steel CONSTRUCTION

Volume 35 No. 2 2011

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Steel builds community development projects

SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION

OFFICIAL JOURNAL OF THE SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION

EDITOR'S NOTE

The year has already ticked over to quarter past!

I was being a bit cynical about the 'green' trend in the first issue of 2011, but a way more positive trend which has grown in the past couple of years is the development of rural and underprivileged communities by government and business (big and small), and better still in a practical and sustainable manner.

Steel is playing a major role in building structures to provide communities with schools, bridges, public transport facilities and sports training facilities *(see page 24 to 27)*. We saw a number of these projects entered for Steel Awards 2010 and expect more for Steel Awards 2011. Without really scratching the surface I also sourced a number of good social investment initiatives that our own members are tackling in their closest communities in need *(see some of the stories on page 8)*.

Steel Awards 2011 promises to be a big party again, but now it is entry time! Enter your projects online, showcase them with your best photos (the photographer of one of your chosen photos can even win a prize!) and see what happens. We even created our own Facebook page to make it more fun and interactive. Needless to say we at the Institute are all on a steep learning curve on this one.

On the generation gap issue. Steel Construction has included a new feature to recognise those students in Engineering and Architecture that excel in steel related projects and in this way try to lower the median age of 'people featured in Steel Construction'...

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Zwelitsha Pedestrian Bridge
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INDUSTRY NEWS IN BRIEF

B&T STEEL PILOTS TB FEEDING SCHEME IN DELMAS

The document Tuberculosis *Strategic Plan for South Africa, 2007-2011* indicates, "South Africa is one of the 22 High Burden Countries that contribute approximately 80% of the total global burden of all TB cases." Moreover, that "South Africa has the seventh highest TB incidence in the world."

These statistics make anyone feel like any effort to help will be but a drop in the ocean. But the process of a nation's recovery has to start somewhere, and B&T Steel has committed to changing the lives of TB patients in Delmas.

B&T Steel 'adopted' the Dumat Clinic's TB unit in January 2011. As part of their commitment, B&T is feeding 42 TB patients with the fortified and highly praised miracle food, e'Pap, for the duration of 2011.

"As a company who cares for our staff members and for the wider community of Delmas, we feel honoured to be able to aid those in need at the Dumat Clinic," says Trevor van Vuuren, B&T Steel's CEO. "We have witnessed the effects of TB firsthand, and are now witnessing how lives are changing dramatically because of the correct treatment – in this case, e'Pap combined with the TB drug program. With good nutrition, patients are able to fight the disease more effectively and recover sooner."

e'Pap is a pre-cooked cereal fortified with 28 vitamins and minerals, which has a profound impact on malnourished people, especially children and the elderly. This super food, also referred to by many as 'white gold', was produced in Klerksdorp eleven years ago and is definitely seen as a miracle to those who use it, giving them a new lease on life.

B&T marketing manager, Bryan Wilken at the launch of their e'Pap campaign at the Dumat Clinic's TB unit.

B&T's initiative is endorsed and supported by The South African National Tuberculosis Association (SANTA), who hopes that other companies in Delmas – and across the country – will follow suit and adopt a TB clinic or an HIV/AIDS clinic.

IZASA SUPPORTS ZN AIR FOR RURAL POWER

The sustainability of rural communities within Africa is under threat. United Nations figures show that there is a global move to urban areas. As a result of the preference for better education and health services for their children there is a drift in Southern Africa towards urban centres. However, because of the low demand for

Zinc Air giving power to enable the development of cottage industry.

unskilled and semi-skilled workers, there is an increase in the development of concentrated squatter camps which become rife with crime and poverty. Thus people are forced away from rural communities due to poor service availability and find themselves in a new environment no better than the ones they left.

Much of Africa remains rural. A key reason for the poor living conditions in rural communities is the lack of access to power. In Malawi, it is estimated that in urban areas only 7% of the population have grid power and in the rural areas this falls to less than 1%. Even in South Africa, it is stated that there are 1.6m households that will not get electric power in the foreseeable future.

The lack of power ensures that sustainable communities cannot be built. With power, appropriate cottage industries can be started and a formal sector developed. In addition, the lack of access to education, highlighted as a key requirement for social upliftment, can be made possible through the use of remote education stations.

Recent developments in battery technology offer a route for community development rather than community migration. Zinc Air is new technology which provides for a light-weight battery system with sufficient power for a month for rural households. This could well be sufficient for the start of community upliftment and the zinc industry has facilitated pilot projects which could provide a huge opportunity to cement rural communities as permanent fixtures enabling the sound development of family life and preventing family break-up due to the breadwinners having to leave their community to seek employment. In 2008, AEDC, the South African company providing Zinc Air systems won the 2008 Energy Globe Award which is international recognition for the benefits and sustainability of the use zinc air in rural communities.

EXPANDED METAL STILL POPULAR CHOICE FOR SPECIFIERS

Few products can claim to be as versatile as expanded metal, largely as a result of the reliability, durability and economy represented by the simple idea of slitting and expanding a solid sheet of metal into a lattice of diamond-shaped meshes.

According to Elaine van Rooyen, marketing manager at Andrew Mentis, a myriad of applications are served by expanded metal because of its inherent structural integrity which is not compromised during the manufacturing process.

"During the manufacturing process no material is lost, and in fact the original sheet of metal can be expanded into anything up to ten times its original size. The result is a mesh which is considerably lighter than the equivalent area of the original piece of metal expanded," Van Rooyen says.

The expanding process creates a network of rigid strands which add strength, while allowing free passage of light and air. As the metal is expanded to an area longer than its original length it is lighter than the original equivalent mass used prior to expanding. The raised mesh or Mentex, as it is called, can be put through an additional process in which the raised meshes are flattened into the same plane as the sheet of metal expanded. This is known as Flatex.

With extensive experience in the various applications of expanded metal, Andrew Mentis manufactures both the raised and flattened meshes, and according to Van Rooyen the correct selection of the appropriate mesh depends on the application at hand.

Mentex and Flatex are available in a comprehensive range of sizes, mesh sizes and thicknesses and the fabrication of the expanded metal in any form is done with ease. The mesh can be bent, shaped to radii, angled or notched while maintaining its inherent rigidity. It is also available in various mesh sizes, from mini meshes with small openings of 1.4mm by 2mm, and with a thickness of 0.4mm, to larger meshes with 115mm x 300mm openings, and a thickness of 6mm.

Expanded metal offers structural integrity.

TEKLA GIVES PROFESSIONAL BIM APPLICATION FOR EVERYONE IN CONSTRUCTION

To make an impact on the construction industry, 3D modeling software provider Tekla is launching a new advanced application for building information model-based project communication and cooperation. Tekla BIMsight is ready for everyone in the industry to download and share over the internet for free. Now contractors, designers, architects, MEP detailers and fabricators can combine their models, check for clashes, and collaborate using new and unique BIM (Building Information Modeling) software.

Tekla BIMsight is a new collaboration tool that lets construction industry professionals step into the BIM process for free. This software application makes it easy to combine and understand 3D models created by different AEC disciplines with different software, to interpret the design intent, check for clashes, and comment and mark changes. Tekla BIMsight presents a centralised way to maintain and communicate shared construction information: project participants can see the big picture as well as every important detail in the same, illustrative and easy-to-grasp 3D model. Tekla BIMsight can be used throughout the workflow of construction, from the design phase of the building to its erection and site management.

"Tekla's mission is to drive the evolution to digital information modeling, multiplying our customers' potential to think and achieve big in their projects and businesses," explains Tekla Executive Vice President Risto Räty. "Understanding BIM as a centralised process rather than 'just a model' requires cooperation and goodwill between the construction disciplines. This is exactly what we want to achieve with the new Tekla BIMsight software, and our part of the goodwill is to distribute it for free for the whole industry to easily take into use."

Tekla BIMsight has been described as 'the missing link' BIM software application because it enables accurate and effective 3D building information model-based project collaboration and management for everyone in the industry. BIM-based way of working supports the modern requirements of sustainability and green building by optimising prefabrication and site management and enabling a paperless process. Accurate, model-based communication enables better constructability through finding,

reacting to and correcting possible design errors early before on-site construction. All this motivates people working in engineering and construction to centralise their data and to make requests for information accurately and efficiently through one shared application that presents the combined model of a whole construction project from every possible angle.

For more information please contact John Swallow or John Duncan at Cadex SA – info@CadexSA.com, telephone +27 11 463 1857 or +27 11 463 3641.

ROBOR ANSWERS LOCAL SCHOOL'S CALL FOR HELP

Steel tube and pipe manufacturer, Robor is continuing its commitment to improving educational facilities in its local community by offering long-term management, repair and maintenance assistance to Sizwe Secondary School in Elandsfontein.

Robor's recent corporate social responsibility initiatives highlight the company's growing focus on education development within the communities surrounding its main operations in the Isando and Elandsfontein areas. "Our contribution to the Klopper Park Primary School upgrade over the past few years has fuelled our passion for facilitating a positive change in this sector and we recently launched the Sizwe Secondary School project, which we are extremely excited about," says Robor Executive, Mike Heyns.

In desperate need of attention, the school building has broken windows, a leaking roof, inadequate gutters, poor ablution facilities and an insufficient number of classrooms. In addressing these issues, Robor hopes to engender a spirit of unity among the school's pupils and their parents.

In desperate need of repair, the school building receives a facelift thanks to Robor representatives, teachers, pupils and parents.

Without Robor's involvement, Headmaster Mandla Cele single-handedly made a considerable improvement to the attitude and morale of pupils, parents and teachers alike. By the time this enthusiastic and passionate leader, who enjoys the complete support of his staff, approached Robor for assistance, the company was only too glad to help.

On Saturday, 9 October 2010, Robor representatives, Sizwe Secondary School teachers, pupils and parents, as well as local community members joined forces to carry out maintenance tasks in the process of upgrading the school's facilities. All necessary materials, such as paint brushes and cleaning equipment, were proudly supplied by Robor. Refreshments for those hard at work were generously sponsored by the Klopper Park Spar.

