steel CONSTRUCTION

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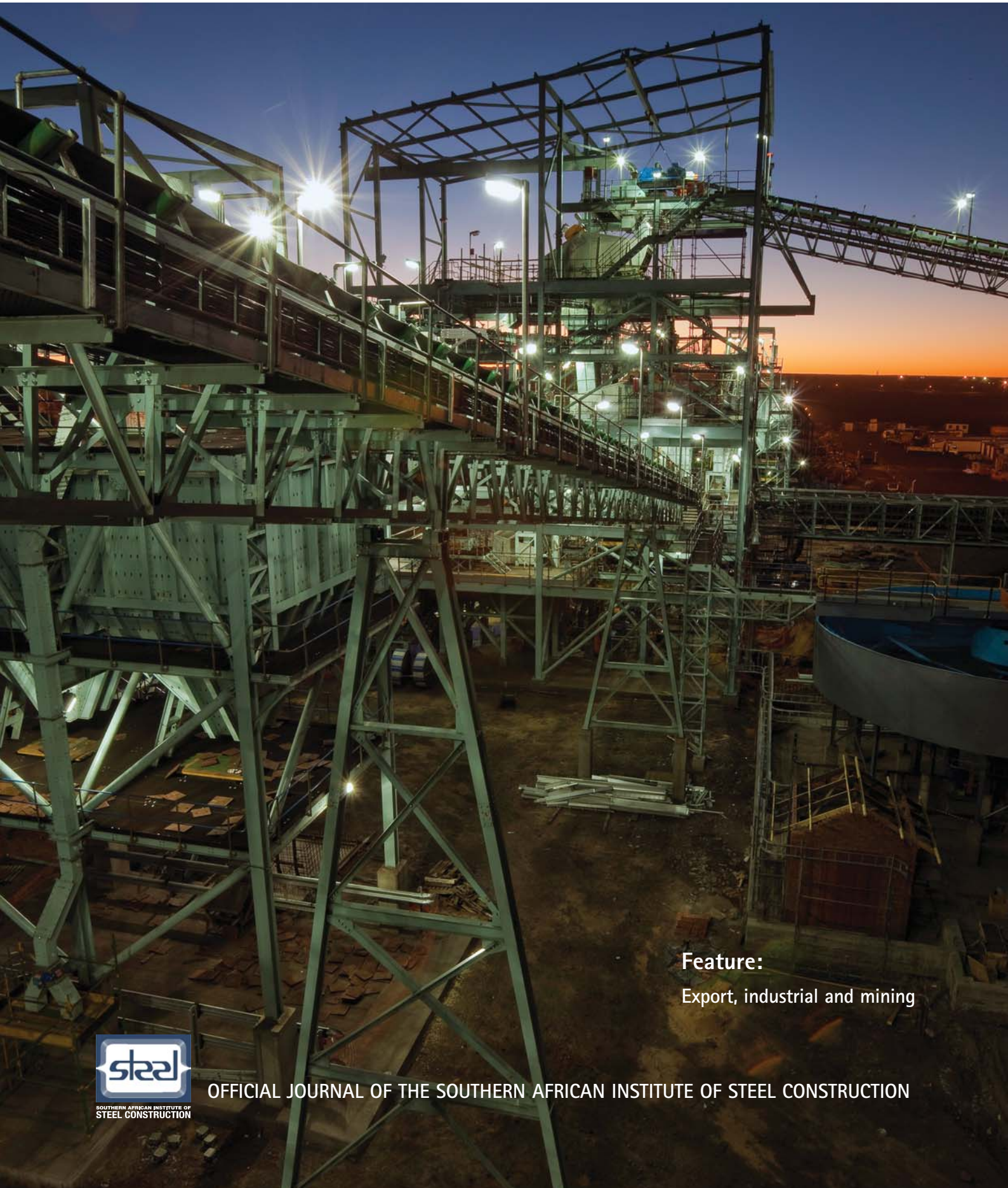

Feature:

Export, industrial and mining

SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION

OFFICIAL JOURNAL OF THE SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION

EDITOR'S NOTE

At the moment South Africa and maybe the world are suffering from post World Cup Blues. But what we found at the SAISC was that once the final whistle (high tech siren?) blew, everybody got out of their couch potato slump and remembered that they had to contact the Institute for something!

The export market for the steel construction industry has always been something of a wary issue. The risks are different if not higher than the local market, but the potential is vast. The trick is to stay in the game even when the local market is booming. So when local opportunities diminish, you have established relationships and projects to keep the company in the black. Read the ISF article on *page 37*.

The mining and industrial projects covered in this Issue are impressive. Lots of steel; plenty of quality; engineering marvels and excellence in execution. Proudly South African legacies for the African continent.

One 'youngish' industry that has already found its feet in the export market is light steel frame building (LSFB). Also read on *page 16* about the project that scored a goal for lightweight steel. All the facets came together to make a great match. Teamwork; strategy; skills and about 90 minutes in which to complete it. *(enough already!)*.

Steel Awards 2010 – what to say? Guests can look forward to a party in three main centres filled with classy entertainment, good food and lots of shoulder rubbing with your clients and peers. As for the Steel Construction Issue... you have to wait and see.

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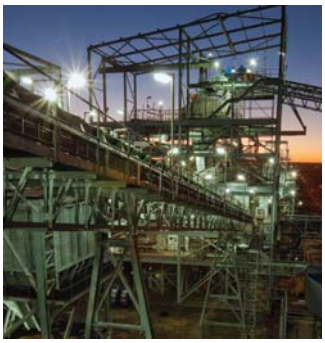

Nchwaning III Beneficiation Plant, Black Rock Mountain.

