and the Madrid Barajas Airport.

Tyley (BSc (Hons); B Arch; M Arch RIBA), since joining RSH+P in 1996, has been involved in a number of key projects as an architect and masterplanner. Most recently he has led teams putting together entries for a number of international competitions, including for Transbay Tower Terminal and Tower, San Francisco. Other important projects on which he has worked include: Wood Wharf re-development masterplan, London; East River Waterfront masterplan New York City; Madrid Barajas Airport, Spain and Leuven Railway Station Competition, Belgium

DISCUSSION BETWEEN HENNIE DE CLERCQ AND ANDREW TYLEY

Hennie: How, in your opinion has steel influenced modern architecture?

Andrew: *Enormously, I believe. Since the turn of the last century, due to steel we are able to make and design buildings which are taller, bigger, have larger spans and incorporate greater open spaces that other load-bearing systems and structures could not provide. So, in that sense, steel enables opportunities to create large, open, free space which promotes transparency. It also allows us to build spaces that can be re-used, not only for today but for future uses that we can't now foresee.*

Andrew Tyley.

So in that regard steel is an enormously important material in being able to deal with the demands and requirements of modern space as we understand it today.

It is also an ecologically respectable material. It is recyclable and reusable enabling the architect to fulfil more and more briefs that contain an ecological imperative.

Hennie: How has steel influenced the aesthetic in architecture?

Andrew: *The great property of steel is that you can do a lot with very little. We use steel in various different forms and wonderful aesthetics grow from the basic property of the material. We enjoy the material, it helps us to construct buildings intelligently and we also love it because it expresses clearly what it is doing.*

Steel in compression and steel in tension looks different and is expressed completely differently resulting in a language of steel which contributes significantly to the aesthetic quality of the building.

Hennie: I am interested in the relationship between architect and engineer, especially on very big buildings. Where does the architect start and where does the engineer stop? Where do the ideas actually come from?

Andrew: *We see very little distinction between the architect and engineer. We respect the engineering profession and often work right at the beginning of the process with an engineer. We propose the aesthetics and then work out how to engineer it – and we enjoy the dialogue. In short, the aesthetics and engineering are really one. Take the Millennium Dome, for example, where there was absolute cooperation between us and the engineers. There had to be. If you were to weigh the air that the Dome encloses you would find that it is heavier than that of the steel and the fabric structure that encloses it. So, I'm glad we worked closely with engineers! In short, it is fair to say that the best buildings come from collaboration between architect and engineer.*

BBVA, Mexico – Koester.

Hennie: Anything in particular that has made your firm so successful?

Andrew: *Obviously there are many things at work including a respect for one another, a strong work ethic and so on. But if I had to choose one thing it is the diversity of interest in the practice. We are influenced by sculptors, painters, great scientific concepts, nature and a plethora of other interesting and*

NEO Bankside – Native Land.

exciting things. This is reflected in the wide range of diverse buildings that we create. Also, every project is started with a clean slate. We throw away all traditional concepts and ideas, go back to basics and find a solution that is unique to the situation at hand. This ability to think originally and freely gives us the edge I believe.

Hennie: Is there teamwork in the practice?

Andrew: *It's fundamental and we create structures within the firm that enhance it. For example every Monday morning all the directors, senior people and all those involved in a particular project work together on ideas for the project. In this way the skills of several generations are working in unison. In general we are very horizontally organised – all working, eating and talking together. You will see some of the oldest people and some of the youngest sketching ideas on their napkins at lunch thrashing out some detail. Some of our greatest problems have been solved in this way. Also it's not just us brainstorming but engineers and other relevant professionals from other disciplines and firms.*

Hennie: How has the computer influenced your creative ability?

Andrew: *The computer is an amazing tool. But it's only a tool. If one is not careful one's 'eye', one's natural creative energy can be compromised by it. This is why we insist that the younger generation can still draw as this is how their creative eye will stay in condition as it were. Our life-blood is the creative response to situations and ultimately, while computers can help us in the technical arena, the act of creation is up to us both as individuals and collectively.*

Hennie: Well, it seems to be working very well. What are your impressions of South Africa?

Andrew: *There's a great energy here. It's a beautiful country and the people I meet are vibrant and energetic. Also, there is a magnificent range of architecture in this country and so much of the new stuff seems to express the spirit of liberation of post-apartheid South Africa. It's all very exciting.*

Building a new 13-story hospital on a century-old medical campus in Pittsburgh's Lawrenceville section presented both opportunities for renewed vitality and the challenge of working in tight quarters.

A HOSPITAL REBORN

By Michael G. Brennan, P.E.

This article was previously published in Modern Steel Construction, February 2010

With an upgraded and expanded facility, the Children's Hospital of Pittsburgh of UPMC is bringing new life to a century-old medical campus.

As part of a continued commitment to excellence, the University of Pittsburgh Medical Center (UPMC), in close cooperation with the Children's Hospital of Pittsburgh of UPMC, has recently completed a new hospital in the Lawrenceville section of Pittsburgh. This project is an ambitious undertaking in that it represents the integration of a new medical campus with the construction or renovation of eight major structures, all situated on close to 10 acres in a densely populated section of the city. The site, which formerly contained the St. Francis Medical Center, served as a medical community for over 100 years and this project will make it viable for another 100 years.

When completed, the campus will contain the main hospital, the John G. Rangos Sr. Medical Research Center, a Central Plant, the East pavilion, the Medical Office Building, the North Garage, the Midcampus Garage, and the Plaza Building as

Twelve 6-ft 6-in.-deep and 60-ft-long plate girders installed on the third floor of the main hospital building accommodate a 60-ft wide, two-story-tall access drive cut through the building for an off- street pedestrian drop off area.

well as linkage bridges. Some of these buildings are existing and represent a conditional reuse. Some are additions to existing structures, notably an expansion to the Central Plant. Others are completely new buildings including the garages, the Rangos Research Center and the main hospital.

MAIN HOSPITAL BUILDING

The main structure is a new 13-story hospital planned around an existing South Tower. During the project's planning process it was decided that the South Tower should remain as intact as practical to preserve recently constructed operating room suites and ancillary cardiac care intensive care rooms, all extremely high-value, highly engineered spaces. Keeping the South Tower and mating the floors created one of the earliest identified design challenges for the project, in part because the use of ramps was prohibited.

Modern hospital planning suggests at least 16-ft floor to floor. This allows a 9-ft ceiling with ample annulus room to run medical gases, information technology, power, HVAC, pneumatic tube, plumbing, fire protection, specialty lighting, cable festoons, etc.

The South Tower is 12$^1/_2$-ft floor to floor, which with a 9-ft ceiling height means the various systems have to coexist in a space of 3$^1/_2$-ft minus the beam depths. The basic grid is 30-ft by 30-ft with a 2-in. composite metal deck and 3$^1/_2$-in. of lightweight concrete fill. Thirty 30-ft-long beams are spaced 10-ft on center. As early as practical, the structural designers coordinated with the mechanical designers to determine where main distribution systems were to be routed. The conclusion was that above the third floor, the girder depths had to be limited to 18-in. Based on the results of the lateral analysis, the inertial demand warranted W18x97 girders; obviously a least weight design was not of paramount importance.

As a consequence of the floor-to-floor height limitations, a systematic network of penetrations was provided in the beams and girders to create the largest openings possible without having to provide stiffeners. The project was on a phased fast track so that the steel was designed long before the systems design could be completed. To encourage and enforce the use of the penetrations, practical and possible contractor coordination drawings were created and weekly meetings were held. The result is a highly coordinated, complex above-ceiling MEP distribution.

The main hospital building is situated on a busy city street. To allow controlled, safe pedestrian drop off, a 60-ft-wide two-story tall access drive was cut through the building. Twelve deep plate girders, each 6-ft 6-in.-deep by 60-ft-long, were installed on the third floor to transfer the column loads of the nine upper floors.

JOHN G. RANGOS RESEARCH CENTER

The UPMC and Children's Hospital of Pittsburgh leadership team insisted that the new research building would be second to none, in both facility, and staff. Among other things, that meant the building had to be strong and it could not vibrate. Although simple in concept there were contributing factors that made the criteria interesting and challenging.

The planning called for a 12-story tower using 3 1/2-in. lightweight concrete fill with 2-in. composite metal deck. Lateral load resistance is provided by discrete moment frames. The floors are designed for flex lab space, which can be arranged and adjusted as needed to support the requirements of the principal investigators.

ASCE 7 Table C4-1 specifies a minimum live load of 100 psf, which was used as the design basis unreduced over the entire floor plate. The sophisticated laboratory requires copious airflow, so the facility has large inline discharge fans on the roof and three floors for mechanical equipment, as well as the distribution floor, penthouse and upper penthouse.

The research building is bordered on the east and west by one way streets, and on the north and south by the Midcampus and North Garages. The garages directly above the building and expansion joints are provided at the separation. A linkage crossover connects the two garages. The hospital's material management department is located in the basement of the Midcampus Garage and the loading docks are located in the basement of the Rangos Research Center where there is a controlled limited access dock. Trucks enter the east side, drive under the building, back into the docks, and drive out on the west side.

Transfer girders on the fourth floor of the research building enabling a regular grid and shallower beams to be used for the upper floors of the building while still providing open space below for access to a loading dock.

The initial architectural requirement was that no columns could land in the loading dock space. After evaluating various framing schemes, engineers settled on a plan allowing the perimeter columns and two interior columns in locations where turning radius modelling determined that it was possible to manoeuvre the design basis truck through the space. The column arrangement creates long span conditions, with 53-ft beams and 42-ft girders, requiring large, deep members. The deep members created impediments to the mechanical distribution, so 10 transfer conditions were established in the fourth floor so that a regular grid and shallower beams could be used for the balance of the building.

The loading dock provided a challenge, as did the parking crossover. It was a design requirement to connect the garages abutting this building. To accomplish that meant allowing vehicles to drive through the research structure. To alleviate the fear that moving cars could impart a vibration into the research areas, the two levels of parking crossovers were constructed as a separate structure, like a nested table isolated from the main building.

Furthermore, due to architectural requirements, the elevator straddles the expansion joint between the parking crossover and the main building. This too had to be isolated. The result is that there are three discrete structures: the main building, the parking crossover and a self-supporting elevator tower.

The reconfiguration of the medical campus will allow UPMC and its Children's Hospital to enhance its leadership position in pediatrics and become the incubator for breakthroughs in medical research.

(1 acre = 4046.86m^2 1 foot = 304.8mm 1 inch = 25.4mm)*

project team

Owner

UPMC

Architect/Engineer

Astorino, Pittburgh

Construction Managers

PJ Dick/Barton Malow, Pittsburgh

Hunt Construction Group, Pittsburgh

Engineering Software

STAAD/Enercalc/Web open

PERTH TOWER AGAPE TO GRAND VIEWS

This article was previously published in the December 2009 issue of the Australian Steel Institute's quarterly national magazine, Steel Australia

The decision to use structural steel was further endorsed by the success of other steel framed buildings built in Sydney by Brookfield Multiplex in recent years; namely the Latitude East building and Australian Taxation Office at World Square and the iconic Macquarie Bank building at King Street Wharf.

An external structural steel 'mega frame' has allowed a major new Perth office tower clear views of the Swan River and the city's breathtaking hinterlands directly from the building's central core.

A key ask from major tenant, BHP Billiton for the City Square Development was to allow for sweeping views of Rottness Island, Swan River and the Perth hills as befitting one of the CBD's premier locations, not interrupted by a traditional building core.

The project's principal structural engineer from Aurecon, Angus Leitch explained that the requirement was met by incorporating an offset concrete core on the northern side of the tower that includes an open back so that the lifts installed can be seen going up and down the building.