Heyns and Robor CEO, Gordon Gilmer attended the event, as did senior engineering staff, including Head of Engineering Johan Scholtz, HR Executive Sundrie Naidoo, as well as her enthusiastic HR team.

Robor staff members feed the hungry team helping to repair Sizwe Secondary School.

SAISC COMMENT

By Dr Hennie de Clercq,
Executive Director, SAISC

There is, in my view, a series of things one should do to get on the improvement train. The first is to know where you stand in terms of international best practice and to be able to differentiate between what is outstanding, good, mediocre and pathetic.

WHERE DO YOU STAND?

The German economy is doing great, unlike most others in the developed world that are still suffering from the effects of the Great Recession. Their exports have grown to some 41% of GDP. Analysing how the Germans achieved this, the following factors stand out:

- The government has been careful to prevent the free spending environment that the Irish, the Spanish, the Americans and many others succumbed to.
- Companies have also cut expenses, except that they have been investing heavily in R&D.
- Relaxation of labour laws has led to a reduction in labour costs.
- German companies have concentrated on things where their quality could ensure that their products would be in demand. In fact, their exports to China grew by 45% in the first 10 months of 2010, which means that they could benefit from China's success.

We can but only hope that our government would take note of the German model; it is the government's job to create an environment that is conducive to the private sector making its contribution to the success of the country. But that does not mean we have to sit at home and wait for government, or use government's slackness as an excuse for our inactivity. Each company should try its utmost to do the following:

- Drive the cost of fabricating and erecting steelwork down. We must be globally competitive to be successful, even in our own country.
- Provide the best quality in every respect – technical quality of product, quality of service, reliability, speed, ability to handle modifications, etc.
- Innovate. There is a lot of space for new products, innovative packaging of services, creative business arrangements, new ways of doing things. This means investing time, effort and money into a conscious and active programme of innovation.
- Develop our human resource. Without top quality people, well trained and equipped, any company can have no hope of success.
- Invest in best practice plant, equipment and software, as has been done by many companies during recent years.

This list of things to do may make many people in our industry go lame at the knees. It requires a super-human performance from ordinary people who have their hands full running a company, getting new work and just keeping body and soul together. I am sure many would think: "nice of you to say; if but only you had any idea of how hard it is out there..." To that I can only admit that what I am suggesting is extremely demanding, but then if one wants to come out tops you have to achieve amazing things. Maybe the solution lies in recognising that one can achieve great things if you are not working alone.

There is, in my view, a series of things one should do to get on the improvement train. The first is to know where you stand in terms of international best practice and to be able to differentiate between what is outstanding, good, mediocre and pathetic. That means, in the first instance, to expose oneself to such practice. Get to see what others do, speak to others, listen to what people say in meetings, read, etc. Then look at your own business.

But it is also necessary to get an independent assessment and view of one's company. Besides the fact that one tends to look at your own things with a certain degree of bias, you may not even think of all the aspects you need to consider, or have access to how others perform in each field. Fortunately, the SAISC can now come to the assistance of its steel fabricator members: courtesy of the DTI and UNIDO (United Nations Industrial Development Organisation) we can offer a free benchmarking service to them. It is an offer almost too good to understand – your management only needs to put less than one day's effort into a workshop to provide all the relevant information to our consultant, and in return you get a report telling you exactly how you compare against others in the business, here and abroad. And everyone can feel safe that nobody else will get access to their information – confidentiality is assured. The feedback we received from companies that have already been benchmarked has been uniformly highly positive.

Maybe a reason for some companies being a bit reluctant to be benchmarked is that they know that it will most likely result in work for their management. And that is true: if you find out that there are things in your company that are not right you have little option to fix them (would look rather stupid not to). That can be a rather daunting thought; after all, I am sure senior managers of most companies in steel construction are already feeling a bit overextended doing their normal work. This is where I would suggest spending some money (remember you got the benchmarking for free) and getting somebody in to assist, especially when it comes to sorting out management systems and people. We have names of firms that can help on a very cost efficient basis, helping top management to decide what to do, getting the company organised, and assuring that all these nice things are not forgotten and go on the back burner the moment the next sizeable project comes in the front door.

It is my conviction that if many of the steel fabricators in South Africa go through the process of improvement to the point of reaching a level of real excellence, we will find ourselves in a much stronger position. As an institute we are working with government, also in collaboration with other industries, and we hope to achieve conditions that are really favourable to growth and success for our industry.

With all these things in place, we can have some hope of emulating Germany.

See page 18 for a progress report on the benchmarking programme.

CALENDAR OF EVENTS

ISCG NEW ZEALAND VISIT
28 March - 3 April 2011

DEADLINE FOR STEEL AWARDS 2011 ENTRIES
6 May 2011
Contact Reneé Pretorius at
011 726 6111 or renee@saisc.co.za

KALTENBACH IPS VISIT,
9 - 13 May 2011
Switzerland
For more info contact
spencer@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
http://www.aisc.org/eventdetail.aspx?id=16024

10TH INTERNATIONAL CONFERENCE ON STEEL, SPACE AND COMPOSITE STRUCTURES (SS11)
18 - 20 May, 2011,
North Cyprus, Turkey

THE CANADIAN INSTITUTE OF MINING, METALLURGY AND PETROLEUM'S 2011 CONFERENCE & EXHIBITION
22 - 25 May 2011
Montreal, Quebec
www.cim.org/montreal2011

SAISC BREAKFAST TALK
1 June 2011
Country Club Johannesburg

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

IT'S OFFICIAL!

THE SOUTH AFRICAN STRUCTURAL STEEL INDUSTRY COMPANIES ARE WORLD CLASS CONTENDERS!

By Kobus de Beer,
Industry Development Executive, SAISC

Not only is the average some 10% better than the comparison group of similar companies, but most of the participants are in the 'contenders' quadrant where good practice is matched with good performance using internationally tested measures.

The first results of the benchmarking exercise done amongst members of the SAISC were presented at a breakfast meeting on the 3rd of March 2011. The scatter-gram *(Diagram 1)* shows how the South Africans compare with similar industries throughout the world. Not only is the average some 10% better than the comparison group of similar companies, but most of the participants are in the 'contenders' quadrant where good practice is matched with good performance using internationally tested measures.

This exercise is being done in the interest of assisting individual companies to improve by comparing their own practices and performance in 50 different areas of the business with best practice worldwide. These confidential results are then used by management teams to identify areas of weakness or where performance can be improved - a sound base for problem solving or annual strategic planning and budgets.

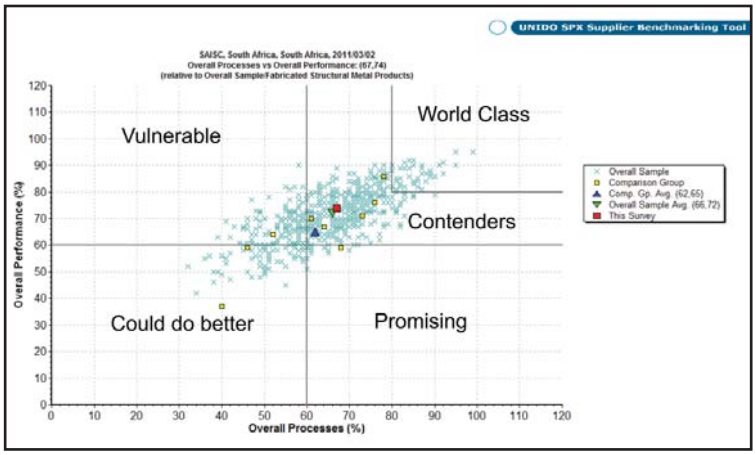
Says one of the participant member companies: "This exercise took five hours of our management teams' time and has given us a clear and balanced view of where we stand compared to the best in the world and specifically what we can do to get better. We have already booked for next year's session which will measure our progress during the year and also give us a basis for the next years' budget plans."

The United Nations Industrial Development Organisation (UNIDO) was commissioned to introduce this approach by the DTI and made contact with various industry associations. The SAISC responded positively and was one of the first registered SPX Centres (Subcontractor and Procurement Exchange Centre).

Mr. Mikkel Christiansen of Rheo Systems was contracted to conduct the benchmarking exercises with SAISC member companies and he reported on the overall results found in the industry.

Based on his observations he made the following comments:

- Prioritise long term competitiveness and establish structures to drive improvements.
- Be part of the industry and help make it stronger.
- You need to be organised to be flexible.
- People are still the ultimate driver of value in organisations.
- Labour productivity is the responsibility of management.
- Government intervention in international trade is temporary – for any government.
- The difference between good and bad cannot be estimated, but must be measured.



While no other organisation knows where your company sits on the graph, you know. This gives you an idea of exactly where your company is benchmarked against the best in the world.

Mondo Cané started with one man's journey ...

Rob Chalmers crossed borders and changed his career direction a few times to finally establish one of South Africa's few independent and successful draughting companies.

Generation Xers and Yers would be baffled by the strange name for a draugthing outfit, but the Baby Boomers will remember the slightly controversial Italian movie of the same name made in 1962. Translated to English as 'A Dog's World', the film consists of a series of travel stories or encounters that provide glimpses into cultural practices around the world. It started a new film genre that included the word 'Mondo' in their title to refer to their exploitative documentary value.

Rob's father's company was creatively named after the movie and Rob carried on with the tradition.

CORE BUSINESS

Mondo Cané is based in Cape Town but provides professional structural steel detailing and draughting services for clients throughout the world. They have over 20 years experience in the steel detailing industry and 23 years in the mining and construction industry.