Photo: Reghardt Rautenbach

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SAISC COMMENT

By Dr Hennie de Clercq,
Executive Director, SAISC

One should not underestimate the ingenuity of the companies in our industry. Companies just seem to find work; sometimes they create the work. It is fascinating that, according to official statistics, some 144 000 tons of fabricated steel was exported last year, while this year's figures seem to hold up quite strongly.

VUVUZELA CONCERTO (IN B FLAT)

Many people would probably agree if I said 2010 is a funny sort of a year. It is marked by one huge, overpowering event, the FIFA World Cup, which we are bound to remember for the rest of our lives, and for a variety of reasons. But for the rest it is extremely bland, as though the World Cup has sucked up all our energy attention and memory. Without the football the year would have been without features, the sort of year like the one a friend referred to some time ago when he said: "I have forgotten last year." Not the kind of year of which the farmers where I grew up used to say: "Jy kan hom vir 'n ram laat loop," meaning that it's so good that, if it were a young male you could use it to breed.

The steel construction industry also seems to be in a featureless year. There is just enough work to keep everybody busy, some companies at reasonable levels of activity while others had to reduce staff. There are no rumours of eminent bankruptcies but also very little talk of exciting projects and prospects. And with both the world and national economies not poised for serious growth, and with uncertainty in the mining industry, there is little prospect for a rapid return to the exciting times of recent years. In such a situation people tend to slip into survival mode. You chase every project you can, you compete on the basis of price, and you keep your costs down.

However, one should not underestimate the ingenuity of the companies in our industry. Companies just seem to find work; sometimes they create the work. It is fascinating that, according to official statistics, some 144 000 tons of fabricated steel was exported last year, while this year's figures seem to hold up quite strongly. Also casting a different light on the picture is the fact that most of the steel for the government's capital expansion programme, which includes the power stations, still needs to be fabricated.

Alongside these activities in the steel construction industry there has been the vuvuzela concerto (in B flat) of changes in steel prices – up, down, doing away with price differentials, adding levies, finding new ways to explain things, etc. This, of course, was in response to local and international market conditions and quite inevitable, but quite confusing and unsettling for the industry. The volatility in the industry may well be with us for some time to come, and it may be wise for steelwork contractors to insist on an escalation clause in contracts (which may well work to the advantage of the client).

But when will things turn around to real buoyancy again? Well, I guess we have all come to a point, where we won't believe any person's predictions about economic issues, be it Warren Buffet, Barack Obama, Alan Greenspan or the Pope. Yet it is interesting that SAFCEC's confidence index, which indicates how the civil engineering industry feels about their prospects about a year from now, has risen sharply in the past quarter. There are also many project proposals in drawers and computers which can be reactivated very quickly. So there are people who think, on the basis of what they see and hear, that things will turn for the better, and it is easy to visualise how things can actually start moving again.

At the Institute we wonder how the present conditions in the industry will affect the entries for Steel Awards next year. It is unlikely that it will match those of this year or last. For this year we had a record number again, including many outstanding ones. This year's Steel Awards function on 15 September in Johannesburg, Durban and Cape Town, will be a very special event. As for next year's, we will worry about it when we get there.