"But the offset core and the resulting torsional response or mode of vibration presented significant challenges for the building," he said.

"The external 'mega frames' and 'mega columns' on the east and west ends of the building are pivotal in the performance of the building to alleviate that concern."

He said that the use of concrete-filled steel tube columns and un-propped steel beams also avoided the need for temporary propping during construction.

The external 47-level structural bracing system on the east and west elevations was clad to achieve a distinctive and impressive external feature as well as provide structural stability.

City Square comprises a 72 750m^2 office tower with four basement carpark levels surrounded by a landscaped podium and retail and heritage buildings. The tower structure has 47 levels which rise approximately 200m above the podium and a capital approximately 37m high crowns the structure. The tower is linked to a four-storey building on the north side by a glass roofed atrium. This structure has a combined footprint at the podium level of about 4 000m^2.

The tower structure required around 9 500 tons of structural steel made up of 2 500 tons of spiral tube columns ranging from 1 350mm to 500mm diameter, 4 900 tons of floor beams and bracing and 950 tons of connections, and 1 200 tons of fabricated reinforced cages which had to be shop fitted into the columns prior to delivery to site.

Project Director with Brookfield Multiplex, Tony Hodder said a composite steel solution was chosen primarily due to speed and ease of construction through reduced crane time onsite.

"Considering the resources available within the construction industry at the time of beginning this project and aligned with time (constraints) and difficult site access, a decision was made to construct the structure using a reinforced concrete core, tubular steel columns which are reinforced and concrete-filled, and a composite metal deck floor slab supported on structural steel beams," Mr Hodder said.

But the speedier construction time afforded through the use of structural steel could only be achieved through sound coordination of all the consultants' and subcontractors' requirements. The whole building frame needed to be project managed to take advantage of the fast floor cycle times, programmed at a six-day cycle per floor. The core had to achieve the same rollout rate.

This meant appointing sub-contractors capable and experienced enough to work accurately and meet cycle times, through adequate craneage, and the use of four high-speed Alimak hoists and two jump lifts. Protective self-climbing screen systems

covering three floors and specialised access platforms were purpose-designed to facilitate the speed required in the cycle times.

The floor plate required 76 000m² of steel decking site-fixed to the floor beam with shear connectors. A further 500 tons of fabricated steel was necessary for the capital, complete with internal access in the columns for ease and safety of erection, access to signage and for maintenance and periodic structural inspections.

"The decision to use structural steel framing was strengthened by the excellent fabrication facilities around Perth ensuring that the highest quality of work would be achieved," Mr Hodder said.

"By designing the fabrication and erection methods to utilise the available fully-automated computer-controlled beam lines, profile cutters and welding machines, a programme of fabrication could be proffered to ensure that all construction target dates would be achieved."

He added that the decision to use structural steel was further endorsed by the success of other steel framed buildings built in Sydney by Brookfield Multiplex in recent years; namely the Latitude East building and Australian Taxation Office at World Square and the iconic Macquarie Bank building at King Street Wharf.

Brookfield Multiplex has viewed the design and documentation to be of paramount importance and set up a regime for cooperation between consultants, steel detailer, fabricator and subcontractors (mechanical, electrical, hydraulic, fire, lift and façade).

"This allowed a holistic coordination of the structure to minimise errors and site rectification and optimise safety onsite," he said.

"Many ideas and processes were incorporated into the design through this consultation and coordination with advantages to all through mutual cooperation and timely implementation.

"Some of the advantages of this coordinated approach can be seen in the design of mechanical and fire penetrations through floor beams where each floor was examined and penetrations placed in the optimum position to help keep the beam sizes to a minimum and allow ready repetition in fabrication."

Another significant decision was to use single and double bolted angle cleats for the beam to beam connections.

"This took advantage of the beam line process allowing the beams to be cropped, notched and drilled and placed straight into a stillage for delivery in the order required for the erection sequence," he said.

"Staggered column splices were introduced into the planning which allowed the cycle of beam erection, decking, reinforcement and concrete placement to be continuous with each floor being completed in a six-day cycle.

"Basically, we took full advantage of a vibrant and competitive steel fabrication industry to achieve an iconic building for the Perth skyline."

The building is due for completion in 2012.

project team

Builder
Brookfield Multiplex

Structural Engineering
Aurecon

Architect
HASSELL Architects and fitzpatrick+partners

Steel Fabrication
Pacific Industrial Company and Steelpipe Australia

Steel Detailing
Detailed Design Drafting

Coatings
Total Corrosion Control

Cladding
Yuanda Australia

HOTELS APPLY THE BENEFITS OF LSFB

SASFA is considering sending a 'thank you' letter to FIFA for hosting the World Cup 2010 in South Africa. The deadline was cast in stone and everyone involved in the construction of venues for the World Cup was primarily looking at 'speed-of-construction.' LSFB offered the solution and the owners got more than they bargained for (in the positive sense of course).

Here are two examples of hotels that needed extensions – and fast. LSFB saved the day

LSFB was a lightweight solution to a hotel's tricky challenge.

SAXON VILLA SKYLIGHTS, JOHANNESBURG

The client

The client wanted to develop a unique extension to the well-known Saxon Hotel in Sandhurst, Johannesburg. The requirement was three ultra-luxurious villas situated in an indigenous forest, on top of a basement parking garage. This scenario forced the construction team to find an innovative solution.

The building process

The three villas were to be built on an area of approximately 2.5 acres (approximately 10 000m^2), on top of a parking garage almost covering the full size of the site area.

The following key elements had to be considered:

- The villas structures had to be designed and constructed as light as possible,
- The project had to be completed in a limited time period, prior to the 2010 World Cup.

The first phase of construction was the parking garage with the roofslab designed to allow the construction of the three 'villas' on top. Thus the villas had to be constructed as light as possible. The garden soil and trees that formed part of the landscaping in front of the villas added a further substantial load onto the roofslab of the basement.

The skylight seamlessly fits in with the interior of the completed villa.

Initially the three villas were single storey buildings but the client then requested Villas 2 and 3 to be extended to double storey buildings. This added a further demand to the roofslab and the architect had to consider alternative materials to meet the challenge.

The floorslabs were constructed as a polystyrene and concrete combination. The height of the walls and the slab design did not allow for the weight of a concrete roof slab for the second storey.

This made the use of a lightweight steel construction the ideal option. Part of the 3 000m^2 roof area were also 3 skylight roofs (approximately 30m^2). These skylights were designed and fabricated from 0.8 gauge lightweight steel. The skylights were cladded with 9mm thick fiber cement cladding and coated with a acrylic based coating as final finish.

Time saving elements of the LSFB solution:

- No props were needed to erect the lightweight steel trusses.
- Once waterproofing to the light weight screed was done, the internal finishing could commence
- Services like air-conditioning ducting, electrical services, sprinkler piping etc. could be fitted to light weight trusses without the usual drilling and fitting.

project team

saxon villa skylights

Developer / Owner
Napier Gardens (Pty) Ltd

Architect
Len Lategan Management Services cc

Structural engineer
JNJ Richter

Quantity surveyor
Brain Heineburg & Associates cc

Project manager
SIP Project Managers (Pty) Ltd

Main contractor
GIP Builders (Pty) Ltd

Steelwork contractor
Innosteel (Pty) Ltd

- The fitment of suspended flush plastered ceilings was also easily hung from 0.8 gauge light weight roof trusses.

The use of a light weight steel roof played an important role in completing the project in time, adding as little as possible weight to the structure, as well as achieving the same aesthetics as a concrete roof.

The steel roof construction of the last villa was completed successfully in December 2009 and the final finishes were completed during May 2010 'Just In Time' for the soccer fans.

HEAD SOUTH LODGE, CAPE TOWN

Head South Lodge situated close to Cape Town Stadium was a prime spot for accommodation for the World Cup 2010.

The owner and project manager, Jeff Levy, wanted to increase his accommodation capacity by adding another storey. He also had to do it on a tight schedule because he had to close his lodge for the construction period, losing income.

His original design plans were rejected because the foundations of the hotel were not designed to carry the extra heavy weight of another conventional brick and mortar storey.

Erection of the steelwork for the extension of the hotel took 6 days to complete.

He had to consider a lighter material and came to hear of light weight steel construction. He contacted a contractor, experienced in LSFB construction – Light Frame Homes.

They erected the steel frame structure and roofing within 10 days, much to the owners delight.

The steel frames were manufactured and assembled in the contractor's factory in four days time. They delivered it to site and hoisted the materials to the second floor. Steel frame wall panels were fixed to a pre-cast concrete deck.

It took six days to erect the steelwork and 4 days to install the roof sheeting. For the internal walls skimmed 15mm gypsum fire stop board was fixed to the frame. 11mm oriented Strand Board was used for the external cladding covered by a waterproofing membrane with 9mm Nutec fibre cement flat sheets and 12mm fibre cement Vermont planks.

The client was very happy with the end result – allowing him to expand his hotel and in time to use the opportunity the World Cup 2010 offered to grow his business.

Steel frame wall panels were fixed to a pre-cast concrete deck.

project team

head south lodge

Developer / Owner

The Scintilla Property Corporation t/a Head South Lodge

Architect

Philip Briel Architects

Structural engineer

Element Consulting Engineers

Project manager

Levico Construction

Main contractor

Levico Construction

Steelwork contractor

Light Frame Homes

TRAINING COURSE FOR LSF BUILDING CONTRACTORS

DURBAN, JULY/AUGUST 2010

When SASFA sent out its notification for the course for Light Steel Frame (LSF) Building Contractors to be presented in Midrand during February 2010, the course was oversubscribed, and not all the applicants could be accepted. It was decided to repeat the course in Durban and also Cape Town, in order to equip as many as possible building contractors using LSF buildings with sound basic skills.

As in the past, SASFA members offered strong support for the course – Saint Gobain Construction Products offered their training facility, Stedone Hazy Crest cast an accurate 6mx4m concrete slab, and Safintra Building Solutions supplied the light steel frame and roof trusses for the training structure. ArcelorMittal SA sponsored the steel for the frame. Everite and Saint Gobain Construction Products supplied cladding, lining and insulation materials, and Kare sponsored the fasteners.

SASFA's goal with the course is to train builders / building contractors to erect the wall panels and roof structure of a simple LSF building, and to enable them to plan and supervise the cladding, lining and insulation operations.

During the first five days John Barnard (SASFA) and Richard Bailey (Maxspan) presented the steel erection part of the course. Students received an introduction to the LSFB industry in South Africa, followed by an explanation of the steel making process and the resultant properties of the high strength zinc or zinc-aluminium coated steel sheet used in this industry. Measures to prevent corrosion of the steel frame were discussed, as well as the manufacturing and assembly of the different types of light steel frame building systems. Steel frame members – floors, walls and roof structures – were explained. The different types of loads which a structure has to resist was explained – not to turn the students into designers, but rather to let them understand why a structure has to be anchored onto the concrete slab, and why bracing of wall panels has to be carried out according to the structural drawings.

Off-loading a truss off the vehicle is a one man job!

John Barnard, SASFA director.

TRAINING

By John Barnard, SASFA director

SASFA's major objective in its industry development programme is to ensure quality in all the facets of the process of light steel frame building. That was the motivation for drafting the SASFA building code, and having it approved by the SABS as SANS 517:2009. SASFA also drafted an Accreditation System on request of the banks, and the NHBRC.

SOUTHERN AFRICAN
LIGHT STEEL FRAME BUILDING ASSOCIATION

Hilti was invited to present their range of battery powered drills and screw guns, as well as their laser level – which makes accurate levelling of a concrete slab a 1-man operation! They also illustrated their different anchor bolts – from expanding sleeve types, to chemical anchors and self threading masonry bolts.