In a nutshell they provide the following services:

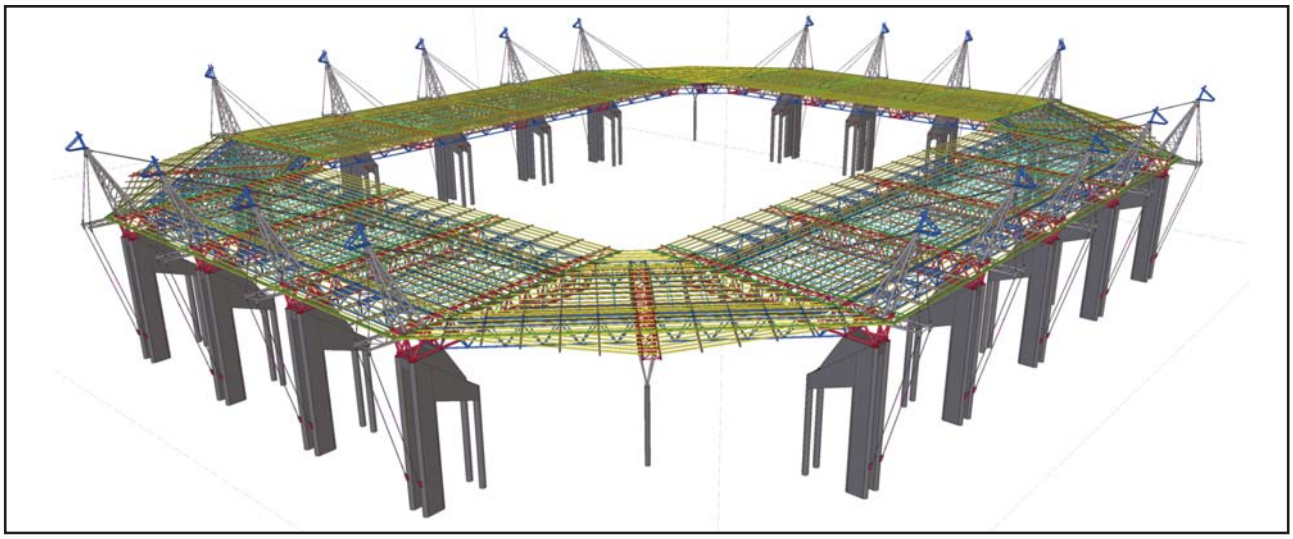
- Structural steel detailing and 3D modelling
- Clear fabrication/workshop drawings
- Detailed erection drawings
- Handrail schedules
- Decking and grating layouts
- Advanced bill of materials reports
- Electronic data for industry standard equipment
- Anchor bolt layouts
- Tekla Reviewer models

Rob Chalmers.

MONDO CANÉ

Mondo Cané is based in Cape Town but provides professional structural steel detailing and draughting services for clients throughout the world. They have over 20 years experience in the steel detailing industry and 23 years in the mining and construction industry.

The Mondo Cané team.



Mbombela Stadium.

FROM THE BEGINNING

The '23 years of experience' comes with a pretty interesting story. Rob grew up in Zimbabwe, starting out in the survey department at Jumbo Mine, Mazowe, he then opted to do a mining learnership and qualified as a hard rock miner. After his education he spent some time overseas and on his return to Zimbabwe, he met Mike Plunkett, a freelance draughtsman, who introduced him to detailing. Rob set himself up with a drawing board etc. and worked from home to assist Mike in drawing purlins and GAs. His interest in draughting took hold and due to his natural ability and mining background it was relatively easy for him to develop an understanding of and mastery in steel construction drawing.

Other mentors were Warren John and John Brownbridge, both well regarded in the Zimbabwean steel industry.

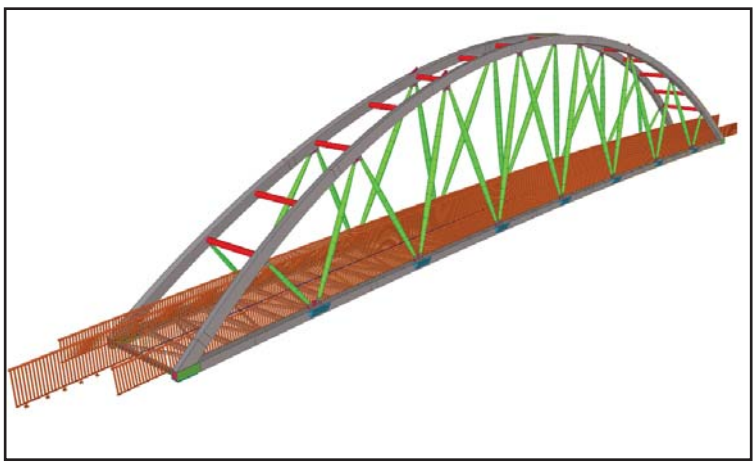
In 1993 he landed his first 'big' contract from Kerries Engineering, working on the Chinhoyi Hospital where he was responsible for the drawings of half of the 1200 tons of steel. While working on this project, he met John Ncube, a learner draughtsman and they became firm friends. It was around this time that Rob moved onto CAD and in 1994 bought his first AutoCad license.

After a short venture back into mining, retreating gold dumps, Rob made the decision to focus on his detailing business. By 1999 his one-man company was growing and the 'one man' could no longer sustain the business on his own so he looked up John Ncube, offered him a position which he accepted and they are still working together today.

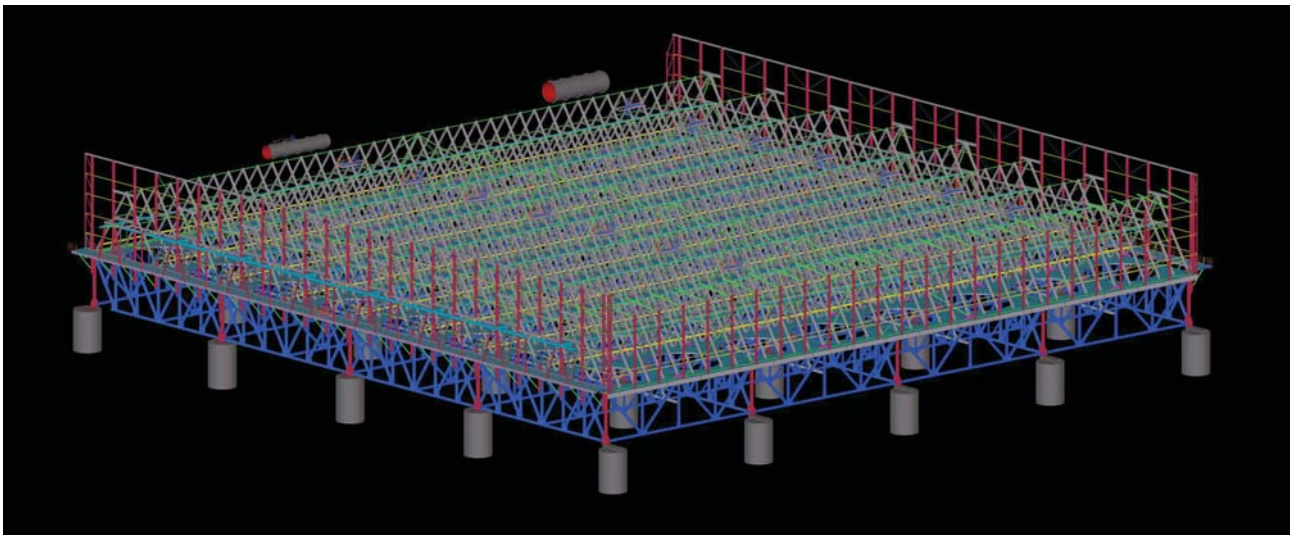
During this time he found that 2D CAD was limiting production and began looking into 3D detailing software. He saw an advertisement in Steel Construction for SteelCad 4.0 and called John Swallow who was marketing the software. Concluding this was the way to go, he bought one license with the assistance of his mother-in-law and Donovan Jones (Kerries Engineering). The economy in Zimbabwe began deteriorating rapidly by 2000 and Rob had to sell his car to finance the balance of the software!

He landed a few projects in South Africa and in 2001 decided to move his business and family to Johannesburg. Soon they were getting the bulk of their work from the mining sector and Rob's house became too small for his growing business, now running four Tekla workstations (SteelCad was bought out by Tekla in 1998). Mondo Cané moved to offices in Fountainebleau, which provided a more professional environment and room for expansion.

From 2006 to 2008 they had their share of the construction boom and worked on many infrastructure projects such as the ORTIA central terminal building and the Mbombela stadium.



Lynwood Bridge on the N1.



Air-cooled condenser structure, Medupi Power Station.

In early 2008 the company relocated to Somerset West in the Cape, as the nature of their work basically allows them to work from anywhere.

WHAT MAKES MONDO CANÉ WORK?

Mondo Cané has a unique offering to clients in the sense that they are a separate entity as opposed to a steelwork fabricator's in-house drawing office. They offer a complete draughting service, interfacing with engineer and fabricator. They mainly work with small to medium size fabricators and have worked on large projects all over the world. Their approach is to establish good long term relationships with their clients.

Mondo Cané also offers the capability of integrating their 3D design software with the various design and process management technologies used in the 'steel construction chain' to manage the flow of information: from receiving information from engineers, distributing it to fabricators to presenting to clients. The integration can be customised to the specific requirements of the client.

Training of young draughtsman is very important to Rob and he has trained most of his staff in-house to become specialised detailers even though some began their careers in various other industries. He is also a firm believer that young people should be mentored by experienced professionals since he had the opportunity and saw the value of working under esteemed engineers and draughtsman.

Rob believes that the success of a project depends largely on the involvement of the detail draughtsman at the earliest stage of the project design, to address connection issues, available sections and the practicality of design. Unfortunately the reality shows that the importance of structural steel detailing is far too often overlooked at this level, resulting in unnecessary delays and complications on many projects.

TWO (of many) SUCCESS STORIES

Mondo Cané was responsible for the detail draughting of the Mbombela Stadium and worked closely with the design engineers (Goba), fabricators (Cadcon/A.Leita JV) and connection design engineer (Johan Jonker) enabling them to meticulously plan the detailing and fabrication of the project.

Another success story *(aka How to successfully work with engineers from the Northern Hemisphere)* was their involvement in the Medupi Power Station, specifically the air-cooled condenser structure and related steelwork. They set up a meeting with the engineers in Germany right at the beginning of the project and were able to manage the expectations between European design and local fabrication and detailing procedures. They then produced a detailed 3D model and arrangements for one module to be reviewed and approved by both engineer and fabricator so that the whole team could agree on the method of construction before any shop drawings or fabrication was done.