SAISC STEEL AWARDS 2010

THE 29th EVENT

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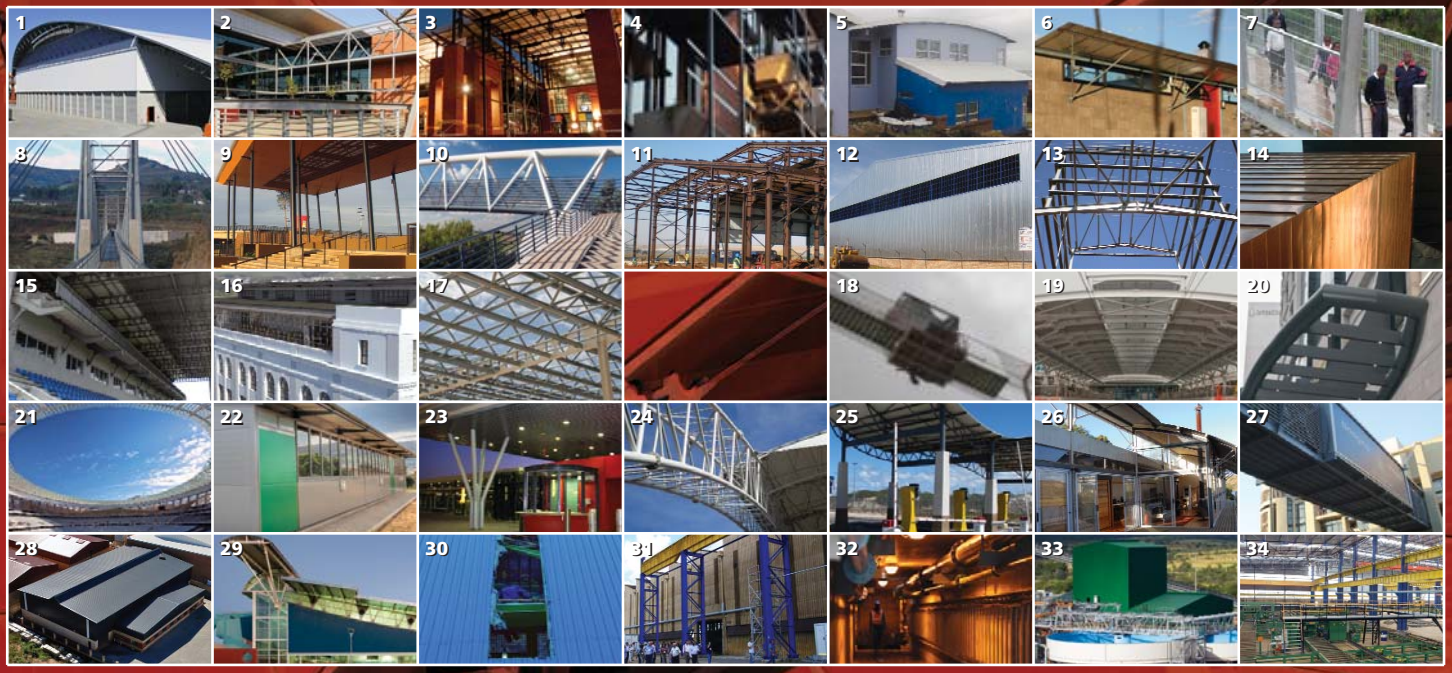
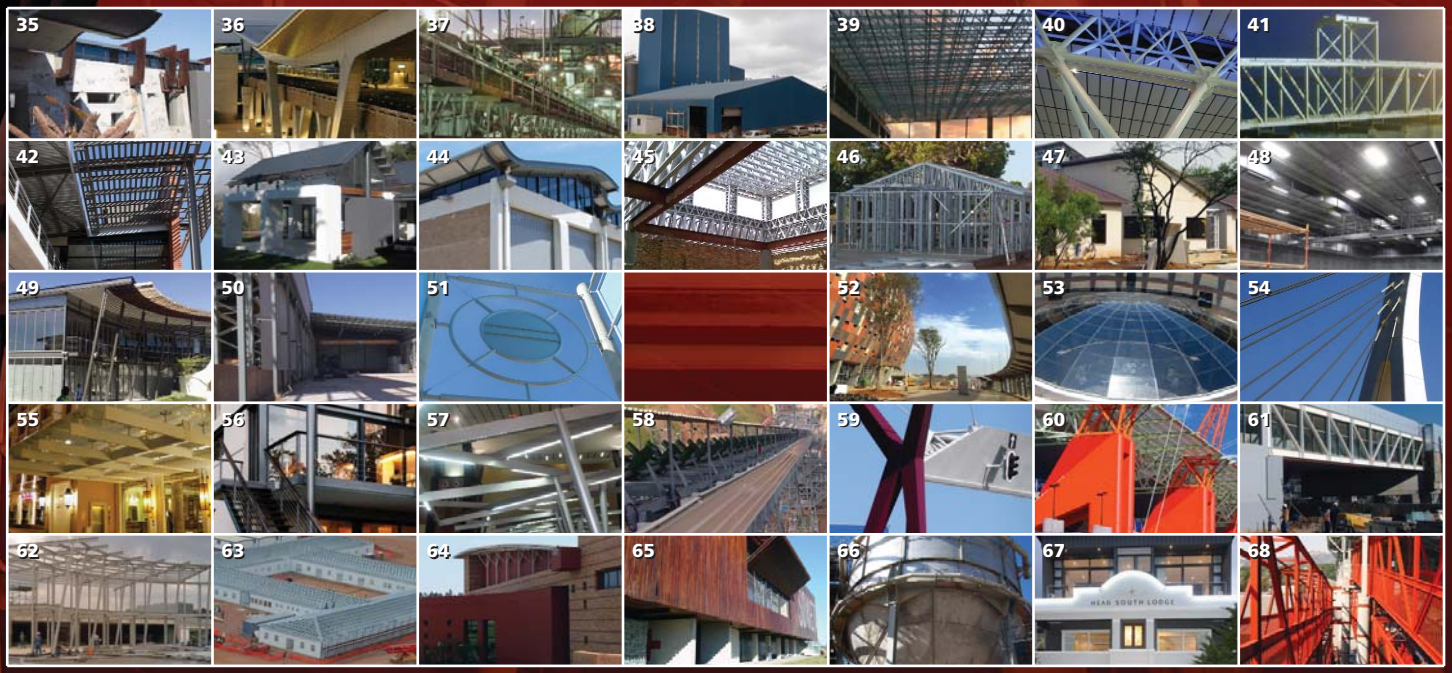
DATE: 15 September 2010 **VENUE:** Johannesburg: Conference Centre, Emperors Palace, Jones Road, Kempton Park
• Durban: Sun Coast Casino, Durban • Cape Town: The Vineyard Hotel, Claremont