The steel frames and trusses were delivered just in time, and the students had to carry them from the delivery truck – this was on purpose, to let them experience how light the structural components really are! They then had to set out the positioning of the wall frames on the concrete slab, and before long, the first frames started going up.

All the students will remember the first rule about cutting LSF sections on site: 'Don't!' And if you have to, get approval from the structural engineer. The different types of fasteners for different applications were discussed, and illustrated on the training structure. Practical work was alternated with sessions in the lecture room.

After a detailed explanation of the different types of roof structures, the students had to erect the trusses on the wall panels. With all the theory and practical work on the steel structure completed, the students had to write a test to evaluate their acquired knowledge.

Mike Crawford from Everite presented the section on cladding – the term used for exterior cladding of external walls – using fibre cement board or planks (Nutec). The students then had the opportunity to install cladding to a few of the walls of the training structure. It was quickly apparent that some practice with the different screw types is required before the installer can do it efficiently and with confidence.

Matthew Baney from Saint Gobain, assisted by Hannes Stevenson, presented the section on lining and insulation – lining being the term used for the cladding of internal walls.

He also lectured on glasswool insulation, discussing the acoustic and thermal insulation properties of the product, as well as the correct installation procedures.

The students again had the opportunity to install glasswool insulation (Cavitybatt) in the wall

The course attendees ranged from business owners to foremen – all equally proud of the structure they had erected.

cavities, and to finish the walls off with gypsum board lining. Finally, they had the opportunity to fill the joints between boards, using a fibre mesh and a gypsum product to obtain a smooth joint. After completion of the practical work, the students again had to write a test to prove that they have mastered the principles of cladding, lining and insulation.

In conclusion, all agreed that it was a very useful and informative course, well worth the time and effort. Depending on demand, SASFA will present the course in Cape Town towards the end of the year.

QUALITY MANAGEMENT SYSTEMS COURSE FOR LSFB MANUFACTURERS

August 2010

SASFA's major objective in its industry development programme, is to ensure quality in all the facets of the process of light steel frame building. That was the motivation for drafting the SASFA building code, and having it approved by the SABS as SANS 517:2009. SASFA also drafted an Accreditation System on request of the banks, and the NHBRC. Four progressive stages were identified for assessment, i.e. the building system, project design and manufacturing, steel frame erection and building completion. A number of locally used building systems have been assessed, and accredited, in collaboration with the Structural Engineering Department of the University of Stellenbosch.

The next stage in the rollout of the accreditation programme, is assessment of the manufacturers of LSFB. In order to facilitate the process, SASFA decided to offer a training course and workshop on quality management systems. While most of the larger companies have formal quality management systems in place, the same does not apply to smaller companies. A specialist quality management consultant, Effective Quality Solutions (EQS), was appointed to prepare the course – with aim to keep the quality management system simple and useable, rather than window dressing with an onerous theoretical management system. While it may not cover each and

Fibre cement external cladding in the form of shiplap planks mounted on OSB board, with internal lining using gypsum board on the far wall.

every aspect of ISO 9001 at the outset, it is in line with the ISO standards, and be developed by the companies to comply fully with the international standard. It is SASFA's intention to raise the bar in the future as industry develops.

An excellent half-day course was presented by Mr Rudi Britz from EQS. The course covered process control, management of quality and the drafting of standard operating procedures such as project design, maintenance and calibration of equipment, supplier selection, purchasing, record keeping and staff training.

In the afternoon, attendees started drafting operating procedures for quality manuals for their own companies. They all agreed that the approach followed made the drafting and implementation of a quality management system practical, and easy. The aim for each company was to draft their core procedures before the end of September 2010, and then to start implementation. As soon as they feel that the QMS is established as part of their management system, they can apply for assessment for accreditation.

This course can be seen as another milestone on the LSFB industry's road to quality.

SOCIAL SNIPPETS

By Marlé Lötter,
Events Manager, SAISC

STEEL AWARDS 2010 – MAIN SPONSOR, THE AVENG GROUP

Congratulations Cape Town!

On 15 September 2010 the SAISC celebrated the 29th Steel Awards event – this time in three cities simultaneously. A record number of 900 guests attended the event at the Emperors Palace in Gauteng, 240 guests at the Suncoast Casino in Durban. For the first time Cape Town had its own show on the same night at the Vineyard Hotel. 140 guests packed the venue to capacity! Guests were wined and dined and entertained in fine style at all venues.

There was a lot to celebrate this year. Our panel of judges considered 68 structural steel projects ranging from residential homes, pedestrian bridges and schools to massive soccer stadiums and airports. Many of these structures were linked to the 2010 World Cup, with Cape Town Stadium taking the laurels as the Overall Winner for 2010. *(See the 'Steel Awards Issue' (September 2010) of the Steel Construction Journal for more details.)*

Our event theme was 'Growing Steel' – a concept supported by the high number of project entries, ushers dressed in 'construction chic' (supplied by our main sponsor –

The Aveng Group), the centre piece steel wire trees and gifts of Meccano sets (sponsored by ArcelorMittal SA). In Gauteng guests were welcomed in the parking lot by two Trident flatbeds displaying the actual growth path of steel from the iron ore and pellets through flat product and cold formed profiles to the steel in construction (Trident is a division of The Aveng Group).

Life Honorary Membership was awarded on the night to Dr Geoff Krige, John Swallow and Dr Hennie de Clercq for their efforts towards the growth of this industry.

The SAISC proudly acknowledges the generous contribution of all the sponsors to the success of this event *(see page ... for full details)*.

Special thanks to Macsteel Trading (Durban and Bellville branches) for sponsoring the wine at these two venues. Macsteel also assisted with courier logistics surrounding the table décor. Thanks to Tim Tasioulas and his Tass Engineering team, who at a moments' notice, solved our problem of transporting 129 boxes of wire art baobabs to SAISC offices.

Live entertainment at Steel Awards

In Gauteng guests were charmed by Sterling EQ, a female foursome with up-tempo sounds on flute and electric strings. They were juxtaposed by the construction dance group of Owen Lonzar International – complete with overalls, steel harnesses, chain saw and grinder sparks! The Other Michael Jackson (or shall we say, the surviving one) once again excelled as MC in Gauteng.

Durban enjoyed the sultry sounds of The Girls – Christina Rodrigues and Cathy del Mei. Ricardo Avellini of Avellini Brothers and chairman of the SAISC Committee in KZN did a sterling job as MC in Durban.

In Cape Town Justin Cohen held the show together brilliantly as MC, while guests were entertained by the easy

listening sounds of the JemsTones including a guest performance by SAISC member, Tony Cooksey.

The SAISC is proud of our association with all of these artists. (See contact details on the right hand side of the page.)

Steel Awards – supporting the community

The steel industry has seen some troubled times lately, but we were still able to host a prestigious gala dinner to a record size audience. The SAISC realises that times are getting tougher for many individuals specially those in need. So, it was decided to use the Steel Awards event to raise funds for a charitable cause.

Guests could make a voluntary contribution in return for a chance to win the wire baobab tree and other table decorations in a lucky draw.

In selecting a beneficiary it made sense to choose an organisation that is somewhat known to our guests and that has representation in the relevant regions. We decided to support CHOC, a country wide voluntary organisation, not funded by government, providing extensive practical help to children (and their families) in South Africa, suffering from cancer and life threatening blood disorders during the very disruptive, vigorous and often lengthy treatment process.

Visit the CHOC website for more information www.choc.org.za

Heartfelt thanks to all our guests in Gauteng and Cape Town who contributed R46 622 for CHOC Childhood Cancer Foundation of SA on the evening. And to ABSA that contributed a further R10 000.

Steel Awards 2010: New Generation Programme

The New Generation initiative was started in 2008 to serve as a special incentive for the high level of work done at our universities both by lecturers and top senior and postgraduate students. This year the programme was made possible by an equal contribution from every one of our sponsors and also by R25 from the attendance fee of every guest. 15 participants representing 6 top SA universities took part in an all-expenses paid full day programme in Gauteng introducing them to special aspects of the steel construction industry and creating a networking opportunity with the major role players. In addition, we could also accommodate 11 candidates as guests to the Steel Awards Dinner at the venue closest to them, i.e. in Johannesburg, Durban or Cape Town.

Read more about the programme in Steel Construction January 2011 Issue.

BEHIND THE SCENES SUPPORT FOR STEEL AWARDS 2010

It would have been impossible to put together Steel Awards 2010 without a very able support team of suppliers and consultants. The SAISC sincerely commends the services of the following people and companies:

REGIONAL EVENT SUPPORT

KZN: Lisa Smith with the Kwa-Zulu Natal SAISC Committee – Contact: lisa@saisc.co.za

Western Cape: Liz Berry with the Western Cape SAISC Committee – Contact: liz@saisc.co.za

EVENT MANAGEMENT ASSISTANCE, INCLUDING SEATING ARRANGEMENTS

Louise & Nadine of Ping Pong Communications – Contact: 083 284 0084 (Louise) / louise@ping-pong.co.za

VISUAL PRODUCTION AND EVENT PRODUCTION MANAGEMENT

Sian and Wendy of Sian Clark Communications – Contact: 083 604 0379 (Sian) / sianclark@vodamail.co.za

TECHNICAL – AV AND STAGING

Gauteng: Lenke and Dave of Multi-Media Staging – Contact: 011 315 3585 / lenke@multi-media.co.za

KZN: Garth Lawler of The Hire Zone – Contact: 031 312 1288 / garth@hirezone.co.za

Western Cape: Patrick Vee of Soundevents – Contact: 072 425 5098 / patrick@soundevents.co.za

MEDIA MANAGEMENT FOR ALL VENUES

Alan Browde of Brooke Browde Communications – Contact: 011 483 1823 / alanb@bbcomms.co.za

AWARDS CERTIFICATE FRAMES

Viv van Zyl of Omni Art & Crafts – Contact: 082 492 8603 / viv@lantic.net

TABLE DECOR

Bess of Bemoci supplied the table runners and huge black paper bags and also arranged the wire-art tress with community artist, Wilson Mahachi – Contact: 011 465 3369 / www.bemoci.co.za / bess@bemoci.co.za

EVENT PHOTOGRAPHY

Gauteng: Darren Alexander Photography – Contact: 082 550 1137 / daz@icon.co.za

KZN: Photography by Colleen – Contact: 084 408 6677 / colleen@photographybycolleen.co.za

Western Cape: Adele Goldberg of Picmemories – Contact: 083 242 4809 / picmemories@mweb.co.za

STEEL AWARDS 2010 – EVENT PICTURES AND AWARDS DVD

A selection of photos of Steel Awards at the respective venues can be ordered at R50 per DVD As well as the visual presentation of nominated and awarded projects shown on 15 September at R100.

The order form is available on our website or could be requested from our office: www.saisc.co.za; Tel: 011 726 6111; pamella@saisc.co.za

STEEL AWARDS 2011 – MARK THESE IMPORTANT DATES:

6 MAY 2011:

Deadline for project nominations – application details should be on our website by January 2011, alternatively contact Renee, renee@saisc.co.za

15 SEPTEMBER 2011:

Steel Awards Dinner in Johannesburg, Durban and Cape Town – venues to be advised.

WHAT NOT TO DO WHEN ENTERING YOUR PROJECT FOR STEEL AWARDS!

PART 2

By Spencer Erling,
Education Director, SAISC

(Because he is the only one who is brave enough to be so bold –** ed**)

In other words: How to win a Steel Award and undo all your marketing and PR efforts (and at the same time frustrate the Institute video production team to needing medication to keep our blood pressure and nervous tension from getting out of hand!)