This enabled them to make the process fabrication-friendly in terms of completing one unit, ironing out the issues and then doing the other five thus saving time and money.

Rob sees the SAISC as a good forum for detail draughtsmen since South Africa's industry is too small for a separate entity. He feels that engineers should utilise the Institute's information and advisory services since a concerning number of them make themselves guilty of poor and impractical design.

Mondo Cané has a number of mining projects in the pipeline and has recently moved to new larger premises.

THEIR NEW ADDRESS

Dynarc Triangle, 13 Urtel Crescent, Somerset Mall, Somerset West, 7130

STEEL BUILDS COMMUNITY DEVELOPMENT PROJECTS

Some of these projects were built specifically for the World Cup 2010 e.g. soccer training facilities, but with long term goals of developing the infrastructure around these stadiums, training the community, stimulating commerce, providing better sport facilities and most important of all instilling a sense of community pride.

Nike Football Training Centre, Soweto.

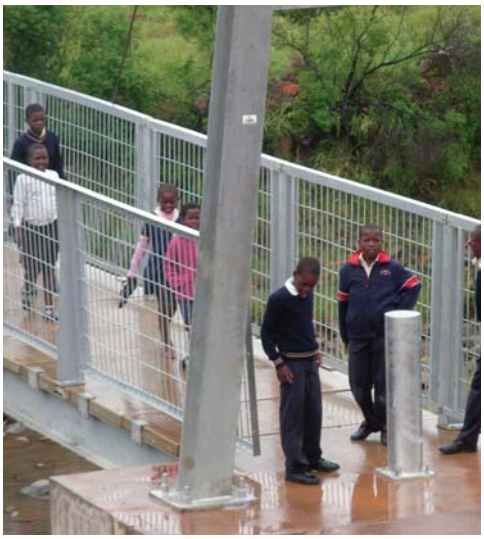
In 2010 the Steel Awards judging team saw many entries that were built in previously underdeveloped areas. Some of these areas were those 'forgotten' places that most privileged South Africans want to believe do not exist.

Quite a few of these projects were built specifically for the World Cup 2010 such as the soccer training facilities, but with long term goals in mind of developing the infrastructure around these stadiums, training the community, stimulating commerce, providing better sport facilities and most important of all instilling a sense of community pride. Other 'World Cup 2010' projects involved revamping transport systems and stations in places usually the last on the list to be upgraded.

Other projects were purely a solution to a rural community's problem like crossing a river or providing a modern school facility for children in Mamelodi.

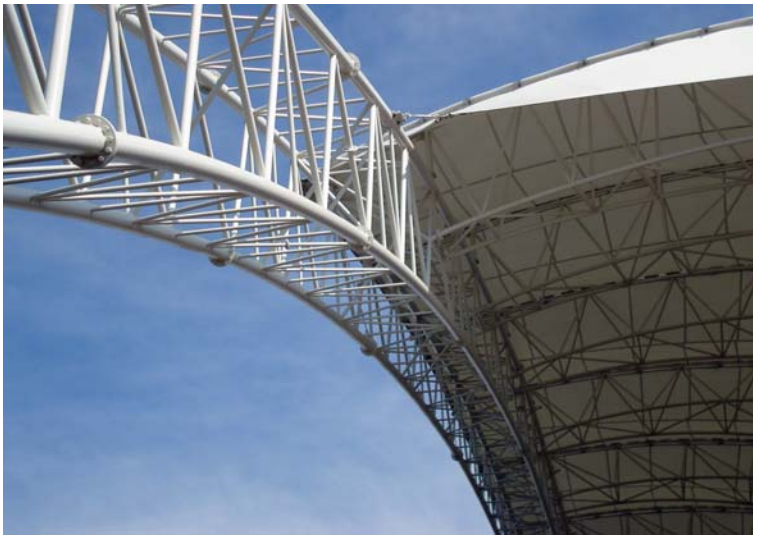
We hope that the judging team will receive more of these community development projects in 2011.

Here is a brief description of each of last year's community development entries:



Nsuze bridge, KwaZulu Natal.

Orlando Station, Soweto.



Sugar Ray Xulu Stadium.

Nike football training centre, Soweto

Giving young footballers access to high-end training facilities, football education and top-level coaching, the centre gives aspiring players the chance to train and feel like a pro. But it's not just about football; it's about education on and off the pitch.

Meetse-a-Bophelo primary school, Mamelodi.

This building is a two storey structure cut into the sloping bank to the south of the pitches. The part basement, lower ground floor includes additional changing facilities, storage areas and pitch access. The upper ground floor will be used for events, educational training, viewing matches as well as a 'chill' area for the

Rhodesfield Station.

Princess Magogo Stadium.

young football players. The roof structure functions as an open air match viewing area.

Nsuze bridge, KwaZulu Natal

This bridge is a solution for rural residents to cross the Nsuze River safely. The project team had to find a design, construction and erection method that could be built on a remote site and not require regular maintenance. So they chose a simple steel bridge design and galvanized it – and it looks nice too!

Orlando Station, Soweto

The station had to be revamped for the World Cup 2010 to get passengers on and off loaded near the Orlando stadium. Although the World Cup is something of the past, daily commuters now have a working station, big enough to accommodate everyone travelling through and pleasant enough to be proud of.

The structure applies pre-cast concrete and tubular steel roof trusses on tree like branch supports for the ideal solution.

Sugar Ray Xulu stadium

This training venue for the World Cup 2010 not only gave the design team an opportunity to upgrade an existing field in Claremont, Durban but also led to a general upgrade of the surrounding areas. The stadium becomes a landmark in the hilly area and provides a sports facility for the community long after FIFA has left.

Circular hollow section profiles are used throughout for the arch and for the trusses. The complex geometry for the waving tensile roof panels means each truss is different.

Meetse-a-Bophelo primary school, Mamelodi
(Winner: Community Development Category)

Part of ArcelorMittal SA's long term drive to build schools for communities the Meetse-a-Bophelo primary school had the pickings of AMSA's local and international technologies. The result has been a cost effective, quick, quality driven solution that could radically change to way schools are built in South Africa in the future.

Sinaba Stadium, Daveyton.

KZN Rural Suspension Bridges.

The proof is in the pride and enthusiasm of the kids. The school has been operating for more than a year now and there has not been one incident of vandalism at the school and all the desks are filled with happy learners. They also receive one balanced meal at the school daily.

Princess Magogo Stadium

Kwamashu had an existing soccer stadium for years, but it was not exactly something to be proud of. FIFA wanted to use it as a training facility for World Cup 2010 and now the project had an opportunity to leave a lasting legacy for the area.

The budget made for clever thinking so they kept the existing roof profile, but introduced some great architectural work, landscaping and structural changes.

The result is a stadium the whole community can be proud of and use for many years to come.

Rhodesfield Station

Another station upgrade for commuters used to the old and weathered one. The use of tubular steel gives the roof structure a light, airy and floating look.

Enormous 32-metre span lattice girders form not only a support for a side wall clad in glass, but is also a bridge support to cross the road linking the metro rail station with the Gautrain station.

Sinaba Stadium, Daveyton

Daveyton was not left out and their stadium was upgraded to a modest but neat 15 000 seat training stadium. The biggest advantage of this project was that the community supplied 70% of the labour to build the project.

The roof structure is a cable stayed structure with cellular beams combined to make the steel structure light, cost effective and with a lower overall weight when compared to a trussed solution.

KZN Rural Suspension Bridges
(Commendation: Community Development Category)

After heavy summer rains in KZN there are many rivers that come down in flood. This makes crossing dangerous and has resulted in sufficient incidents to have motivated KZN Transport to erect suspension bridges with a standardised design in numerous places.

These hot dip galvanized bridges are user friendly to erect in the most rural of areas.

A truly great community spirited project.

ZWELITSHA PEDESTRIAN BRIDGE, EAST LONDON

By John Anderson, Technical Director,
Vela VKE Consulting Engineers
incorporating Munyai Malaka Engineers

The bridge provides a safe crossing point for some 500 pedestrians who cross the Buffalo River each day. It provides access for the surrounding communities to schools, clinics and police services. It will also prevent the tragic drownings that have happened in the past.

INTRODUCTION

The Zwelitsha pedestrian bridge exemplifies the principle of "attractive structures at a reasonable cost". Built for R1 750 000 this striking 58m long and 1.5m wide rural footbridge was bolted together on site with minimal temporary works.

The standard stock of rural pedestrian bridges is U-frame steel truss bridges as they are considered the most economical option. Typically these structures are fabricated in sections that can be easily transported, handled and bolted together. Their construction on remote sites is therefore possible without the use of heavy equipment. The Zwelitsha pedestrian bridge project team took this concept and adapted it for an attractive cable stayed bridge.

PURPOSE OF THE BRIDGE

The bridge provides a safe crossing point for some 500 pedestrians who cross the Buffalo River each day. It provides access for the surrounding communities to schools, clinics and police services. It will also prevent the tragic drownings that have happened in the past.

DESIGN DEVELOPMENT

U-frame structural steel pratt trusses are often used in South Africa for pedestrian bridges in rural areas. In this case the client accepted a more attractive alternative, a three span cable stayed structure with a main span of 27m and back-spans of 17m.

The design had two main goals: The first was to create a cable stayed structure that could be built for a price comparable to that of a simple truss bridge; the second was to detail a durable, low maintenance structure that could be easily erected in a remote area.

The bridge design responds to the natural surrounds of the Buffalo River. Low towers with a limited amount of stays give the bridge an appropriate scale.

The steel towers are integral with the concrete piers. Their stiffness is relied upon to limit the deflection in the deck due to asymmetric pedestrian loading. The resulting high moments in the towers are transferred to the concrete pier bases that are dowelled into the river's rock bed.

The deck section floats independently of the towers and its longitudinal restraint is provided by the stays. This was the only alternative that maintained adequate tension forces in the stays during the thermal expansion and contraction of the deck. The resulting structural system is relatively complex. Parametric studies showed that as the stiffness of the beam increased so did the non-linear behaviour of the structure.