1 SACD
2 National Library of SA
3 UNISA Es'kia Mphahlele Registration Building
4 Absolute Farenden
5 House Blue Myrtle
6 House Celeste and Pieter Venter
7 Nsuze River Pedestrian Bridge
8 KZN Dept of Transport Pedestrian Bridge Project
9 Nasrec Transportation Hub
10 Orange Farm Pedestrian Bridge
11 Standard Development Projects Workshop
12 Academy Bed & Breakfast Hangar
13 PSA Plastic Processing Plant
14 Freedom Park: Museum
15 Sinaba Stadium
16 Cape Town High Court
17 Kwanobuhle Shopping Centre
18 Orlando Towers Bunjee Jumping Bridge
19 Gautrain ORTIA Link Station
20 Legacy Corner
21 Cape Town Stadium
22 Meetse-a-Bophelo Primary School
23 Integrated Rapid Transport (IRT) – CapeTown
24 Sugar Ray Xulu Stadium
25 Port of Ngqura Canopy Structures
26 The Rainbow House
27 Brooklyn Bridge
28 New Factory MIS Pipelines
29 Mandela Bay Aquatic Centre
30 Meerkat II – FT3 Building
31 DSE's Extra Heavy Fabrication Bay
32 Ngezi Concentrator
33 Unki Concentrator
34 Cosira Vulcan
35 Contemporary Farmhouse, Vredefort Dome
36 Cape Town International Airport
37 Nchwaning III Beneficiation Plant
38 De Heus Feed Mill Building
39 Zambesi Retail Mall Extension 5: Light Gauge Roof
40 King Shaka International Airport
41 Port of Port Elizabeth New 54m Span Fire-fighting Bridge
42 Princess Magogo Stadium in Kwamashu
43 House Meyer
44 Durban Container Terminal: Straddle Carrier Workshop
45 Saxon Villas Roof and Skylights
46 Camp Pemba – Mozambique
47 House Venter
48 Stark Studios – Support for Soundproofing Materials
49 Eastgate Shopping Centre Extension
50 Kusile Ducting Workshop
51 Orlando Station
52 Ring of Fire – Soccer City
53 Wits Chamber of Mines Courtyard Dome
54 7th Avenue Bridge
55 Pivot Hotel Canopies
56 8 Rugby Road
57 New CTB Chopstix Canopy – ORTIA
58 Zibulo Overland Conveyor
59 William Nicol Traffic Light Gantry
60 Mbombela 2010 FIFA Stadium, Nelspruit
61 Rhodesfield Metro Station
62 LSFB Solution – Eastgate Mall
63 H-block building – Medupi and Kusile 1 & 2
64 The Church of the Beatitudes
65 Soweto Football Training Centre
66 Pin Bed Clarifier Installation at Tenke Fungurume in the DRC
67 Head South Lodge, Green Point
68 Re-development Bus Terminal Nelspruit



CALENDAR OF EVENTS

SAISC BREAKFAST TALK – KALTENBACH

5 August 2010

Country Club Johannesburg, Auckland Park

SAISC VISITING ARCHITECT – Andrew Tyley (Robert Stirk Harbour + Partners)

25 August 2010: Pretoria

27 August 2010: Bloemfontein

30 August 2010: Cape town

31 August 2010: Durban

STEEL AWARDS 2010 – DINNER

15 September 2010

Johannesburg - Conference Centre, Emperors Palace, Jones Road, Kempton Park

Durban – Sun Coast Casino, Durban

Cape Town – The Vineyard Hotel, Claremont

GREEN BUILDING COUNCIL CONVENTION & EXHIBITION 2010

20 to 23 September 2010

CTICC, Cape Town

Visit www.greenbuilding.co.za for more information.

STEEL STRUCTURES: CULTURE & SUSTAINABILITY

20 – 22 September 2010

Istanbul, Turkey

www.sscs2010.com

ARCHITECTURE ZA2010

22 – 27 September 2010

Johannesburg

www.saia.org.za

SAISC STUDY TOUR AND 9TH PACIFIC STRUCTURAL STEEL CONFERENCE

October 2010

Beijing

Contact SAISC or visit www.pssc2010.com for more info

SAISC KZN GOLF DAY

21 October 2010

Amanzimtoti Golf Club

SAISC, ISF & SASFA AGM

18 November 2010

13TH INTERNATIONAL SYMPOSIUM ON TUBULAR STRUCTURES (ISTS)

15 – 17 December 2010

Hong Kong

www.hku.hk/civil/ISTS13/

EUROSTEEL 2011

31 August – 3 September 2011

Budapest, Hungary

www.eurosteel2011.com

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

INDUSTRY NEWS

SAISC SUPPORTS IPAP2

Through various initiatives, substantial progress has already been made by the steel construction industry under the framework created by IPAP1. These include: scaled up efforts to promote long term industrialisation through new investments.

Molefe Kgomo, SAISC chairman.

Kobus de Beer, SAISC industry development executive.

At the invitation of the Parliamentary Portfolio Committee, the SAISC responded formally to the announcement of the Industrial Policy Action Plan (IPAP2). After extensive consultation with members of its industry and others in the general construction industry, the Institute said that it fully supports the initiative as outlined by the Minister in the National Assembly in February 2010.

The Institute was represented by its chairman Molefe Kgomo, executive director, Dr Hennie de Clercq, industry development executive Kobus de Beer and Steinmuller's business development consultant, Bob Stephens.

In his report Minister of Trade and Industry Dr Rob Davies said that IPAP2 builds on the National Industrial Policy Framework (NIPF) and the 2007/08 IPAP. "It represents a significant step forward in scaling up our efforts to promote long term industrialisation and industrial diversification beyond our current reliance on traditional commodities and non-tradable services. Its purpose is to expand production in value-added sectors with high employment and growth multipliers that compete in export markets as well as compete in the domestic market against imports," he said.

.

"Our industry agrees with and supports the basic outline and purposes set out by the Minister," says SAISC chairman Molefe Kgomo. "We are particularly supportive of the move to having Industrial Policy geared up to achieve the genuine and comprehensive involvement of all government and industry players."

Through various initiatives, substantial progress has already been made by the steel construction industry under the framework created by IPAP1. These include scaled up efforts to promote long term industrialisation through new investments. During the last three years (2006-2009) the industry invested some R1 billion in world class equipment and facilities; achieving increased skills development and employment; increased industrial diversification with the industry now serving the power generation, mining, materials handling, petrochemical, transport, logistics, retailing, processing and high rise building industries and achieving better competitiveness against imports. The industry has responded to all major requirements including a meaningful local content for the soccer stadiums and the maintaining of a high level of export participation.