Please do not misconstrue this article as a gripe, winge, moan from the Institute team. There is no doubt that we are having a go at the guilty parties. Yes, this is definitely "many a true word said in jest" article. But not every entrant is having a finger wagged (remember 'die Ou Krokodil' and his finger?) at him. Those of you who get hot flushes of embarrassment when you read this article should know exactly who we are talking about.

Our real aim is to save embarrassment (of which there are plenty examples coming) and make our lives at the SAISC a little easier in future years.

You have finally made the ratings for Steel Awards...

Now we start the process of making the video. We know for sure that most of you who submit entries are professionals or experienced contractors. Boy, do I hope you read your contract documents or requests for quotation clauses better than you do the requirements for entering Steel Awards. I suppose you do, because if you treated your contractual clauses in the same ham handed way you do our requirements I am convinced you won't be in business for too much longer. To clarify please allow me to quote (in part) from our entry form:

> ***"Conditions of entry:***
>
> *Written and illustrative material forming part of the project entries will become the property of the SAISC.*
>
> *The SAISC reserves the right to publicise the nominations and awards as it sees fit.*
>
> *The SAISC may visit short-listed structures for adjudication, publicity or filming purposes. The nominator and members of the project undertake to assist in arranging such visits and to furnish the SAISC with additional information about the project on request.*
>
> *By submission of an entry, the nominator assumes responsibility for the accuracy of all information, and provides the SAISC with assurance that permission for the submission has been obtained from the owners of the project."*
>
> **And**
>
> ***"Material to be submitted:***
>
> *To enable the SAISC to give proper publicity to the nominations, the following is requested:*
>
> *Note: It is critical that project information and names of the team members are submitted accurately (also details such as (Pty) Ltd, JV, etc.) – what is submitted will be used in the publicity regarding Awards projects. Errors lead to embarrassment for everyone involved with the project submitted and for the SAISC. Please prevent this by double-checking all details.*
>
> *Pictures of the project: A minimum of 5 and a maximum of 10 high-resolution digital photographs on a CD (jpg format, at least 300 dpi)"*

We contact you and ask you to arrange a visit to site so that we can take a camera man to capture the project on film for editing into the Steel Awards feature 'movie'.

Now all of a sudden we get "well I don't know if we are allowed...". That is sure going to frustrate the team that drives the video production. They are under extreme pressure to meet the deadline set a year before (when we booked the function rooms which we have to do kind of 11 months ahead of time.)

The last thing in the world we want to hear is that when we (SAISC representative, camera man, producer) arrange to go to (say) Cape Town for filming that one of the sites is not available on the chosen date or that we have some red tape to cut through and are trying to get permission from a hierarchical group of people we only hear about on the day we start arranging the 'shoot'.

Didn't you read the bit about *"and provides the SAISC with assurance that permission for the submission"* before signing the entry?

Now comes the time to give you written publicity...

So we write a 'teaser' article in Steel Construction (or forward it to a whole host of technical journals, weekly papers and the like) before the event about your project. We do want a few nice pictures for the article only to discover that you sent us a bunch of low resolution pictures (sometimes taken from a cellphone!) not suitable for publication.

Didn't you read the bit about *'Pictures of the project: A minimum of 5 and a maximum of 10 high-resolution digital photographs (jpg format, at least 300 dpi)'.*

So we ask you for high res pics, and only too often we now get told "well I will have to get permission for you to print the article" (goodness knows what would have happened had we not asked for the hi-res pics) or my client wants to censor (that is what it feels like to us)/review your article and he needs two weeks to do it" I will not repeat the 'permission' bit again!

No ways guys, why not tell us that in the entry form, then we will not have last minute 'meeting print deadline' calamities.

Please let us know up front in your entry if there is some red tape involved with the 'permission' bit such as 'approving' all articles, need at least one week or longer to get you onto site etc. Remember that site visit access changes from construction phase to when the owner is using it!

The great evening comes and goes...

The SAISC team get through 'unscathed'. None of you picked up the 'disasters' only we are aware of, none of you know how close we came to dropping the proverbial ball. Lots of you compliment us in various ways, verbally and by e-mail (you just do not know how good a feeling it is for us to read compliments that some of you take the trouble to write, thanks!).

Then the complaints start to roll in. Usually from some poor unsuspecting 'victim' who was left off the contracting team roll used for everything we do, i.e. our articles in Steel Construction and press releases for the media, for the rolling loop tape of all the entries, for those who made the short list and were covered in the video, or for those that actually received certificates for winning awards.

For example...

"I was the main steelwork fabricator, but because I fought with... (usually the guy who submitted the entry)... he left my name off" or "I was a partner in the JV but my name was left off" or in the case of one of our category award winners this year, had Spencer not actually discussed the entry with the engineer, and mentioned it to Reneé, then the engineers would probably not have been on 'roll'.

APOLOGIES AND RECOGNITION TO THOSE PROJECT MEMBERS OMITTED OR NAMED INCORRECTLY IN PROJECTS ENTERED FOR STEEL AWARDS:

CATEGORY WINNER – ARCHITECTURAL:
Freedom Park: Museum
Architect:
Office of Collaborative Architects: Gapp Architects / Urban designers, **MMA Architects (not Luyanda Mpalhlwa Design Space Africa)**, Mashabane Rose Architects

CATEGORY WINNER – COMMUNITY DEVELOPMENT:
Meetse-a-Bophelo Primary School
Steelwork contractor:
Jomi Project Management & Cicon Project Management

CATEGORY WINNER – TUBULAR STRUCTURES:
Mbombela 2010 FIFA Stadium, Nelspruit
Steelwork contractor:
Cadcon - A. Leita JV
Steelwork sub-contractor:
Omni Struct Nkosi (Pty) Ltd

Didn't you read the bit about *"**Note:** It is **critical** that project information and names of the team members are submitted **accurately** (also details such as (Pty) Ltd, JV, etc.) – what is submitted will be used in the publicity regarding Awards projects. **Errors lead to embarrassment for everyone involved with the project submitted and for the SAISC.** Please prevent this by double-checking all details"*

If (in reality "when" because it happens every year) you do get it wrong, it is the SAISC that gets embarrassed in these situations – not you. We have to do the written apology (which is included in this article!) for your not doing your entry forms properly.

The SAISC really does pride itself in the quality of our annual Steel Awards competition. The fact that over 1 200 of you came to our functions in Cape Town, Durban and Johannesburg speaks for itself. We really only get a small handful of gripes about what we have written about in this article.

In the end we strive to make your projects look good. So please help us make next year an embarrassment free year. Remember the old adage, "When all else fails please read the instructions".

A CLEVER CONNECTION SOLUTION FOR THE FAÇADE CLADDING OF THE MOSES MABHIDA STADIUM

By Linda Ness PrEng., Linda Ness Associates
(Edited by Spencer Erling)

Ed: This is a very technical article, but persevere and get the gist of it if you are in the connections business. The Moses Mabhida Stadium in Durban (2009 Overall Winner Steel Awards) was an immense engineering project with exceptional design challenges from the arch to the seemingly minor detail of connecting the façade sheeting to the bowl wall. The author and the professional team realised the old adage that the labour cost for steel structures lies in the connections. This is a classic example of how to resolve complex connections. We realise that we are 'boosting' the stainless steel market with this article, but this connection solution is a clever design from the highly regarded façades engineer, Linda Ness (also well known for her steel structure design). The well executed fabrication was done by a familiar KZN based steelwork contractor – Rebcon Engineering.

The stadium bowl façade is a uniquely designed system which embodies the visual simplicity and transparency of the iconic stadium structure, which itself is a beautifully engineered achievement. Peaking at 40m high off the elevated podium, 20 000m^2 of perforated powder-coated aluminium standing seam sheeting sweeps round the bowl with a geometry of deceiving complexity. In some places leaning outward up to 30 degrees, the design and supply team were on a journey to resolve what essentially wants to be a static planar cladding system, into one that rakes warps and racks. *(Ed: as derived from the old torture system, stretches, curves and wants to pull out of its supports under differing wind loading conditions.)* *(See picture 1)*

The cladding design and supply subcontract was won on the back of a two part bid and negotiate process. Our team was awarded the subcontract in late 2008 and the cladding was completed early 2010.

Stainless steel played a major role in the suite of materials used for the 'purpose designed component system' that attaches the perforated sheeting to the bowl wall. Situated but a few hundred metres from the Indian ocean in the warm and humid Durban environment; corrosion issues played a major role. High strength duplex steel (see explanation below) offered an excellent interface with the higher yield strengths playing a role in structural challenges. *(See picture 2)*

GENERAL ARRANGEMENT

A series of horizontal steel box beams collect a notionally vertically striated system of purpose designed protruding aluminium 'fins'. Each 'set' of fins stand proud between the large steel box columns to form discrete bays of cladding. Horizontal sheeting rails are connected between the fins, and the proprietary powder-coated standing seam sheeting system with a 60% open punch-perforated tray clips over proprietary extruded halters, and the tray seams are finally zipped tight together. *(See picture 3)*

The solidity of the primary reinforced concrete framework ends some 20m off the podium level, and hands over to prefabricated steel box columns, on spherical pins, that are tied together at the head with the bowl compression ring, also a fabricated steel box. The columns were temporary stabilised during the erection of the compression ring. Release of the columns, cable-net attachment and sequential tensioning of the tensile fabric roof structure made sure that the final static geometry of the bowl wall structures was not available for the cladding installation until at least the cable net was fully tensioned. Thus the cladding attachment system had to be a component based Lego-set. *(See picture 4)*

UNDERSTANDING THE STATIC GEOMETRY

The geometry of the bowl surface describes what can be loosely termed as a 'ruled surface', singly curved. As such the surface can be populated by a series of straight lines. From the North and South ends the vertical surface starts to rake outwards as the top edge rises. The outward lean achieves a maximum of 30 degrees in association with the maximum height of 40m at the East and West.

Closer inspection reveals a varying warp effect in each bay, which within the global geometry is handed and reflected, making some 50 differently warped


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bays repeat only three times each. It soon became clear that the connection complexity would lead the design effort. *(See picture 5)*

Another look reveals the architects' desire to vary the set angle of the vertical fins in sympathy with the circulating column axes as the bowl sweeps around the 800m circumference. This means that the fins are skew to some degree in each bay, and any thoughts of traditional linear bracketry were finally left behind.

...AND IT MUST BE ABLE TO MOVE!

The wind loading forces on any lightweight large structure are significant, no less the effect on the Moses Mabhida Stadium. As the wind forces gather pattern around the bowl, the compression ring 'breathes' and flexes. Differential pressures on the fabric roof apply varied forces through the pull-up tendons, causing deflection of the arch in sympathy. The columns supporting the compression ring are pinned in a way which allows them to spherically rotate at the base.

The end effect is a design requirement for the cladded bays below the compression ring to sway and rack in service. At the design case 50-year return wind loading, this relates to a 300mm vector shift at the top of the columns (some 22m high).