A key element in the detailing of the bridge was to restrict the length of the individual elements. Thus the sections were easy to handle on-site and could be galvanized. This allowed the specification of a 'duplex' paint system that will ensure the bridge requires minimal future maintenance. An important benefit of bolting the bridge together was that no on-site welding was required. This ensured that the galvanising was not damaged during the erection process.

All the bridge elements are commonly used standard sections such as H-section towers support stays that are constructed from standard steel flats. These stays connect with a simple spade and fork connection detail to the I-beams (356 x 171 x 45) used in the deck section. A simple handrail, fabricated into independent panels was bolted into place with sufficient tolerance to easily align it.

CONSTRUCTION

The erection process was quick and simple. Trestle towers supported the main beam during the installation of the stays. The concrete deck was then poured onto the permanent formwork. The stays were then stressed by the system's dead weight as the trestle towers were removed. The vertical alignment of the deck achieved by this simple construction method was very satisfactory, as shown in the photographs.

With the main piers located on either side of the river, the construction process had minimal environmental impact. The serviceability performance of the structure has been good, as predicted by the dynamic analysis.

CONCLUSION

The end result of this project is a satisfied client and a grateful local community. Without paying a premium, the client has a visually striking and durable bridge that reflects positively on the local municipality. The community has a structure that allows safe passage to essential services for themselves and their children. Although a small project, it was a rewarding one for all involved.

SOCIAL SNIPPETS

By Marlé Lötter,
Events Manager, SAISC

Sibusisiwe Mpofu achieved over 90% for her exam in the Steel Enlightenment course.

Students of Estimating Course of 2011.

Delegates at the Basics of Steel Course.

BASICS OF STEEL COURSE

9 February 2011, Protea Hotel OR Tambo

On popular demand the SAISC has offered a course on the Basics of Steel annually over a number of years already. This course is aimed at anyone working in the broader steel construction industry, from engineers to persons with a commercial interest. It provides a basic understanding of a broad range of issues relevant to persons working in the steel construction industry. It also empowers them to find information on such issues. This year the course was attended by around 60 delegates. Post event comments indicate that the lectures were 'informative', 'inspiring' and 'developing a deeper understanding of the material that (delegates) will use on a daily basis'.

The course presenters were Bruce Saxby (seasoned metallurgist), Jan Kotzé of ArcelorMittal SA, Franco Mordini of Robor Tube and Spencer Erling, education director of SAISC.

WITS ENLIGHTENMENT PROGRAMME

14 to 18 February 2011

The Institute is passionate about the education of students, especially when it comes to steel. Nothing proves this better than the Steel Enlightenment Programme for Civil Engineering undergraduates of the University of the Witwatersrand. This is an intensive programme over 5 days, coordinated and presented (to a large extent) by Spencer Erling.

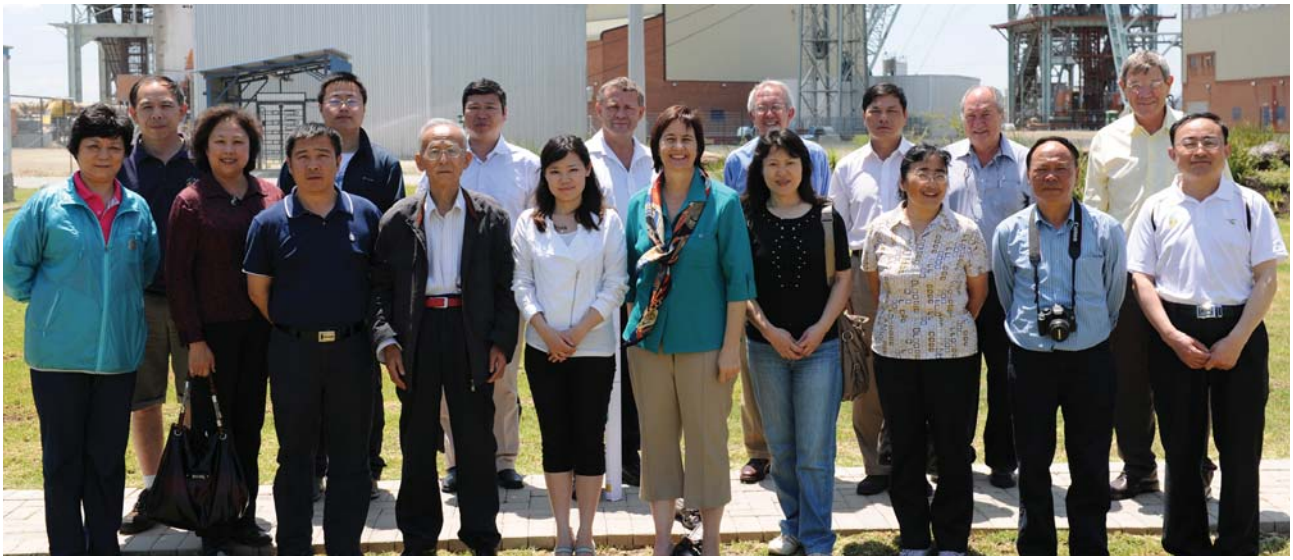
The programme comprised lectures covering steel related topics like the steel making process, types of structures, the role of fabricators, cladding, safety issues, costing, composite construction, corrosion protection and galvanizing. The SA Institute of Welding assisted with providing welding experience to the students. In addition, students had direct exposure to various aspects of structural steel at a number of sites including Robor Tube, Macsteel Tube, the fabricating works of Tass Engineering and Omnistruct, a new warehouse for Toyota and the construction site of the new roof dome at Sandton City. Students also reviewed several drawings and even had to write an exam on the last day to assess the integration of information during the week.

SAISC thanks all our members and others who assisted in making this programme memorable for the students and in this way certainly also invested in the future of our industry.

Three students that scored over 90% for their exam received Red Books from the Institute as a prize.

SAISC PRACTICAL COURSE IN ESTIMATING FOR STRUCTURAL STEEL MANAGEMENT 2011

This hands-on course is presented again and started on 21 February 2011 and will run over 45 hours in a series of afternoon sessions on Mondays until the end of June 2011. The first part of the course covers reading and understanding contract documents with an emphasis on pricing. The second part will cover items such as material costing, labour costing, putting together bids and understanding the difference between qualifications and clarifications, among others.



The SAISC accompanied delegates of the China Steel Construction Society on a visit to 17 Shaft at of Impala Platinum near Rustenburg.

The 21 delegates enrolled for 2011 will also be writing two exams to prove they have an understanding of 'how the structural steel process ticks'. This course is presented by Spencer Erling in the boardroom at SAISC. Registrations for this year have closed, but anyone interested in attending future courses can send their contact details to info@saisc.co.za and they will be notified.

CSCS INDUSTRY TOUR SUPPORT

In February 2011 the Institute assisted our sister organisation, the China Steel Construction Society during an industry visit to South Africa. The SAISC arranged a number of meaningful contact sessions for the group, including a visit to the University of Stellenbosch Department of Civil Engineering, a guided trip (from an engineer's perspective) along Chapman's peak drive, a visit to 17 Shaft of Impala Platinum near Rustenburg and visits to the workshops of Grinaker-LTA, Genrec, DSE and the Sandton City expansion and refurbishment site.

Mikkel Christiansen of Rheo Systems presenter at the SAISC breakfast talk.

SAISC MEMBERS BREAKFAST

3 March 2011, Airport Grand Hotel

Guest speaker Mikkel Christiansen of Rheo Systems gave a very interesting overview of the benchmarking process and how the SA steel construction industry is benchmarked against the best in the world. In spite of a few aeroplanes passing overhead the choice of location (Boksburg) was welcomed by many of our regular breakfast guests, who have previously requested that some SAISC events are hosted on the eastern side of town. Around 45 guests attended the presentation.

A copy of the presentation by Mikkel Christiansen is available on the SAISC website: www.saisc.co.za, look under 'Recent Events' *(By default contact Marlé Lötter, marle@saisc.co.za)*

JUST A REMINDER...

Steel Awards 2011

Deadline for entries: 6 May 2011

Visit our website for details about the special **Project Photo Competition** and the application process for projects.

Awards dinner: 15 September 2011

SAISC Golf Day 2011

11 May 2011, Houghton Golf Club

Alliance entries close 24 April.

Please contact Marle Lotter if you would like to receive the Alliance and Sponsorship information: marle@saisc.co.za

THE STEEL CONSTRUCTION AWARD FOR EXCELLENCE IN THE USE OF STRUCTURAL STEEL

SAISC STEEL AWARDS 2011

The 30th Event

and Photo Competition – Best Steel Award Entry Photo!

Closing date for nominations: 6 May 2011

SAISC Steel Awards Dinner: 15 September 2011

CRITERIA AND CONDITIONS OF ENTRY

Categories:

There are no fixed categories in which to enter projects except the Tubular and Light Steel Frame Building Categories. Judges decide on the categories and winners in the respective categories based on the actual entries received every year.

In 2010 the following categories were covered:

- Overall Winner
- Tubular Structures
- Community Development
- Architectural Structures
- Infrastructure
- Light Steel Frame Building
- Mining and Industrial
- Bridge

We do our best to give **ALL** projects entered some publicity – so please enter the projects you are most proud of.

Criteria for adjudication:

The primary criterion: *Does the project illustrate what can be achieved with steel?*

Other factors to be considered:

- Steel as a structural component of the project
- Benefits achieved by using steel
- Innovation
- Engineering expertise
- Export
- Special details
- Any other unique features
- Environmental / sustainability consideration
- Aesthetic appeal
- Technical skill
- Tubular content
- Client satisfaction
- Value to community

Conditions of entry:

- Substantial completion of the steelwork must have occurred in 2010.
- South African steelwork contractors must have played a significant role.
- The nominator assumes responsibility for the accuracy of all information and provides assurance that permission for the submission has been obtained from the client.
- Written and illustrative material 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.