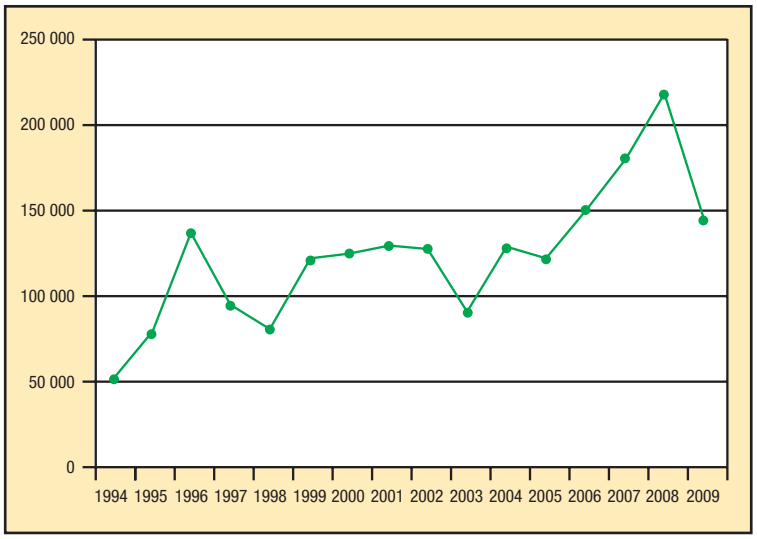
Kobus de Beer is equally optimistic about IPAP2. "It is a meaningful initiative which will help the development of industry and the economy in general in this country," he says

He adds that an important aspect of IPAP2 is the overhaul of the Preferential Procurement Policy Framework. In this regard he says there are a number of important issues.

"Major projects should be announced and firmed up with as much lead time as possible. The lack of certainty, like with the indefinite deferment of nuclear power projects and the new refinery at Coega, results in missed opportunities and hasty execution plans.

"More focus on and demand for local content is needed, including a 'local content preference' as a predefined percentage based on local content achieved by value. It is disturbing that, for example, in the supply of cellular masts and

INDUSTRY NEWS



Export graph - 1994 to 2009.

power pylons, capable South African companies are losing sales and reducing their labour complements in the face of Indian and Chinese competition.

"Aligned to this, it should be reiterated that skills are available or can be made available in the industry and many examples exist were people were trained for specific requirements in relatively short periods. The lack of skills needs almost never be a consideration when promoting local content.

"The introduction of more meaningful financial assistance interventions is welcomed as essential. Many of our competitor countries enjoy capital investment and working capital assistance and the establishment of an EXIM Bank would materially assist SMME's and companies trading across borders.

"It should be noted that incentives such as the EIP (Enterprise Investment Scheme) are used by the industry and that it would have been even more effective during the past three years had it been possible to introduce the incentives earlier or to backdate applications. Also, import tariffs should be used more widely to prevent dumping and to provide a time period for South African industries to become proficient or competitive," says de Beer.

With regard to the sensitive issue of pricing, the input prices for locally supplied steel have not been a constraint in the structural steel industry as shown by the low incidence of structural steel being imported into South Africa – even if duty free. The substantial growth of structural steel exported – from 100 000 tons in 2006 to in excess of 200 000 tons in 2008 and 144000 tons in 2009 to 115 countries (41 in Africa) – illustrates the point.

de Beer says that the SAISC is conscious of the fact that for IPAP2 to succeed, close cooperation from industry is essential. "In this regard it should be known that we are a registered UNIDO SPX Centre and actively participate in profiling, benchmarking and seeking CSDP opportunities with ESKOM, Transnet, PetroSA and others.

"Regular feedback opportunities should be created for IPAP2, thereby allowing industry and government to report on progress and identify and deal with shortcomings or opportunities. Also, the establishment of a 'direct line' of communication with the Minister and his personnel to consider urgent appeals or opportunities should be considered," he concluded.

STRUCTURAL STEEL EXPORT OPTION GROWS IN IMPORTANCE AS S.A. MINING INDUSTRY LOSES SHINE

The ISF continues to play an important role in facilitating relationships between local firms and foreign ones. The principle is simple – firms who want the business must meet the customers face to face wherever they may be.

Neels van Niekerk, ISF director.

Local structural steel companies with substantial exposure to mining projects in South Africa will have to enter, or further expand their export markets or face the possibility of having to substantially shrink their operations. This is the opinion of Neels van Niekerk, South African International Steel Fabricators (ISF) director.

Taking note of the Fraser Institute's globally accredited 'Survey of Mining Companies', it is clear that for local fabricators to find foreign contracts is becoming increasingly important as the local mining industry continues to lose its once famous shine.

The survey measures the overall attractiveness for exploration and mining companies to operate in 72 mining regions of the world.

In the last survey - 2009/2010 - South Africa was pushed from 49th to 61st position in the summary Policy Potential Index. This only just beats the bottom ten regions, which include Venezuela, Ecuador, the Philippines, DRC, Mongolia, Bolivia, Honduras and Guatemala.

There are several other African countries that do better than South Africa including Botswana (21), Mali (27), Ghana (34), Burkina Faso (36), Namibia (37), Tanzania (44) and Zambia (52), while all the important destinations in Southern and Central America – Chile (7) Mexico (28), Peru (39), Brazil (40), Columbia (48) and Argentina (59) – are above South Africa.

The top ten scores are Quebec, New Brunswick, Finland, Alberta, Nevada, Saskatchewan, Chile, Newfoundland/Labrador, Manitoba and South Australia. Seven of Australia's regions lie in the top 30 scores. Scandinavia, with Finland (3), Sweden (12) and Norway (31), will remain important for many years to come.