SYSTEM DEVELOPMENT

Warp, rake and rack... The only generic model that comes to mind is ball-and-socket: similar to car tow-hitches and roll-on deodorants. Sometimes the best seeds of engineering concept are drawn from everyday life. *(See picture 6)*

The primary connection component for the unique system was a machined and fabricated stainless steel ball with a single hole. Over 2 000


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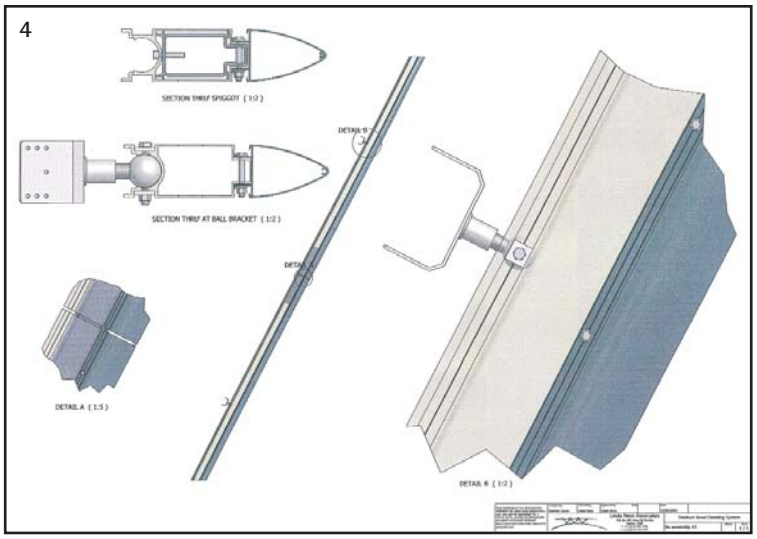
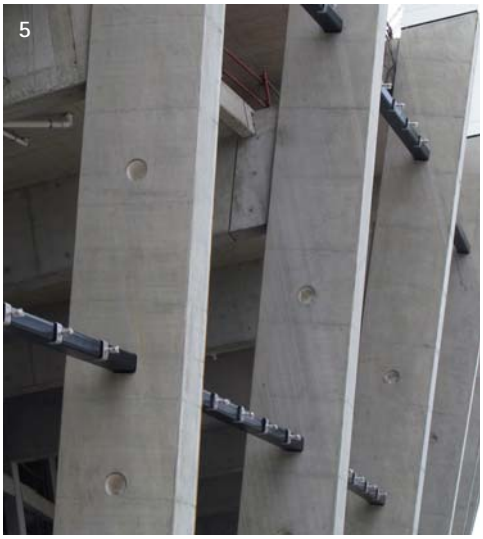




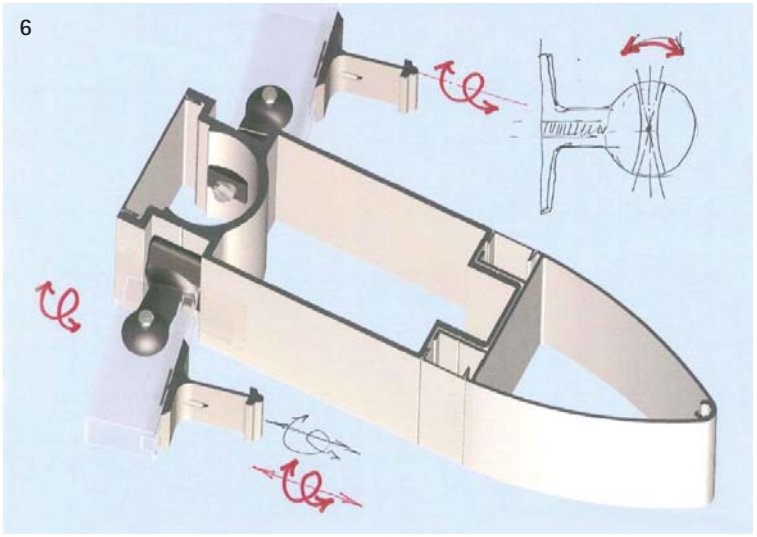
of these identically manufactured brackets slipped down the spines of the purpose designed aluminium fins, absorbing all of the raking and warping variations and bracketing the interface tolerances. The only two variations that evolved during design optimisation were variations in the fixing arrangements and plate thicknesses (rational design for varying wind loads up the height of the bowl.)

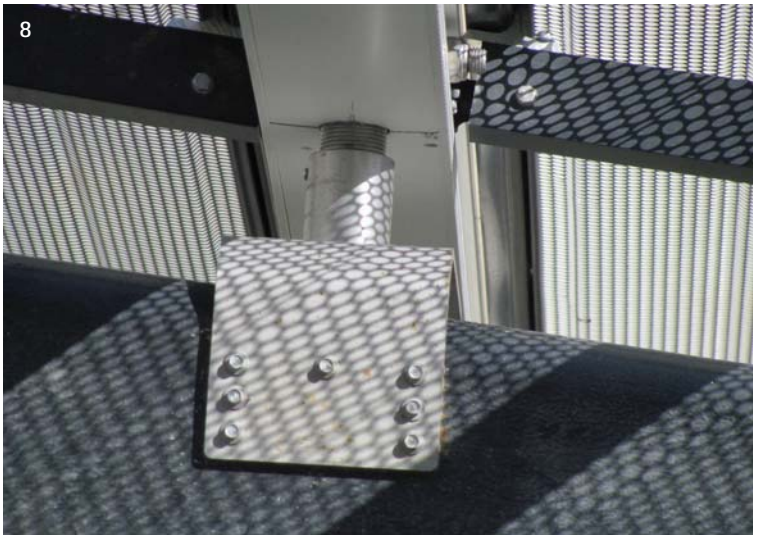
The Grade 316 machined ball is welded to a machine-threaded solid stalk, also grade 316, which allowed for half thread pitch adjustments out of the theoretical set plane during erection, and provided rotational release on elevation for each fin during racking motion – this eliminated lateral bending stresses in the fin extrusions.

The internally threaded ferrule is welded to a bent from plate 2101 Grade duplex steel channel. (Ed: This is an unknown material to the average steel structures person in South Africa. It differs from 316 stainless in that it has a third more carbon, more than double the manganese, 20% more chrome, 85% less Nickel and only 5% of the Molybdenum. It has a slightly higher Pitting resistance equivalent. What is impressive is that the yield strength is more than double that of 316 and the tensile strength is 30% higher and yet still has 30% elongation. So the material (developed by Outokompo) is pretty cost effective.) The channel slipped over the face of the support cold formed square hollow section beams. Allowance had to be made for both tolerance in the face dimension of the hollow sections, and tolerance to accommodate its final erected position. Unexpected rotation tolerances were excluded since the ball could be rotated in the fin extrusion!

Finally, the variation in the set angle of the fin to the support box beams was simply taken by the ability to rotate the channel about a vertical axis, on the box beam. *(See picture 7)*

The channel is fixed to the box beam with a designed arrangement of grade 316 stainless steel Tek screws. These were supplied with hardened steel drilling tips. Once aligned, the Tek screws used pre-laser cut holes in the channels as a guide

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to drill straight through the hollow section beams (in-situ). Full size mock-ups were load tested to investigate / confirm calculated Tek-screw groups for shear strengths and to determine any possible redundancy.

The setting out and fixing of the ball brackets was the absolute benchmark for the success of the system, there was no time for errors, rethinking or recycling. A common digital interface 3D model of the bowl structures was used by all consultants.

A centrally positioned Tek, the so called 'swivel Tek' on each bracket was located on the digital model, translated by a specialist land-surveyor to a physical point on the support box beam. Interface tolerances were checked, the ball bracket was slipped onto the box and the 'swivel Tek' installed. A digital inclinometer was used to set the pre-calculated and scheduled rotation angle for the bracket, and the balance of teks installed. Gaps were epoxied. *(See picture 8)*

The ball was screwed into position, and the fins threaded through, with site drilling through the extrusion to fit the single connection bolt through each ball completing the connection.

moses mabhida façade team

Façade engineer	Linda Ness Associates cc
Façade contractor	Façade Solutions cc
Specialist analysts	Endurasim (Pty) Ltd
Specialist drafting	Cladline cc
Steel fabricator	Rebcon Engineering (Pty) Ltd
Injection moulders	Extreme Manufacturers cc
Extrusion suppliers	Wispeco (Pty) Ltd Aluminium
	Fujian Nanping Aluminium Co. Ltd
Sheeting Contractor	MJ Cheetah and Co. (Pty)Ltd
Sheeting Supplier	Hulamin (Pty) Ltd Roofing Solutions

STEEL PRODUCERS

ArcelorMittal South Africa
Representative: Charles Dednam
Tel: (016) 889 9111 Fax: (016) 889 5668
charles.dednam@arcelormittal.com
www.arcelormittal.com

Davsteel (Pty) Ltd
Representative: Coen Otto
Tel: (016) 980 2121 Fax: (016) 988 3760
ottoc@capegate.co.za
www.capegate.co.za

Scaw Metals Group
Representative: Chris Booysen
Tel: (011) 842 9364 Fax: (011) 842 9705
millsales@scaw.co.za
www.scaw.co.za

STEELWORK CONTRACTORS

Eastern Cape

Project Services
Representative: Arthur R White
Tel: (041) 452 2151 Fax: (041) 456 1121
arthur.w@projectservices.co.za

Gauteng

A Leita Steel Construction (Pty) Ltd*
Representative: Claudio J Leita
Tel: (012) 803 7520 Fax: (012) 803 4360
claudio@aleita.co.za
www.aleita.co.za

Bessemer (Pty) Ltd
Representative: Fritz Hoogendyk
Tel: (011) 762 5341 Fax: (011) 762 5345
bessemer@iafrica.com

Betterect (Pty) Ltd
Representative: Thomas Siebert
Tel: (011) 762 5203 Fax: (011) 762 5286
betterect@betterect.co.za
www.betterect.com

Boksan Projects cc
Representative: L Boksan
Tel: (011) 316 2172 Fax: (011) 316 1645
laszlo@boksan.co.za

Branch Engineering (Pty) Ltd*
Representative: Shannon Van Den Heuwel
Tel: (011) 493 1197 Fax: (011) 493 7884
shannon@branchengineering.co.za

Cadcon (Pty) Ltd
Representative: Richard Butler
Tel: (012) 664 6140 Fax: (012) 664 6166
richbutler@cadcon.co.za
www.cadcon.co.za

Carbon Steel Fabricators
Representative: Gerhard Van Zyl
Tel: 011 762 5209 Fax: 011 762 7723
gerhard.vanzyl@vbvholdings.com
www.vbvholdings.com

Central Welding Works
Representative: Stephen Horwitz
Tel: (012) 327 1718 Fax: (012) 327 1727
stephen@cwwpta.co.za

CIS Engineering (Pty) Ltd
Representative: Christo Marais
Tel: (016) 422 0082 Fax: (016) 422 0975
christo@cisengineering.co.za
www.cisengineering.co.za

Concor Engineering*
(a Division of Concor Holdings (Pty) Ltd)
Representative: Jean Charoux
Tel: (011) 249 7800 Fax: (011) 249 7984
jcharoux@concor.co.za
www.concor.co.za

Cosira International (SA)*
Representative: John da Silva
Tel: (011) 626 2317 Fax: (011) 626 2917
john.dasilva@cosiragroup.com
www.cosiragroup.com

DSE Structural Engineers & Contractors*
Representative: Kobus Marais
Tel: (011) 871 4111 Fax: (011) 871 4141
kmarais@grinaker-lta.co.za
www.dse.co.za

Fabricated Piping Systems SA (Pty) Ltd
Representative: Craig Fyall
Tel: (011) 828 4388 Fax: (011) 828 2147
craig@fabpipe.co.za

Ferro Eleganza (Pty) Ltd
Representative: Chris Narboneses
Tel: (012) 803 8035 Fax: (012) 803 5645
chris@ferroe.co.za
www.ferroe.co.za

Genrec Engineering (Pty) Ltd*
Representative: Michael Mamotte
Tel: (011) 876 2300 Fax: (011) 827 1733
michael.mamotte@murrob.com
www.genreceng.com

Impact Engineering Gauteng cc
Representative: Robert Mylroie
Tel: (011) 818 1343 Fax: (011) 818 4330
robmyl@webmail.co.za

IVMA Engineering cc
Representative: Mauro Munaretto
Tel: (011) 814 3124 Fax: (011) 814 1505
ivma@ivma.co.za
www.ivma.co.za