Material to be submitted:

To enable the SAISC to give proper publicity to the nominations, the following is requested:

1. The fully completed entry form
2. Pictures of the project
3. A description of the project and a motivation for entering the project

To submit an entry you can either:

1. Enter Online: www.saisc.co.za/steel_awards_2011
2. Courier/hand deliver
3. Post

PHOTO COMPETITION

COMPETITION PRIZE:

The photographer of the **best Steel Award Entry Photo** will receive a prize to the value of **R10 000**

The winning photo will be chosen from all the entries received for Steel Awards

The competition will be judged by the Steel Awards judging panel as well as an experienced photographer.

The winner of the competition will be announced at the Steel Awards function. Special recognition and publicity will be given to the project from which the winning photo was chosen.

All nominations will be entered for the competition. If the nominator does not select a photo from the images submitted with the entry, the SAISC will select one of the images as an entry for the competition.

More details about the competition will be added shortly – visit www.saisc.co.za

For further information go to www.saisc.co.za and click on the Steel Awards button on the home page or contact Reneé Pretorius renee@saisc.co.za

RULES OF THUMB FOR STEEL STRUCTURES

By Dr Hennie de Clercq,
Executive Director, SAISC

With the advent of proper engineering theory and the power of the computer, the old rules have been largely forgotten, although they will always survive in what is perhaps the most powerful of all the rules of thumb:

If it looks wrong, it might just be wrong.

INTRODUCTION

Rules of thumb have a proud history in engineering. In fact, there was a time when they constituted almost the whole body of engineering 'theory'. The old master craftsmen and those who called themselves architects etc. only had their experience, and those of others, to go on, and such experience got laid down in rules such as that a dome will be unlikely to collapse if it is built to certain proportions. With the advent of proper engineering theory and the power of the computer, the old rules have been largely forgotten, although they will always survive in what is perhaps the most powerful of all the rules of thumb:

If it looks wrong, it might just be wrong.

A corollary to this rule is that a highly experienced engineer or structural steel draughtsman will typically be able to draw a final structure, and assign quite accurate member sizes, without making a single calculation. We are here trying to capture just a little of that internal computer that tells these people what 'looks right'.

The rules below can be used for any of the following purposes:

- The engineer can get a reasonable estimate of the required size of a member to resist a given force, even without recourse to a computer or handbook.
- The initial size of a member can be guessed for input into calculations or a computer model.
- The initial configuration chosen for structures can be closer to the optimal or to values that will not cause problems.
- They allow a quick check of the order of magnitude of member sizes, quantities, etc.

The approach with the shortcut calculations and the other rules of thumb listed below has been to aim to err on the conservative side. There is no guarantee that they are correct however, and people are encouraged to use and test them and to give feedback to the SAISC at info@saisc.co.za.

SHORTCUT CALCULATIONS

Basic assumptions

The formulae below, are based on the following assumptions:

- Grade S355JR steel is the standard
- Only I-sections are used for beams
- The symbols have the following meaning:

A	=	cross sectional area, in mm^2
b	=	width of flange or leg length of angle, in mm
C_r	=	factored compressive resistance, in kN
d	=	outer diameter of a circular hollow section, in mm
h	=	depth of section, in mm
I	=	moment of inertia, in mm^4
KL	=	effective length of column or span of beam, in m
m	=	mass of steel element, in kg/m

m_{req} = required mass of section in kg/m

M_r = factored moment resistance, in kNm

M_u = ultimate (factored) bending moment, in kNm

r = radius of gyration, in mm

w = unfactored uniformly distributed load on beam in kN/m

Formulae

See table 1.

GENERAL GUIDELINES

Recommended span over depth (L/h) ratios for beams and trusses:

Member		L/h
Truss or lattice girder		10 to 15
Continuous purlin		35 to 45
Portal rafter		25 to 30
Floor beam		20 to 25
Composite floor beam		25 to 30
Plate girder	Light construction	15 to 20
	Heavy construction	10 to 15
Crane girder	Up to 10t crane	12
	10t to 25t crane	10
	25t to 75t crane	8
	Over 75t crane	7

General proportions of steel structures

- Plate girder web thickness about depth/160.
- A brace should have a capacity in the order of 2% of the force in the main compression member or in the compression flange of a beam or girder.
- Stacks, towers and laced columns (for example transfer towers, furnace pre-heater towers): ratio of height to smallest plant dimension should be smaller than 10.
- Portal frames for single storey industrial steel buildings without cranes:
  - For pitched portals, eaves rafter haunch length 7,5% to 10% of span and haunch cut from section equal to or bigger than rafter section.
  - For acceptable deflections in pitched portals with haunches, rafter depth to be bigger than span/75.

Item	Formula		
Area of section	If m is known: $A = \frac{m}{7{,}85} x10^3 \text{mm}^2$ For equal-leg angles: $A = 1{,}9bt$ mm^2		
Moment of inertia of I- section	$I_x = \frac{mh^2}{47000} \; x \; 10^6 \text{mm}^4$		
Radius of gyration	For I-section: $r_x = 0{,}41h$, $r_y = 0{,}22b$ For H-section: $r_x = 0{,}42h$, $r_y = 0{,}24b$		
Deflection of an I-beam at midspan		UDL	Point load at midspan
	Simply supported	$2900 \frac{wL^4}{mh^2}$	$4750 \frac{PL^3}{mh^2}$
	Fixed ends	$580 \frac{wL^4}{mh^2}$	$1200 \frac{PL^3}{mh^2}$
Required mass m_{req} of an I-section for a laterally-supported beam to resist an ultimate moment M_u	$m_{req} = \frac{65M_u}{h}$ (reduce by 30% for a composite beam)		
Factored resistance moment M_r of a laterally unsupported I-section beam	KL: 0 | 2 | 4 | 6 | 8 M_r: $mh/65$ | $mh/65$ | $mh/90$ | $mh/150$ | $mh/220$ Note: These values are not applicable to 305 x 102 and 406 x 140 I-sections		
Factored compressive resistance of a compression member of effective length KL	H-sections	$C_r = 46m\left[1 - \frac{26KL}{b}\right]$	
	I-sections	$C_r = 46m\left[1 - \frac{28{,}3KL}{b}\right]$	
	Angles	$C_r = bt\left[0{,}6 - 16\frac{KL}{b}\right]$	
	Circular hollow sections	$C_r = dt\left[0{,}94 - 14{,}6\frac{KL}{d}\right]$	
	Square hollow sections	$C_r = bt\left[1{,}15 - 16{,}1\frac{KL}{b}\right]$	

Table 1.

- Stanchion section one or 2 serial sizes bigger than rafter section, with depth bigger than eaves height/25
- For acceptable deflections in propped portals rafter depth to be bigger than span/55.

- Spacing of frames in industrial buildings (portal frames or trusses) without cranes:

Span of frame (m)	Optimum spacing of frames (m)
<15	6
15 - 20	7,5
25+	9

- Spacing of columns in industrial buildings with heavy cranes to be approximately equal to the height of the crane girder above the ground.

- Distance between legs of latticed crane columns: H/7 to H/10 where H = height to top of crane girder.
- Vertical leg depth of angle roof bracing ≥span/70. Span may be taken as distance between points where braces are hung from the purlins.

Assorted rules

- The amount of pre-camber in a plate girder should be equal to the deflection under its total permanent loading. As a rule of thumb, let precamber equal span/500.
- Precamber of lattice girders and trusses: span/600.
- Number of purlin sag bars for different spans (L) of purlin and two widths b of top flange of purlin:

No of sag bars	b < 100mm	b ≥ 100mm
No bars	L < 4,5m	L < 5,4m
One, at midspan	4,5 ≤ L < 7,5m	5,4 ≤ L < 9m
Two, at third points	7,5 ≤ L < 12m	9 ≤ L < 14,4m

- Under typical serviceability loads the elastic strain in tension and compression members is about 0.9mm per meter of length.
- To facilitate erection on typical projects, keep the mass of any member to less than 6 tons.
- In industrial buildings, expansion joints and full sets of roof and vertical bracing are required for every 60m to 75m of building length.
- Thickness of a base plate for concrete cube strength 25MPa about 30% of distance from face of column to edge of minimum area required to spread load on base.

Estimating

- Weight of steel (kg/m²) in multi-storey building: 35 plus 1,6 times number of storeys.
- Mass of light industrial single-storey buildings without cranes typically less than 25kg/m²
- Number of 20mm shear studs on a composite beam with 100% shear connection equal to 2 times mass of beam in kg/m.
- For estimating purposes, allow 10% of light and medium steelwork (excluding purlins and girts) for connections, splices, column cap and base plates, plus 1% for Grade 8.8 bolts and 0,5% for Grade 4.8 bolts.

SOME GEMS FROM SPENCER'S STEEL ENLIGHTENMENT COURSE FOR WITS STUDENTS

By Spencer Erling,
Education Director, SAISC

The objective of the course is to explain and expose second year civil engineering students to the structural steel process. Over the years I have developed a stock of questions that I mix and match each year to produce a new exam. The answers are generally well done, but I do get some real 'gems'. I would love to share some of these with you.

I have just finished my 10th enlightenment course at Wits University which started in 2002. I have done nine at UKZN and a few at other universities over the last couple of years.

Generally the course is a DP plus test course (Due performance, i.e. attend all the lectures, welding experience, factory and site visits and achieve 50% in a test).

The objective of the course is to explain and expose second year civil engineering students to the structural steel process from digging iron ore out at the mine, steel making, explain design, detailing, the fabrication process, welding including an opportunity to do a bit of SMAW (Stick welding), bolts, transport, erection, corrosion protection, fire protection, what we clad buildings with, how we connect the steel to concrete foundations etc. etc.

Over the years I have developed a stock of questions that I mix and match each year to produce a new exam.

The answers are generally well done, on average I get about an 80% pass rate and on a few rare occasions (I just could not get that class at the unnamed university to co-operate and pay attention) it drops as low as a 55% pass.

But I do get some gems of answers to my questions. I would love to share some of these with you.

Maybe they will open up some new theories for us...