In circumstances like these exports have become mission critical for South African firms but the export market takes time to develop and, of course, a certain investment. To become a successful exporter is not an overnight thing. It is a process requiring focus and discipline founded on the understanding of several fundamentals in a changing global mining and structural steel scenario.

SA project: QMM Ilmenite mine in Madagascar.

SA project: Overland conveyor, Nigeria.

SA project: Modular diamond mine structures, Canada.

The South African fabricators that have the best chance of success in the global environment are those that run 'lean and mean' and utilise the latest world-best practices to genuinely meet customer needs including:

- **An erection offering**

  Increasingly clients want to deal with a single supply source for their structural steel needs and that includes erection. This significantly helps projects to be completed on time. Time in the structural steel process is critical to the cost of the entire project because it's on the critical path of many other major parts of any mining project.

- **High accuracy of structural components**

  This is only achievable through automated equipment like, for example, the latest generation of beam lines. The cost of rectification through a lack of accuracy and the time lost on site as a result, is a critical expense risk.

- **State-of-the-art shop floor and site control systems**

  These should include in-line hard stamping of structural members and even microchip-marked components to ensure tracking and location on site.

- **Multi-lingual capabilities**

  English alone is not sufficient in many mining countries. For South Africans the most important languages today are French for Africa, Spanish for South America and Portuguese for some countries in Africa and wherever there are Brazilian interests.

- **The ability to follow global trends**

  Commercial trends are changing so fast in the world that even to find work in Southern Africa local firms will increasingly require intimate knowledge of what is happening the world over.

Meanwhile the ISF continues to play an important role in facilitating relationships between local firms and foreign ones. The principle is simple – firms who want the business must meet the customers face to face wherever they may be. For example, there is a plethora of Russian projects in Africa including the imminent investment of about US$1 billion by the Russian State Atomic Energy Corporation (ROSATOM) in the development of their Namibian uranium interests. Should South African companies want to be involved they better be talking to ROSATOM in Russia.

This is why the ISF has been travelling a lot lately to fulfil its main goal, which is to match people in the South African industry with markets in other parts of the world.

This is no exaggeration. The ISF took part in several oil, gas and mining events in the past months including CIM 2010 – Vancouver, Canada; OTC 2010 – Houston,

SA project: Woodchipping plant, DRC.

Texas; Expomin 2010 – Santiago, Chile; Euromin 2010 – Skelleftea, Sweden. In the near future, the ISF will spend two weeks in Australia including taking part in the African Down Under 2010 mining event in Perth.

Africa is obviously a crucial market and is, in fact, the ISF's number one priority area for exports. However, except for in South Africa and Egypt, there are no other major EPCM companies based in Africa, which is generally serviced by EPCM companies in Australia, Canada, Scandinavia, China and Europe. Ironically, our EPCM clients for Africa are in these countries and our role is to facilitate relationships between them and the South African structural steel industry.

While Africa is the number one market, the ISF's number two priority is South America and it also continues to keep its finger on the pulse in identifying the next mining boom areas such as Iran, Kazakhstan and many other countries where mining potential is great.

Many South African main contractors are world-class and winning foreign contracts in the ISF targeted regions is completely within their reach. Apart from Africa, where South Africa has been successful, significant strides have also been made in South America this year, where, due to the ISF's continuous market research programmes and marketing in general, one of our major contractors has opened an office there and another has made the strategic decision of targeting the entire continent as a major potential market.

Neels is optimistic about the ISF continuing to help open and develop new markets. When the ISF started to explore the potential opportunities in South America more than four years ago there was skepticism about the successful outcome of the endeavour. "But our efforts have paid off and now we're also vigorously monitoring opportunities in Australia, Europe and other regions especially in the deep-level mining arena where we are the indisputable world leaders," he concluded.

MEERKAT II – FT3 BUILDING

Exacting quality assurance and safety requirements together with specialist requirements for corrosion protection are a part of the challenge of constructing this great example of an industrial project.

The structure had to be built according to SA standards interpreting the Eurocode.

Sasol continues to develop chemical plants to beneficiate and modify by-products from their plants into commercial specialist products.

Steel structures to support a myriad of equipment and piping are the order of the day. But only those involved in such projects recognise the effort and planning that goes into this type of project such as pausing the steel erection to allow for the plant installation.

Exacting quality assurance and safety requirements together with specialist requirements for corrosion protection are a part of the challenge of constructing this great example of an industrial project.

Steel was the main component and was used due to the ease and speed of erection and practicality of building around the process. The primary 24m x 18m x 27m high structure went up in under three months using 555 tons of steel.

The main challenge in this interesting project was to replicate an existing building and process plant in Europe here in Sasolburg where harsh local climatic conditions had to be taken into account. The BKS-Royal Haskoning Partnership had to design to South African standards based on the original European design standard – bringing together European and South African

The structure went up in three months using 555 tons of steel.

project team

Developer/Owner:
Sasol/Royal Haskoning Dordtse Engineering

Architect:
Walker Smith Architects

Structural Engineer:
BKS (Pty) Ltd

Quantity Surveyor:
Royal Haskoning

Project Manager:
BKS

Main Contractor:
Haskoning International BV

Steelwork Contractor:
Imbabala/Van Staden Engineering

thinking to recreate this unique building and process. The Joint Venture recreated the building to replicate the process under significantly different local conditions, seamlessly.