Khombanani Steel (Pty) Ltd
Representative: Tim Tasioulas
Tel: (011) 975 0647 Fax: (011) 970 1694
accounts@khombanani.co.za

L & D Contracting cc
Representative: Donald Koertzen
Tel: (011) 786 2429 Fax: 0865 082 543
donaldk@icon.co.za
www.ldc.co.za

Linrose Engineering Gauteng (Pty) Ltd*
Representative: Jorge Pereira
Tel: (011) 827 0314 Fax: (011) 827 0878
linrose@icon.co.za
www.linrose.co.za

Louwill Engineering cc
Representative: Deon Kotzé
Tel: (011) 818 5186 Fax: (011) 818 5185
deon@louwill.co.za

MAC Engineering cc
Representative: Mino Carniel
Tel: (011) 814 1834 Fax: (011) 814 6620
maceng@maceng.co.za
www.maceng.co.za

Magnet Engineering (Pty) Ltd
Representative: Paul G Catalo
Tel: (011) 908 3500 Fax: (011) 908 2723
paulocatalo@snet.co.ao

Malitech Engineering
Representative: Sipho Malinga
Tel: (016) 931 2069
smalinga@malitech.co.za
www.malitech.co.za

Mfana Projects cc
Representative: Henry Schoeman
Tel: (011) 900 2489 Fax: (011) 900 2328
henrys@netactive.co.za

Midvaal Structures (Pty) Ltd
Representative: Christo Van Dyk
Tel: (016) 365 5961 Fax: (016) 365 5951
christo@steelstructures.co.za
www.steelstructures.co.za

Moco Steel Engineering cc
Representative: Merlin Labuschagne
Tel: (011) 914 5608 Fax: (011) 914 5612
merlin@mocogroup.co.za
www.mocogroup.co.za

MPW Steel Construction (Pty) Ltd
Representative: Paolo Visentin
Tel: (011) 887 8430 Fax: 0866 856 543
paolo@sgiuricich.co.za

Nancy Engineering
Representative: Ricardo Adriano
Tel: (011) 493 1585 Fax: (011) 493 1564
nanceng@mweb.co.za

Nicholas Structures cc
Representative: Nico Venter
Tel: (016) 366 1605 Fax: 086 610 7993
info@nicholasstructures.co.za
www.nicholasstructures.co.za

Okirand Construction
Representative: Rowan Forte
Tel: (011) 463 1423 Fax: (011) 463 1240
rowan@okirand.co.za
www.okirand.co.za

Omni-Struct Nkosi (Pty) Ltd
Representative: Dave van Asche
Tel: (011) 474 9140 Fax: (011) 474 7487
dave@osn.co.za
www.omnistruct.co.za

Prospan Structures cc
Representative : David Paola
Tel: (011) 440 2116 Fax: (011) 440 2135
david@prospan.co.za
www.prospan.co.za

QM Steel cc
Representative : Quintin Venter
Tel: 011 864 7885 Fax: 086 594 2008
info@qmsteel.co.za
www.qmsteel.co.za

Renlyn Engineering
Representative : Willie Fourie
Tel: 011 757 1705 Fax: 011 757 1587
willie@renlyn.co.za
www.renlyn.co.za

SASSI Metal Innovations cc
Representative: Ignazio Plumari
Tel: (011) 795 4049 Fax: (011) 794 4684
info@sassi-biab.com

SE Steel Fabrication (Pty) Ltd
Representative: David J Essey
Tel: (011) 953 4584 Fax: (011) 660 5855
sesteel@icon.co.za

Sectional Poles (Pty) Ltd*
Representative: Phil M Koen
Tel: (012) 348 8660 Fax: (012) 348 9195
pkoen@sectionalpoles.co.za
www.sectionalpoles.co.za

Spiral Engineering cc
Representative: Colin Kirkland
Tel: (011) 474 9119 Fax: (011) 474 6528
colin@spiralengineering.co.za
www.spiralengineering.co.za

Steel Band Construction cc
Representative: Steven Smit
Tel: (011) 918 2454 Fax: (011) 918 3252
stevesmit@icon.co.za

Structa Technology (Pty) Ltd
Representative: Hercules Rossouw
Tel: (016) 362 9100 Fax: (016) 362 3608
hercules@structa.co.za
www.structa.co.za

Tass Engineering (Pty) Ltd
Representative: Tim Tasioulas
Tel: (011) 975 0647 Fax: (011) 970 1694
tim@tasseng.co.za

Tegmul Engineering (Pty) Ltd
Representative: Toby Esterhuizen
Tel: (016) 362 2007 Fax: (016) 362 1188
tobie@tegmul.co.za

Trentbridge Engineering cc
Representative: David Hunter
Tel: (016) 365 5327 Fax: (016) 365 5320
trentfab@intekom.co.za

Tudor Engineering & Draughting cc
Representative: Braam Beukes
Tel: (011) 914 5163 Fax: (011) 914 5165
hotah@nettron.co.za

Van Driel's Steel Construction
Representative: Robby van Driel
Tel: (016) 341 6102/5 Fax: (016) 341 6685
vdriel@mweb.co.za

Viva Steelfab Engineering (Pty) Ltd
Representative: Collen Gibbs
Tel: (011) 454 3405 Fax: (011) 454 5694
colleng@vivaeng.co.za

WBHO Services North
Representative: Andrew Breckenridge
Tel: (011) 265 4000 Fax : (011) 310 3578
andrewb@wbho.co.za
www.wbho.co.za

Free State

Engski Manufacturing (Pty) Ltd
Representative: Dawie van der Merwe
Tel: (016) 976 2592 Fax: (016) 976 0072
engski@mweb.co.za

KwaZulu-Natal

Avellini Bros (Pty) Ltd
Representative: Pietro Avellini
Tel: (031) 464 0421 Fax: (031) 464 0966
ravellini@iafrica.com

BNC Projects (Pty) Ltd
Representative: Sunthosh Balchund
Tel: (031) 902 3777 Fax: (031) 902 6798
balchunds@bncprojects.co.za
www.bncprojects.co.za

Churchyard & Umpleby*
Representative: Mark Ferreira
Tel: (031) 705 4008 Fax: (031) 705 5815
mark@candu.co.za
www.candu.co.za

Crimson Clover Trading 9 (Pty) Ltd*
Representative: James Pinnell
Tel: (033) 346 2555 Fax: (033) 346 1242
pinnell@sai.co.za

Impact Engineering*
Representative: Douglas Nidd
Tel: (032) 947 1054 Fax: (032) 947 2017
impact@saol.com

Ogilvie Engineering
Representative: Allan Olive
Tel: (031) 700 6489 Fax: (031) 700 6488
ogilvadmin@lantic.net

Pro-Spec Steel Structures
Representative: Tony Jugmohan
Tel: (033) 330 2295 Fax (033) 330 2295
tonyj@telkomsa.net

Rebcon Engineering (Pty) Ltd
Representative: Warren Butler
Tel: (031) 705 5851 Fax: (031) 705 5855
warren@rebcon.co.za
www.rebcon.co.za

Redfab Engineering cc
Representative: Jayram Reddy
Tel: (031) 463 1673 Fax: (031) 463 1659
redfab@iafrica.com

Robsteel Structures cc
Representative: Rob Drysdale
Tel: (032) 946 1922 Fax: (032) 946 2138
rob@robsteel.co.za

Mpumalanga

B&T Steel*
Representative: Trevor van Vuuren
Tel: (013) 665 1914 Fax: (013) 665 1881
marketing@btsteel.co.za
www.btsteel.co.za

Da Costa Construction Welding cc
Representative: Vivian Swart
Tel: 082 874 6374 Fax: (017) 647 6091
vivian@dcconstruction.co.za

Powerstation Engineering Services
Representative: Henro Pretorius
Tel: (017) 712-4837 Fax: (017) 712-4803
pse@pseservices.co.za
www.pseservices.co.za

Quality Steel
Representative: Andre D Potgieter
Tel: (013) 752 2723/4 Fax: (013) 752 2407
andre@qualitysteel.co.za
www.qualitysteel.co.za

Tecco Engineering cc
Representative: Neels Welsh
Tel: (013) 246 2261 Fax: (013) 246 2262
tecdraft@lantic.net

Tubular Technical Construct (Pty) Ltd
Representative: Jorge Bonifacio
Tel: (013) 690 2335 Fax: (013) 656 2408
jorge@tubular.co.za
www.tubular.co.za

Witbank Engineering
Representative: Flip J. Van Rensburg
Tel: (013) 690 1379 Fax: (013) 656 4920
weas-lc@mweb.co.za

North West

Rutherfords
Representative: Cecil Rutherford
Tel: (018) 293 3632 Fax: (018) 293 3634
cecilr@rutherfords.co.za
www.rutherfords.co.za

Western Cape

Inenzo Water (Pty) Ltd
Representative: Jan Cloete
Tel: (021) 948 6208 Fax: (021) 948 6210
jcloete@inenzo.com
www.inenzo.com

Konti Industries
Representative: Costa Kontopirakis
Tel: (021) 852 2559 Fax: (021) 852 3115
steel@jkpg.co.za
www.jkpg.co.za

Mazor Steel cc
Representative: Shlomo Mazor
Tel: (021) 556-1555 Fax: (021) 556-1575
judy@mazor.co.za
www.mazor.co.za

Prokon Services (Pty) Ltd
Representative: Martin Lotz
Tel: (021) 905 4448 Fax: (021) 905 4449
martin@prokonservices.co.za
www.prokonservices.co.za

Scott Steel Projects
Representative: Dave N Scott
Tel: (021) 671 3176 Fax: (021) 671 8736
dave@scottsteel.co.za

Union Structural Engineering Works
Representative: Mike N Papanicolaou
Tel: (021) 534 2251 Fax: (021) 534 6084
michael@unionsteel.co.za
www.unionsteel.co.za

DEVELOPING MEMBERS

Arctex cc
Representative: Lenin Kiviet
Tel: (011) 900 4136 Fax: (011) 900 1837
arctex@netactive.co.za

Bathehi Engineering (Pty) Ltd
Representative: Gregory Ramphore
Tel: (011) 452 7633 Fax: 0866 649 550
greg@bathehi.co.za

RSG Engineering
Representative: Rudzani Mposi
Tel: 073 191 8943 Fax: 086 525 5973
rsgengineerin@gmail.com

DAVCON Construction
Representative: David Nel
Tel: 012 658 5123
mwdalnel@mweb.co.za

Four Tops Engineering Services cc
Representative: Essau Motloung
Tel: 072 229 9128 Fax: 0866 911 619
fourtopseng@vodamail.co.za

Sach-Warr Construction cc
Representative: Kesavan Moonsamy
Tel: 083 283 6636 Fax: (011) 760 2595
sachwarr@polka.co.za

Spartan Metal Works
Representative: Kagiso Mokoka
Tel: 011 970 3410 Fax: 086 536 5986
kagisom@spartangroup.co.za
www.spartangroup.co.za

Zamani Engineering Services cc
Representative: David Nkosi
Tel: (013) 656 1978 Fax: (013) 656 1979
admin@zamaniengineering.co.za

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Representative: Leon Coetzee
Tel: (011) 876 4000 Fax: (011) 876 4014
phoenix1@argent.co.za
www.argent.co.za

Clotan Steel
Representative: Danie Joubert
Tel: (016) 986 8000
Fax: (016) 986 8050
daniej@clotansteel.co.za
www.clotansteel.co.za

General Profiling (Pty) Ltd
Representative: Gavin Poplak
Tel: (011) 839-2917 Fax: (011) 837-1617
sales@generalprofiling.co.za
www.generalprofiling.co.za