Question: ***What is the minimum nominal yield strength in MPa of a steel bolt made from grade 8.8 material?***

Expected answer:

First 8*100 gives ultimate tensile = 800 Mpa. Multiply that by the second .8 = 640 Mpa the yield strength.

Some of the gems:

- They write out 8*100 *.8 = (some amazing answers) about 450 Mpa but it could be anything from 430 Mpa to 470 to 730 to 870 to 4000 Mpa (they do not bring calculators to the exam and boy does it show. Clearly mental arithmetic is not their strong points).
- 800 kips (Kilo pounds per square inch) in MPa?

The best of the gems:

80% of 800 Mpa *"I have forgotten how to do maths" (this from a second year civil engineering student with, I would guess, not too bright a future?)*

Question: ***Give the three main steps in the turn of the nut method of tightening friction grip bolts.***

Expected answer:

Snug tighten the bolt group, make two marks opposite each other on the bolt and the nut, do an extra part turn (depending on the grip length of the bolt).

Some of the gems:

- Only a one part answer in this case: Weld the bolts.
- Tighten by turning to 0.2mm. Hem... must own some special equipment?
- Hammer the bolt into 15° position. If it does not snap it is strong *(I guess he was confused by the test for shear stud welds).*

The best of the gems:

Rotate the nut anticlockwise, rotate the nut clockwise. *(Clearly a politician with job creation in mind, definitely designed to keep workers busy for a long, long time).*

Question: ***Name the two basic methods of protecting the weld pool from the atmosphere.***

Expected answer:

Use of flux covered or cored welding rods to create a chemical reaction at the weld pool, creating a gas shield to keep undesirables (hydrogen etc.) from contact with the weld pool. Deliver a gas shield to the weld pool through the welding equipment to keep undesirables away (Mig/Mag process).

Some of the gems:

- Cover the welding rod in thin plastic. *(I guess he got confused about how to keep low hydrogen rods dry – keep them in the hermetically sealed bags they are delivered in).*
- "Oil it"
- Plastic and glass *(these answers from the same expert).*

The best of the gems:

Dip the weld pool into paint.

Now after marking all these papers it is clear to me that many of the students mechanically answer questions without thinking about earlier questions. Look at this pair of questions and answers. I like to ask about the melting point of iron, or the temperature in furnaces. It is usually near to the start of the paper as steel making is early on in the process.

Question: ***What is the melting point of iron?***

Expected answer:

1530°C up to 1600°C. *(Generally this question is answered well but occasionally I get a few random answers e.g. 600°C and very occasionally 8000°C. Wow, that steel mill must really be a hot place to work in!)*

2 or 3 pages later I pop the question: ***What is the critical temperature in the case of a fire for a steel structure and why?***

Expected answer:

600°C. That is the temperature at which steel has lost 70% of its yield strength.

One of the gems:

Remember the answer to the earlier question – 600°C because that is the temperature steel melts *(that steel mill must be the cheapest producer in the world. Boy, they were clever to get the melting point of steel down to 600°C!)*

Question: ***Name three types of material used to 'passive' fire protect steelwork.***

Expected answer:

Sprayed or plastered vermiculite cementitious covering, fire proof boards, intumescent paint, cover in concrete or bricks.

Some of the gems:

- Use glass to fire protect
- Use plastic
- Waterproofing
- Box out in wood (?)
- Spray cans (sic). *(I suppose if we can build up a thick enough layer of aerosol cans to the steel and find a way from preventing them from exploding we may just be on to something).*

The best of the gems:

Add water to the steel when we make it. *(Ouch!)*

Question: ***Name two common methods of removing rust from steel before painting.***

Expected answers:

Hand or mechanical wire brush, sand or shot blast, acid dip.

Some of the gems:

- Rinse in the zinc bath *(what happens next?)*
- Add acid to the steel. *(I don't suppose this is worse than adding water.)*

Question: ***What is the purpose of a prime coat of paint on steel?***

Expected answer:

Protect the prepared surface until the full specification is applied, act as a bond between later coats.

A new theory expert answer – Make the steel stronger

Question: ***What are the main constituents in pricing of steel (or for that matter any material)?***

Expected answer:

Material costs, labour costs and equipment costs.

The gem:

The price of oil…

Question: ***Name three common welding processes.***

Expected answer:

SMAW (stick), GMAW (Mig/Mag), FCAW (flux cored), SAW (submerged arc)

The gem:

Hot welding rods.

A few final gems:

- I carefully explain steel making as a two-stage exercise i.e. make pure iron (they enjoy the old name 'pig iron'). I sometimes ask them about this. **The gem theory…** "remove the steel from the iron".
- For some reason, not in answer to a question, the student was describing scarfing of welds in tube making:
  Smooth the welds with water. *(A new method if we can get it right!)*
- Concrete is heavier than steel…
- Steel can burn unlike concrete…

If you truly believe some of these new theories are worth pursuing contact the writer. I have kept the names of the geniuses involved. This is just in case you would like to employ them to conduct the studies or maybe even more importantly to ensure they do not get too close to your works.

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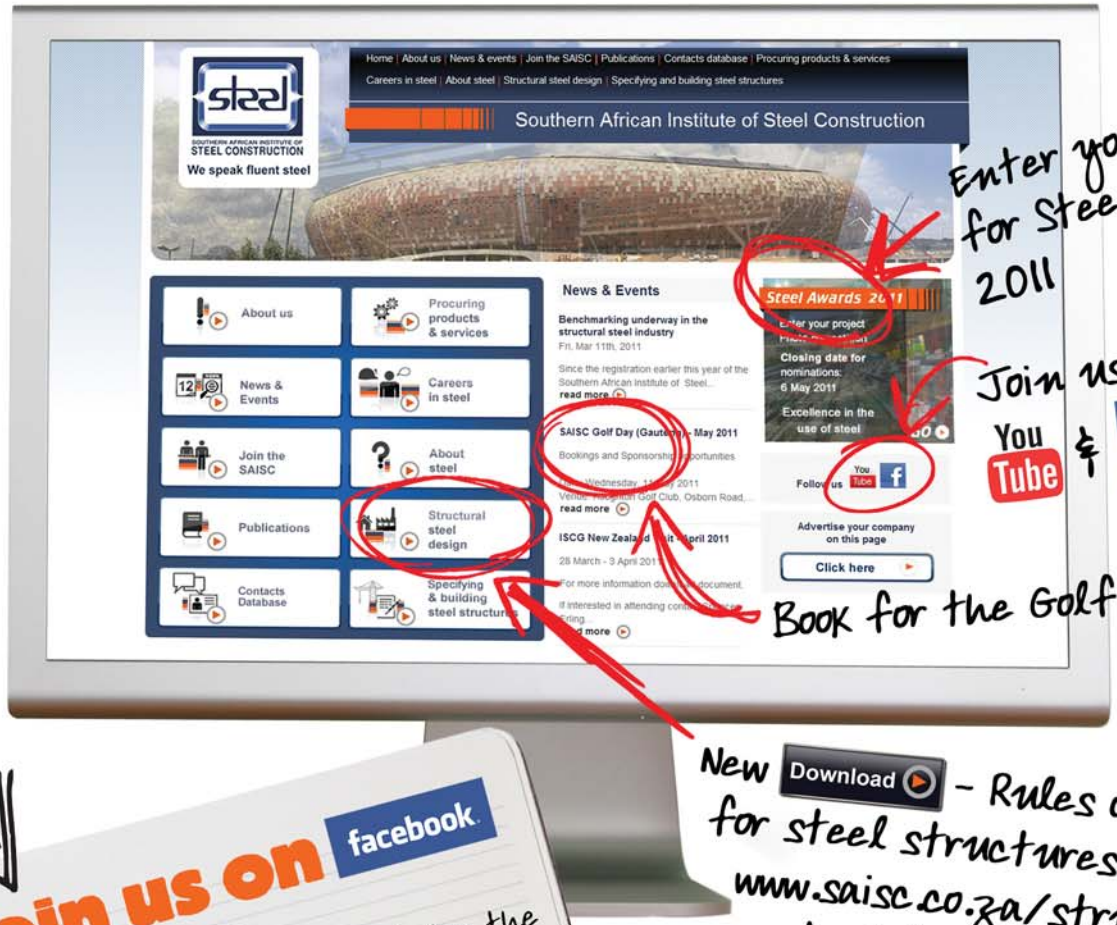

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News & events

STEEL PRIZE WINNERS FOR ARCHITECTURAL DESIGN PROJECTS

UNIVERSITY OF JOHANNESBURG

The SAISC sponsored the Steel Prize for Architectural Design at the Faculty of Art Design and Architecture at the University of Johannesburg in 2010. Karabo Mokaba (4th year) and Jessica Grobbelaar (3rd year) both used steel in their winning designs to great effect.