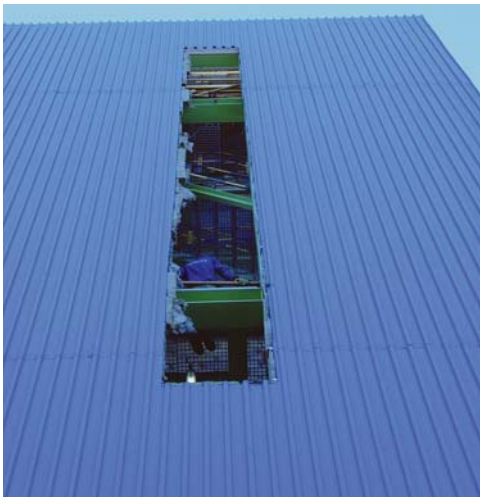
Throughout the phased erection, staged compliance checks and certification had to take place at different points due to vessels being brought in and the installation of process equipment.

A significant number of steel section sizes had to be created out of plate in South Africa. This implied that built up sections were manufactured to match large European rolled sections which do not exist locally. A typical built-up section was 437 x 412 x 505kg/m with a flange thickness of 50mm.

The cladding is a special feature in that it is a sandwich panel, made up of steel sheeting inside and out with thermal insulation inside. The massive panels span six metres horizontally between columns, with no intermediate support. Multi-level flooring consisted of Q-Deck for the composite or Rectagrid for grated flooring.

The value of this project was in creating a process which forms the catalyst for creating a Sasol-patented process of making liquid fuel from gas.

The process vessels on the structure had to be hydro-tested in situ. This meant that the structural members had to be designed for temporary loading far exceeding the final design load for accommodating the requirements of a gas plant.



The cladding is a sandwich panel – steel sheeting the bread and thermal insulation the ham.

Some of the difficulties experienced by the steelwork fabricators and erectors were a very tight programme. In addition to this, the structure had to be erected involving the interface with the installation of mechanical equipment. Steel erection took place around some of the larger process equipment due to the sheer size of it.

NCHWANING III BENEFICIATION PLANT, BLACK ROCK MOUNTAIN

It's far from home, so logistics are critical. A who's who of engineering and metallurgical skills all pull together to create this engineering wonder.

A view of the tailings dam and screening building.

Look at the map of Namaqualand, find Pofadder, find Springbok, see the bend in the road between them? You got it! That's the location of this mine.

It's far from home, so logistics are critical. A who's who of engineering and metallurgical skills all pull together to create this engineering wonder.

The Nchwaning III **Beneficiation** Plant, designed by TWP Projects, will treat up to 900 tons per hour of ore from either Nchwaning II Shaft or Nchwaning III Shaft. The operation produces low and high grade ore that will be stored in four separate 2 500 ton concrete silos. Assmang requires ore from the silos to be **screened** at 75mm while the oversized material will be crushed.

This primary screening structure accommodates the chutes and screen that is required to divert the larger material to the **crusher**. Although the crusher itself is supported on concrete wing walls, steel was used for the main structure in order to accommodate the plate work transfer bin and conveyors.

The crusher will be **choke-fed** to ensure optimum efficiency. Ore from the crusher will then be returned to the primary screen for resizing. The -75mm material from the screen will be transported to the **wet screening** building where it will be screened out and deposited into product bins.

Photography: Reghardt Rautenbach

The mine changes into a landmark of light on the flat landscape of Namaqualand.

LEXICON FOR THOSE OF US WHO DO NOT SPEAK MINE

Beneficiation: Improving the chemical or physical properties of an ore so that metal can be recovered.

Choke-fed: To allow material to fill a space and then vibrate it out.

Crusher: In the comminution (pulverisation) of ore, a heavy-duty dry crushing machine capable of accepting run-of-mine coarse ore and reducing it in size.

Cyclone: The conical-shaped apparatus used in dust collecting operations and fine grinding applications. In principle, the cyclone varies the speed of air, which determines whether a given particle will drop down the equipment through the force of gravity or be carried through friction of the air.

Dewatering screen: Dewatering screens are used to remove water from the product.

Gravity fed: Lifting the material up to a high point in a structure and allow gravity to make it fall through the various processes i.e. pulled by gravity.

Launder: A flume, trough, channel, or chute by which water or powdered ore is conveyed in a mining operation.

Screens: Screens are used to group process particles into ranges by size. These size ranges are also called grades. Screens can be static, or mechanically vibrated.

Tailings dam: One to which slurry (a thin mixture of a liquid, especially water, and any of several finely divided substances) is transported, the solids settling while the liquid may be withdrawn.

Wet screening: The addition of water to a screen to increase its capacity and improve its sizing efficiency. Water may be introduced either by adding it to the feed stock or by spraying it over the material on the screen deck. The latter method is also used in rinsing or washing ores, etc., to recover minerals.

project team

Developer/Owner:
Assmang

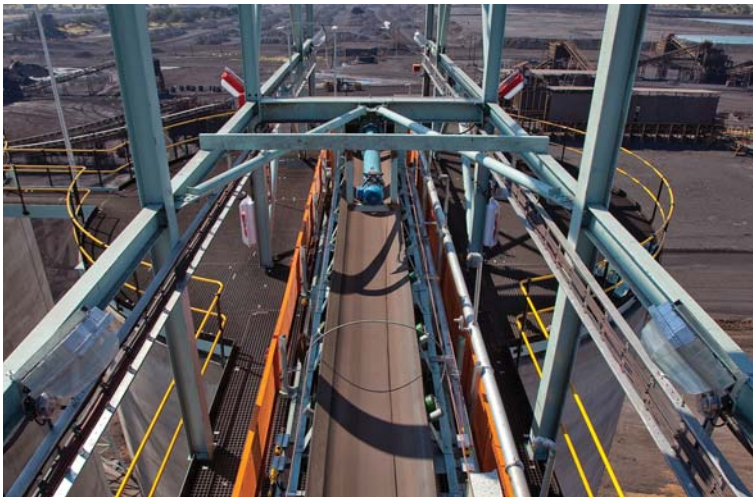
Structural Engineer:
TWP Projects

Quantity Surveyor:
TWP Projects

Project Manager:
TWP Projects

Main Contractor:
TWP Projects

Steelwork Contractor:
Louwill Engineering



One of the numerous conveyors at the mine.