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Representative: Tony Windt
Tel: (011) 929-5000 Fax: (011) 929-5062
tonyw@kmg.co.za
www.kmg.co.za

Macsteel Service Centres SA (Pty) Ltd*
Representative: Dave Dawkshas
Tel: (011) 871-0000 Fax: (011) 824-4994
dave.dawkshas@macsteel.co.za
www.macsteel.co.za

Macsteel Trading Germiston South
Representative: Granville Rolfe
Tel: (011) 871-4677 Fax: (011) 871-4667
granville.rolfe@mactrading.co.za

Macsteel V R N
Representative: Mike Hall
Tel: (011) 861-5200 Fax: (011) 861-5203
Mike.Hall@vrn.co.za
www.vrnsteel.co.za

NJR Steel Holdings (Pty) Ltd
Representative: Michael Riley
Tel: (011) 477 5515 Fax: (011) 477 5550
mriley@njrsteel.co.za
www.njrsteel.co.za

Stewarts & Lloyds Holdings (Pty) Ltd
Representative: Ronnie Turner
Tel: (011) 553-8500 Fax: (011) 553-8510
ronniet@sltrading.co.za
www.stewartsandlloyds.co.za

Trident Steel (Pty) Ltd*
Representative: Alan van Rooyen
Tel: (011) 861-7111 Fax: (011) 865-2042
Tel: (011) 908-4686 Fax: (011) 864-7629
alan.vanrooyen@trident.co.za
www.trident.co.za

KwaZulu-Natal

BSI Steel Limited
Representative: Lee Daff
Tel: (033) 846 2222 Fax: (033) 846 2233
lee.daff@bsisteel.com
www.bsisteel.com

Macsteel Trading Durban
Representative: Paul Simpson
Tel: (031) 913-2600 Fax: (031) 902-2345
paul.simpson@mactrading.co.za

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Macsteel Trading Cape Town
Representative: Marinus Muilwijk
Tel: (021) 950-5500 Fax: (021) 950-5600
Marinus.muilwijk@mactrading.co.za

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Representative: Carl van Rooyen
Tel: (021) 534-3211 Fax: (021) 534-5890
carlvr@transcape.co.za
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Gauteng

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Representative: Rory Whelehan
Tel: (011) 914-4628 Fax: (011) 914-4748
augsteel@iafrica.com

Bolt & Engineering Distributors
Representative: Mike Giltrow
Tel: (011) 824-7500 Fax: (011) 824-0890
mike@bolteng.co.za
www.bolteng.co.za

Cavotec Gantrex (Pty) Ltd Group
Representative: Johann M Jankowitz
Tel: (011) 963-0015 Fax: (011) 963-0064
gantrex@netactive.co.za
www.cavotec.com

CBC Fasteners (Pty) Ltd
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Tel: (011) 767 0000 Fax: (011) 767 0150
rob@cbc.co.za
www.cbc.co.za

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Representative: Steve Van Wyk
Tel: (011) 872 1138 Fax: (011) 873 3066
stevev@firstcut.co.za
www.firstcut.co.za

Geo Stott & Co (Pty) Ltd*
Representative: Dennis Dedwith
Tel: (011) 474 9150 Fax: (011) 474 8267
dennis@geostott.co.za
www.geostott.co.za

Global Roofing Solutions (Pty) Ltd
Representative: Johan van der Westhuizen
Tel: (011) 898 2902 Fax: (011) 892 1455
johan@globalroofs.co.za
www.globalroofs.co.za

Grating World (Pty) Ltd
Representative: George Whittle
Tel: (011) 456 5250 Fax: (011) 452 2536
george@gratingworld.co.za
www.gratingworld.co.za

Horne Hydraulics cc
Representative: Bernadine Teessen
Tel: (011) 974 1004 Fax: (011) 392 5650
bernadine@horne.co.za
www.horne.co.za

Integrated Business Construction (IBC) International (Pty) Ltd
Representative: Vernon Lucas
Tel: (011) 425 3190 Fax: (011) 425 4308
vernonlucas@myconnection.co.za

Le Blanc Communications SA
Representative: William Brough
Tel: (011) 814 1404 Fax: (011) 814 1444
rosstan@worldonline.co.za
www.lightingstructures.co.za

Macsteel Roofing
Representative: Dennis White
Tel: (011) 878 7500 Fax: (011) 827 1890
dennis.white@macroofing.co.za

Macsteel Tube and Pipe
Representative: Peter Curr
Tel: (011) 897 2100 Fax: (011) 826 6333
peter.curr@mactube.co.za

Mentis Sales
Representative: Chris Green
Tel: (011) 255-3200 Fax: (011) 828-1463
cjgreen@mentis.co.za
www.mentis.co.za

MiTek Industries SA (Pty) Ltd
Representative: Richard Bailey
Tel: (011) 237 8700 Fax: (011) 314 3978
rbailey@mitek.co.za
www.mitek.co.za

Project Materials Southern Africa (Pty) Ltd
Representative: Nishal Sheoprosad
Tel: 082 567 2844 Fax: 086 605 7194
nishal.sheoprosad@pmpiping.com

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Representative: Adriaan Fourie
Tel: (011) 914 5103/4 Fax: (011) 914-5106
adriaan.fourie@stud-weld.com

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Tel: (011) 977 2029
francom@robor.co.za
www.robor.co.za

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Tel: (011) 608 4640/1 Fax: (011) 608 6443
ericw@robventind.co.za
www.robventind.co.za

Safintra (Pty) Ltd
Representative: Sarit Shah
Tel: 011 944 6800 Fax: 011 783 1128
sarit@safalgroup.com
www.safalgroup.com

Steel Fabrication Consultants & Allied Services
Representative: Alan Armitage
Tel: (011) 615-7240
Fax: (011) 615-8913
alan.armitage@mds-skills.co.za

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www.gratings.co.za

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Representative: Gandeloro Ruffini
Tel: (053) 313 1651 Fax: (053) 313 2081
info@rufco.co.za
www.rufco.co.za

Vonmeg Staalwerke cc
Representative: Jacques Goosen
Tel: (027) 712 2606 Fax: (027) 718 1015
vonmegbk@telkomsa.net

North West

Almec Manufacturing
Representative: Joan Basson
Tel: (018) 469 3202 Fax: (018) 469 3200
joanalmec@gds.co.za

PEL Construction
Representative: Ben Delport
Tel: (018) 469 3894 Fax: (018) 469 2783
ben@pel.co.za

WJ Engineering (Pty) Ltd
Representative: Bert J Werkman
Tel: (018) 294 3395 Fax: (018) 294 5472
bwerkman@wjengineering.co.za
www.wjengineering.co.za

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Representative: Nick VD Mescht
Tel: (011) 907 7364 Fax: (011) 869 9107
nickv@africacellular.co.za
www.africacellular.co.za

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Representative: Sava Savov
Tel: (011) 719 6000 Fax: (011) 444 5393
sava.savov@andrew.com
www.andrew.com

Babcock Ntuthuko Powerlines
Representative: Kevin Kane
Tel: (011) 739 8200 Fax: (011) 739 8201
kevin.kane@babcock.co.za
www.babcock.co.za

Tricom Structures cc
Representative: Udo Topka
Tel: (012) 803 0041 Fax: (012) 803 6040
udo@tricom1.co.za
www.tricom1.co.za

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Representative: Dave Fensham
Tel: (011) 974 8511 Fax: (011) 974 8510
mail@armco.co.za
www.armco.co.za

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Representative: Graeme Carr
Tel: (011) 951 4500 Fax: (011) 955 2841
gcarr@plascon.co.za
www.plascon.co.za

Bulldog Projects cc
Representative: Mike Book
Tel: (011) 827 4221 Fax: (011) 827 4561
mike@bulldogprojects.co.za
www.bulldogprojects.co.za

Hot Dip Galvanizers Association of SA
Representative: Terry Smith
Tel: (021) 797-4735
terry@hdgasa.org.za
www.hdgasa.org.za

Pyro-Cote cc
Representative: Trevor Miller
Tel: (011) 864 5205 Fax: (011) 908 6636
pyrocotejhb@pyrocote.co.za
www.pyrocote.co.za

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Uhambiso Consult (Pty) Ltd
Representative: Forbes Kamba
Tel: (041) 373 0180 Fax: (041) 373 0102
fkamba@uhambiso.co.za

Gauteng

Acecad Software Ltd
Representative: Paul Marais
Tel: 011 452 0811 Fax: 086 552 5129
p.marais@acecad.co.za
www.acecadsoftware.com

Aurecon*
Representative: Tomme Katranas
Tel: (012) 427-2470
Fax: (086) 607-7838
Tomme.Katranas@af.aurecongroup.com
www.aurecongroup.com

Arup (Pty) Ltd
Representative: Ric Snowden
Tel: (011) 997-9025
ric.snowden@arup.com
www.arup.com

Bateman Projects Limited
Representative: Kurt Waelbers
Tel: (011) 899-9111
Fax: (011) 899-2660
kurt.waelbers@batemanengineering.com
www.batemanengineering.com

Bigen Africa Services (Pty) Ltd
Representative: Johann Human
Tel: (012) 842 8751 Fax: (012) 843 9000
johann.human@bigenafrica.com
www.bigenafrica.com

BKS (Pty) Ltd*
Representative: Alwyn Truter
Tel: (012) 421 3500 Fax: (012) 421 3501
alwynt@bks.co.za
www.bks.co.za

Clearspan Structures (Pty) Ltd
Representative: Jeff Montjoie
Tel: (011) 823 2402 Fax: (011) 823 2582
jmo@clearspan.co.za
www.clearspan.co.za

DRA Mineral Projects
Representative: Leon Uys
Tel: (011) 202 8600 Fax: (011) 202 8807
luys@drasa.co.za
www.drasa.co.za

Fluor SA (Pty) Ltd
Representative: Carlo Zambon
Tel: (011) 233 3400 Fax: (011) 233 3522
carlo.zambon@fluor.com
www.fluor.com

Goba (Pty) Ltd
Representative: John Cowden
Tel: (011) 236 3300 Fax: (011) 807-8535
johnc@goba.co.za
www.goba.co.za

Group Five Projects (Pty) Ltd
Representative: Greg Heale
Tel: (011) 899 4697 Fax: (011) 918 2707
gheale@g5.co.za
www.g5.co.za

Hatch Africa (Pty) Ltd
Representative: Francois du Toit
Tel: (011) 239 5300 Fax: (011) 239 5790
fdutoit@hatch.co.za
www.hatch.co.za

Holley and Associates cc
Representative: David Haines
Tel: (011) 803 1159 Fax: (011) 803 0970
david@holleyassociates.com
www.holleyassociates.com

Pollock Williams James & Partners cc
Representative: Tim James
Tel: (011) 679 2282 Fax: (011) 679 384
pwp@iafrica.com

Roymec (Pty) Ltd
Representative: Malcolm Royal
Tel: (011) 804 5123 Fax: (011) 804 5185
malcolm.royal@roymec.co.za
www.roymec.co.za

SH Services
Representative: Simon Du Toit
Tel: (011) 918 1991 Fax: (011) 918 1994
shsccs@global.co.za

SRK Consulting (Pty) Ltd
Representative: Jaya Omar
Tel: (011) 441-1111
Fax: (011) 880 8086
jomar@srk.co.za
www.srk.co.za

TWP Consulting (Pty) Ltd
Representative: Mushir Khan
Tel: (086) 123-1542 Fax: (011) 356 7500
mkhan@twp.co.za
www.twp.co.za

Walker Ahier Holtzhausen (WAH) Engineering Consultants cc
Representative: Graham Cross
Tel: (011) 888 2150 Fax: (011) 888 2296
grahamc@waheng.co.za