KOPANONG YA DINALEDI (The gathering of stars within a beacon of light) AIDS & HEALTH TOWER

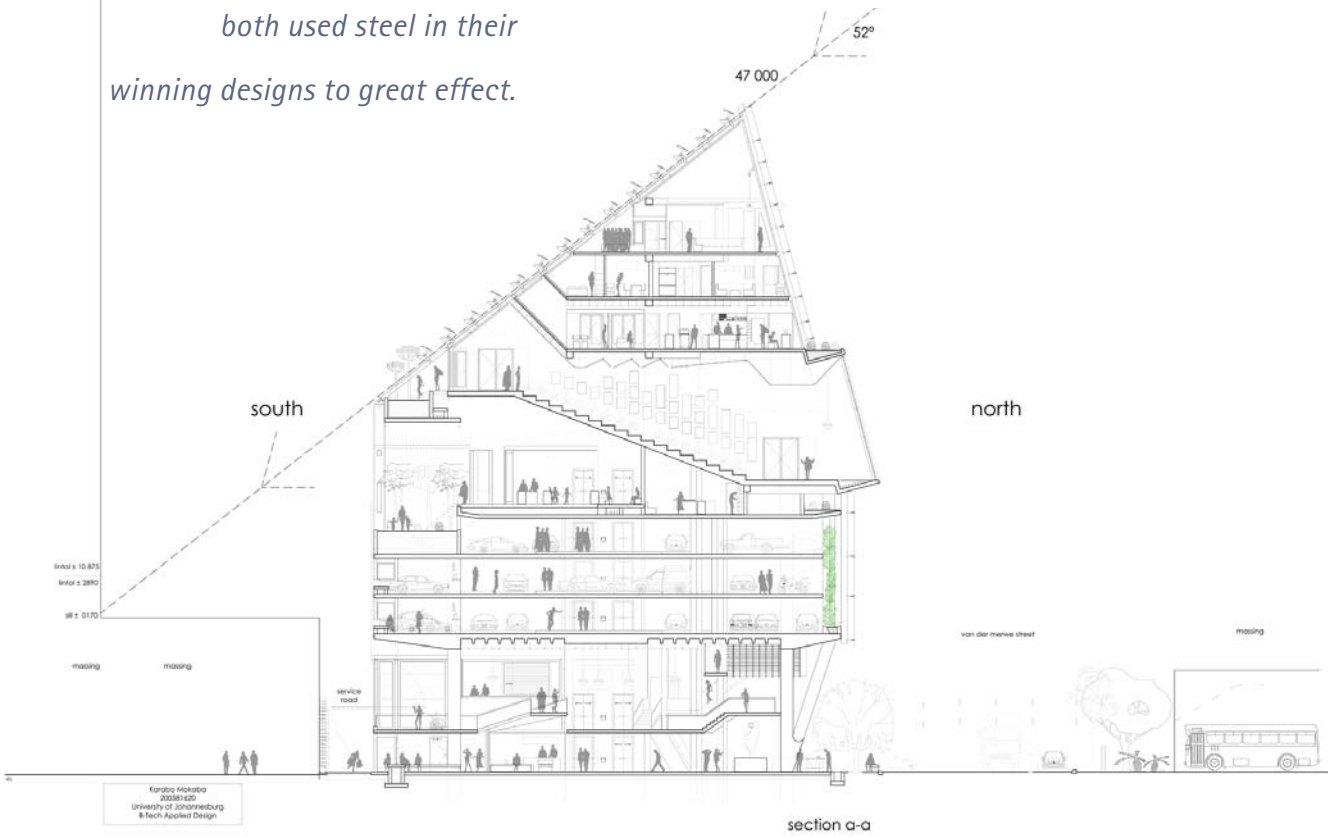
Project by Karabo Mokaba

High densities, foreign national influx, hard urbanity and over-crowded vertical homes in poor conditions are the key factors for the electrifyingly busy Hillbrow phenomenon. These are also the catalysts for the birth of the HIV-AIDS clinic project.

A land-scraper by design, it seats itself in the north-east portion of Johannesburg, and topographically occupies the highest point along a significant watershed for the subcontinent. Hence the ethical decision not to excavate the precious bowls of the earth for yet another soulless parking basement. Respecting the highest point, the existing ground plane becomes the landscape which gets moulded, cut and shaped to become a playground for the city and a foyer for the controversial brief.

The ground floor becomes the most public interface of the project. Diagonal paths cut across this space acting as hierarchical route, access and views into public participation programmes like food production, auditorium, workshops, etc. It also serves as an extension of the existing Quartz street market, a key pedestrian route through this part of the city. The intervention respects this economical lung.

Parking occupies the next three levels and is shaped by vertical circulation. The podium level becomes a tranquil suspended green park for the public and patients. This green cloud in the sky is visible from the ground and aims to inspire, intrigue and create a secondary skyline to the Hillbrow urban edge.



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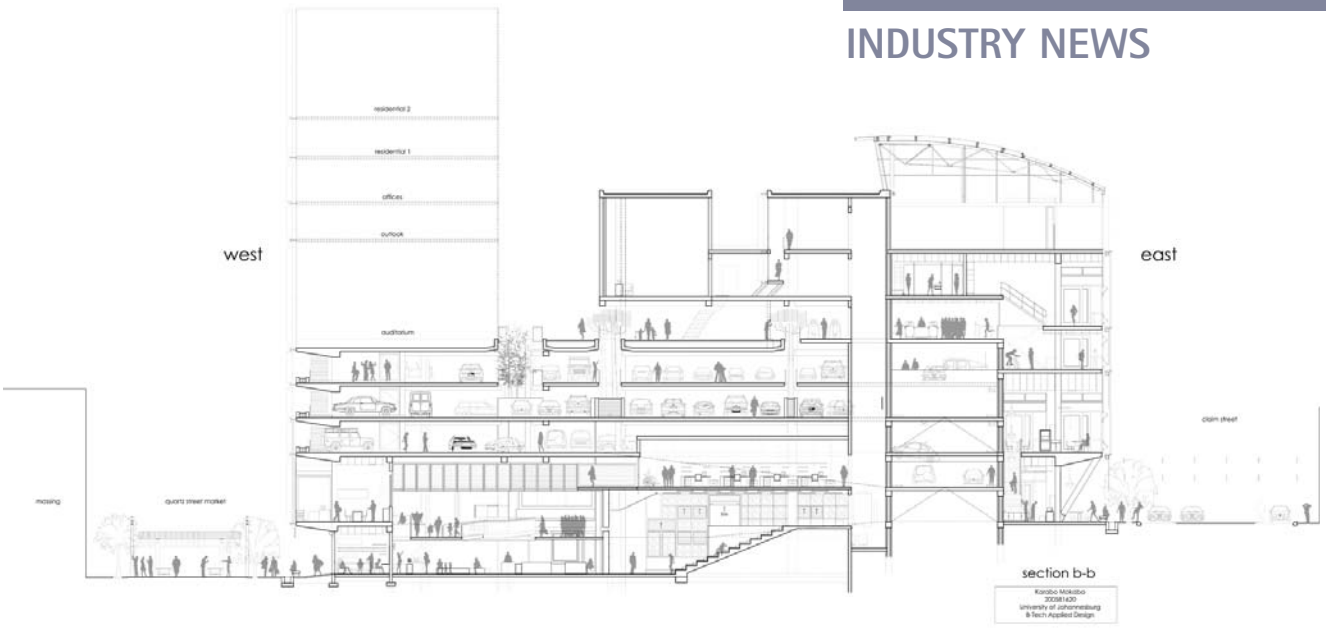


Section B-B Hillbrow Tower.

Three steel towers rise from this green oasis to form the HIV-Aids clinic. Innovative materials and light-filled rooms change the spatial quality to uplift the morale of the patients.

The 52-degree inclined facade tilts to allow maximum winter light to reach the adjacent southern property while increasing its own light penetration. The roof is made of tinted brown glass which reflects the light towards the building on the southern boundary. Steel louvers form a secondary skin which prevents heat gain during warm summer days. These louvers are raised above the façade, allowing filtered light to enter the building and ventilate the glazed surface.

The use of low-key technology and simple passive design such as steel screens and gabion walls inform the language of the building –

Collage showing East view of new Gasworks Precinct.

demonstrating 'hope' in a practical sense. The opaque side walls are clad with burnt orange Cor-Ten steel.

Similarly the metaphor, 'A beacon of light' becomes symbolic of the project: demystifying the stigma of HIV-Aids and celebrating the value of the lives of those who live with the virus.

SOUTH AFRICAN FASHION AS CULTURAL IDENTITY

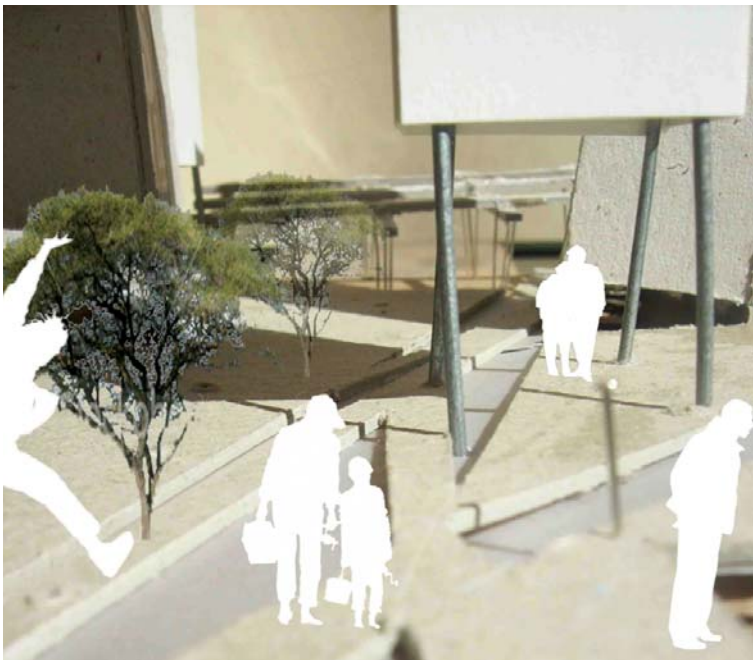
By Jessica Grobbelaar

My design is a proposal for a fashion establishment in Johannesburg that addresses the cultural diversity of South African society and acts as a catalyst for the promotion of trade and global recognition. The project proposes a hybrid space which is democratic and transparent. An activity-based facility like this would encourage the interaction of many people of different backgrounds, and would also be beneficial for the development of South Africa through fashion.

The spatial organisation respects and enhances the urban landscape and the building's programme is hierarchically organised. The existing original industrial brick and steel buildings on the site required a sensitive architectural approach. My design proposed supplementing this existing post-industrial landscape with a contemporary architectural language, employing materials like steel, glass and concrete.

My goal was to achieve a layered aesthetic, whilst, on a functional level, to promote and display the rapid growth of material technology. The successful integration of architecture and landscape was also an important concern. An architectural analogy with fashion is represented by a light steel canopy that floats elegantly above the existing structures. Its functional role is to connect all of the primary programmes of the large site. This floating 'cloud' also contains the scale of the existing buildings and results in a comfortable and humane space for users of the new complex.

In conclusion, the proposal suggests a careful response to the existing urban landmark of the Gasworks, the topography and ecology of the site, the larger context, and the ever-changing and dynamic social patterns of South African society.



Hillbrow Tower – landscape level.

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