WSP Group of Companies (LC Consulting)
Representative: John Truter
Tel: (011) 300-6000 Fax: (011) 361 1595
john.truter@wspgroup.co.za
www.wspgroup.co.za

KwaZulu-Natal

Cousins Steel International
Representative: Adam Oldfield
Tel: (031) 312 0992 Fax: (031) 303 5299
adam@cousinssteel.co.za
www.cousinssteel.co.za

Gavin R Brown & Associates
Representative: Gavin R Brown
Tel: (031) 202 5703 Fax: (031) 202 5708
gavbrown@global.co.za
www.gavbrown.co.za

WSP Structures Africa (Pty) Ltd (KZN)
Representative: Deon Du Plessis
Tel: (031) 240 8950 Fax: (031) 240 8951
deon.duplessis@wspgroup.co.za

Young & Satharia Structural & Civil Eng
Representative: Rob Young
Tel: (031) 207 7252 Fax: (031) 207 7259
rob@yands.co.za
www.yands.co.za

Mpumalanga

Ijubane Projects (Pty) Ltd
Representative: Kobus Badenhorst
Tel: (013) 243 4390 Fax: (013) 243 5005
kobus@glps.co.za
www.glps.co.za

Lategan Bouwer Civil & Structural Engineers
Representative: Anton Van Dyk
Tel: (017) 634 4150 Fax: (017) 634 4188
avandyk@latbou.co.za
www.latbou.co.za

Neda Engineering Group
Representative: David Naude
Tel: (013) 755 4093 Fax: (013) 755 4094
davidn@neda.co.za
www.neda.co.za

Western Cape

ASCH Professional Services (Pty) Ltd
Representative: Anwar Davids
Tel: (021) 418 4988 Fax: (021) 419 5187
adavids@asch.com
www.asch.com

Bergstan South Africa
Representative: Alan Davies
Tel: (021) 487 4900 Fax: (021) 424 7653
alan@bergstan.co.za
www.bergstan.co.za

Kwezi V3 Consulting Engineers
Representative: Pravesh Naidoo
Tel: (021) 912 3000 Fax: (021) 913 3222
pnaidoo@kv3.co.za
www.kv3.co.za

Mondo Cane cc
Representative: Rob Chalmers
Tel: (021) 852 2447 Fax: (021) 852 2447
rob@mondocane.co.za
www.mondocane.co.za

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Representative: John Anderson
Tel: (021) 417 2900 Fax: (021) 417 2999
andersonj@velavke.co.za
www.velavke.co.za

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Representative: Geoff Krige
Tel: (011) 638 2061 Fax: (011) 638 4636
gkrige@anglotechnical.co.za

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Representative: Pieter Van Heerden
Tel: (017) 614 5033 Fax: (011) 522 2691
pieterschalk.vanheerden@sasol.com
www.sasol.com

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Tel: (011) 681 2252 Fax: (011) 680 1810
mbotes@grinaker-lta.co.za
www.grinaker-lta.co.za

Skotia International Metals Limited
Representative: Richard Calveley
Scotland
Tel: 0044 189 980 8650 Fax: 0044 189 922 1683
r.calveley@skotiametals.com
www.skotiametals.com

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Tel: 011 794 5299 Fax: 011 794 2844
kyle@tracesol.co.za

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hannes.basson@arcelormittal.com
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Tel 011 345 5300
andre.schlunz@za.bpb.com
www.bpbsa.com

Brits Nonwoven
Producer of insulation products
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Tel 082 453 7977
alberth@brits.co.za
www.isotherm.co.za

Group Five Manufacturing (Everite)
Producer of fibre cement board
Annemarie Robertson
Tel 011 903 8049
arobertson@g5.co.za
www.everite.co.za

Saint Gobain - Isover
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Tel 011 360 8200
Andrew.Scott@isover.co.za
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Tel 011 917 2110
mohamed@avlock.co.za
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Du Pont de Nemours
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Tel 012 683-5607
langalakhe.nxumalo@zaf.dupont.com
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Kare Industrial Suppliers
Distributor of fasteners
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Tel 011 941 3170
reitze@kare.co.za
www.kare.co.za

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Leon Bekker
Tel 021 933 0052
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www.ufcc.co.za

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ncm@cicapglobal.co.za
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Brandon Harding
Tel 031 713 6571
brandon@dezzo.co.za
www.dezzoroofing.co.za

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Patrick Swanepoel
Tel 031 713 0737
patrick@stedonehazycrest.co.za
www.stedonehazycrest.co.za

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richard@mitek.co.za
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Johan Marais
Tel 082 450 0086
johan@steelframe.co.za
www.steelframe.co.za

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vernon@silver-falcon.co.za

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Tel 051 446 0218
info@siteform.co.za

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Profiler and assembler
Brent Harris
Tel 011 397 8742
brent@velasbs.co.za
www.velasbs.co.za

MANUFACTURERS

Inno Steel
Profiler and assembler
Len Lategan
Tel 011 794 5436
info@innosteel.co.za

InProfile 2000 P/L
Profiler and assembler
Wolfgang Neumann
Tel 011 908 1903
wolfien@mweb.co.za
www.inprofile2000.co.za

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Profiler, assembler and builder
Frede Van Zyl
Tel 044 695 0237
info@steelframemosbay.co.za
www.steelframemosbay.co.za

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Graham Smith
Tel 082 801 5346
graham@steelteksystems.co.za
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danie j@clotansteel.co.za
www.clotansteel.co.za

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www.clydesteel.com

Global Innovative Building Systems
Distributor of cladding and insulation materials
Tammy Bywater
Tel 011 903 7080
tammy@gissa.co.za
www.gissa.co.za

Global Specialised Systems KZN (Pty) Ltd
Distribute and manufacture insulations products and ducted air cons
Carole Tomkinson
Tel 031 468 1234
carole@globaldbn.co.za
www.globalsystems.co.za

Howick Ltd
Distribute and manufacture specialized roll forming machine
Craige During
Tel +64 09 534 5569 / 072 137 7865 / 083 547 9930
info@howickltd.com
www.howickltd.com

Metal Rollforming SA
Distributor of LSFB equipment
Dirk Moolman
Tel 028 316 1291
sales@metalrollformingsa.com
www.metalrollformingsa.com

Proroof Steel Merchants
Steel service centre
Charles Domingo
Tel 016 450 5800
charles@proroof.co.za
www.proroof.co.za

Scottsdale
Distributor of LSFB equipment
Steve Cullender
Tel 011 486 4195
scottsdale_sa@global.co.za
www.scottsdale.co.nz

DESIGN CONSULTANTS

AMS Civil & Structural Consultants
Structural design engineer
Anna-Marie Sassenberg
Tel 058 303 7223
ams@isat.co.za

By Design
Structural engineer
Barend Oosthuizen
Tel 021 883 3280
barend@bydesign.org.za

CG Structural Design Services
Structural engineer
Cassie Grobler
Tel 011 472 4476
cassie@cgsds.co.za

Entity Engineering
Structural engineer
Andrew Bull
Tel 011 462 8564
entity1@mweb.co.za

Hull Consulting Engineers
Structural engineer
Mike Hull
Tel 011 468 3447
hull@iafrica.com

Martin & Associates
Structural design engineer
Ian Upton
Tel 031 266 0755
ibu@martinjw.co.za

Molapo Projects
Structural engineer
Gert Visser
Tel 016 933 0195
gert@molapo.biz
www.molapo.biz

ASSOCIATE MEMBERS

AAAMSA Group
Promotion of fenestration, insulation and ceiling systems
Hans Schefferlie
Tel 011 805 5002
aaamsa@iafrica.com

CSIR (Built Environment)
National building research institute
Llewellyn Van Wyk
Tel 012 841 2677
lvwyk@csir.co.za
www.csir.co.za

FrameCAD Solutions Limited
Develop and supply end to end LSF
Matthew Day
Tel 00 649 307 0411
md@framecadsolutions.com
www.framecadsolutions.com

HDGASA
Promotion of hot dip galvanized steel sheet
Terry Smith
Tel 011 456 7960
terry@hdgasa.org.za
www. hdgasa.org.za

IZASA
Promotion of the use of zinc
Rob White
Tel 083 456 4989
robwhite@icon.co.za
www.izasa.org

European Light Steel Construction Association (LSK)
www.easysteel.info

National Association for Steel framed housing Australia
Ken Watson
kwatson@nash.asn.au
www.nash.asn.au

Pretoria Institute for Architecture
Institute for architects
Maureen Van Wyk
Tel 012 341 3204
admin.pia@saia.org.za
www.saia.org.za

Standard Bank
Provider of home loans
Johann Strydom
Tel 011 631 5977
Johanjj.strydom@standardbank.co.za

University of the Witwatersrand, School of Mechanical Engineering
Educational
Kamil Midor
Tel 011 717 7358
Kamil.midor@wits.ac.za

BUILDING INDUSTRY

AC Group Holdings (Pty) Ltd
LSFB construction, ceilings & partitions
Johan Stoltz
Tel 082 411 0247
0825683011@vodamail.co.za

AMC Land Developments
Developer and builder
Trevor Abrahams
Tel 021 761 6943
trevora@amcld.co.za
www.amcld.co.za

Big Rigging Crew
LSF building
Henry Robinson
Tel 082 898 7693
henryr1@telkomsa.net

Blue Sands Trading 437 cc
Construction and Manufacture wooden roof trusses, timber decks and solid doors
Pieter Scheepers
Tel 014 717 3600
pieter@foreverwood.co.za
www.foreverwood.co.za

Brainwave Projects 1726 cc
Builder of LSFB
Thami Khanyile
Tel 031 267 2468
thamik@bwproject.co.za
www.bwproject.co.za

Bruün Agencies t/a Eticon Construction
Builder of LSFB and renovations
Wayne Bruün
Tel 083 260 4339
lsfb@eticon.co.za
www. eticon.co.za

Castle Projects & Consultants
Builder of LSFB and project management
Rob Castle
Tel 032 946 2787
rob@castleprojects.co.za
www.castleprojects.co.za

Chad Construction
Builder of LSFB
Anton Coetzee
Tel 082 715 9411
Anton@chadcon.co.za
www.chadcon.co.za

Gecko Development Services
Developer and builder
Ryan Hesketh
Tel 083 324 5059
geckodevelopment@telkomsa.net
www.dirasteelhouses.com

Group Five Housing
Developer and builder
Paul Thiel
Tel 011 253 8833
pthiel@g5.co.za

SAFINTRA Building Solutions (Pty) Ltd
Construction/ production of LSFB
Patrick Swanepoel
Tel 031 702 9683
patricks@safintra.co.za
www.safintra-buildingsolutions.co.za

Shospec (Pty) Ltd
Shopfitting ceilings, partitions and shop fronts
Bjorn Kahler
Tel 033 386 0100
bjorn@shospec.co.za
www.shospec.co.za

Silverline Group
Developer & Construction
Charl Van Zyl
Tel 0861 001 177
charles@silverlinegroup.co.za
www.silverlinegroup.co.za

Sixbar Trading 819 cc
Construction
Wayne Barr
Tel 031 713 0737
wayne@stedonehazycrest.co.za

Steel Frame Projects
Builder of steel frame homes and trusses
Johan Venter
Tel 074 128 1840
johan@steelframeprojects.co.za
www.steelframeprojects.co.za

Steelworx Homes (Pty) Ltd
Residential builder
Keith van der Linde
Tel 011 465 2612
keithr@accoladepg.co.za

Tec Homes Construction (Pty) Ltd
Building / supply of LSFB
Schalk VD Walt
Tel 021 852 4237
schalk@techomes.co.za
www.techomes.co.za