The product sizes are:

- -75mm + 60mm,
- -60mm + 32mm,
- -32mm + 12mm,
- -12mm + 6mm and
- -6mm + 0.5mm

Five screens were required to separate these various size fractions out. Three of the screens are supported in the structure itself, which therefore had to be designed to accommodate the dynamic loads of the screens. This structure also had to accommodate the **cyclones** as well as the head end and tail-end of numerous conveyors. The -0.5mm fraction will be classified through guard cyclones. The guard cyclone underflow will be screened using a **dewatering screen.** The screen will remove excess water from the -0.5 + 0.3mm fraction. This fraction will be stored on concrete pads. The cyclone overflow will be **gravity-fed** to a 15m diameter thickener.

The screen undersize will gravity-feed to the thickener floor drain pump. The material is then pumped to the thickener **feed launder.** The thickener overflow will be re-used as process water, whilst the underflow is to be pumped to the **tailings dam.**

The wet screening building was designed to accommodate three large vibrating screens. With the highest screen 20 metres above ground and the other screens vibrating at different frequencies, the dynamic analysis of this structure proved to be a challenging task. Plate girders up to 1.2m deep were used to not only support the screens, but also to ensure that the natural frequency of vibration of the structure was kept out of the range of the screens frequency.

Structural steel was used as the material of choice for the majority of structures in this process plant as it was deemed to be the most cost effective and fit for purpose due to the ease of construction. Circular hollow tubing was used as bracing for many of the structures as the mass per length efficiency for strength in tension and compression far exceeding other sections.

Large conveyor gantries were designed for optimal span ratios to transport the ore through the process and although the structures were not designed for their aesthetic appeal, they could not be more functional.

PIN BED CLARIFIERS FOR TENKE FUNGURUME, DRC

This is pretty high tech stuff involving high-walled, steep-coned tanks with significant equipment inside them.

Logistics and transport over some of Africa's worst roads are only a small part of such a project.

The brief: Build the client a pregnant leach solution clarifier system at de Tenke, only 170 kilometres north of Lumbumbashi in the Katanga province, in the southern part of the Democratic Republic of Congo.

First, find the definition of 'pregnant leach' in a mining dictionary. Pregnant leaching is a final filtration process one step before extracting copper. This is pretty high tech stuff involving high-walled, steep-coned tanks with significant equipment inside them.

Logistics and transport over some of Africa's worst roads are only a small part of such a project.

PREGNANT LEACH SOLUTION (PLS) CLARIFICATION – PIN BED CLARIFIERS

Fabricating and erecting plant components in Africa are fraught with challenges. As the adage goes, if you see a pair of eyes in the road it could be a giraffe in a pothole. Engineering projects in Africa are challenging for a variety of technical reasons, lack of local skills and infrastructure and sometimes political interference.

The Tenke Fungurume mining project is a partnership between Freeport-McMoRan Copper and Gold, the Lundin Mining Corporation and the government of the Democratic Republic of Congo, (DRC), through Gecamines.

The Tenke Fungurume concessions encompass over 1 500 square kilometers and is one of the largest and highest grade undeveloped copper-cobalt mineral concessions in the world. The project entails an open-pit mining operation and a 40-year mine plan producing initially 115 000 tons per annum of London Grade A quality copper cathode and 8 000 tons per annum of cobalt.

Construction activities for the Tenke Fungurume project are complete, having commenced with copper and cobalt production in 2009 and ramping towards budgeted annual capacity of both copper and cobalt towards the second half of 2009.

The tanks were a composite construction combining steel and stainless steel.

Logistics and transport in the harsh African environment were just some of the challenges.

The primary purpose of Roymec Technologies's part of the project was the supply, delivery to site, supervision of erection and participation in commissioning of three 9.5 metre diameter pin bed clarifier structures, elevated platforms and elevated tank support structures for copper PLS clarification and a single 11.25 metre diameter unit for cobalt precipitate clarification.

Modern solvent extraction (SX) plants are increasingly specifying pin bed clarifiers (PBC) as a final filtration step before the SX because of the proven efficacy of PBC's to contribute to the reduction of crud formation and the increased run time of SX plants. The defining features of Pin Bed clarifiers are high side walls, steep cones and significant internal equipment. The overall construction is not especially heavy but is extremely high with the top of the tank being 18 to 20 metres above ground level. Internal equipment necessitates detailed erection planning to avoid excessive cranage and access.

As in all construction projects on remote sites, cranage and scaffolding is tightly resourced and project managers tend to dislike construction practices which consume either resource for protracted periods. There is little time available on site for trial assembly and no time available for rework.

Acidic PLS electrolyte is aggressive towards mild steel. Traditionally, large tanks in PLS service are fabricated either in acid resistant stainless steels or rubber lined mild steel. Again, the remoteness of the site argued against sandblasting and lining on site and the wetted surfaces were specified in 316 and 304 stainless steels.

Historically, plant owners have been cautious of using composite tanks of mild and stainless steels, owing to fears of galvanic corrosion, leading to the construction of excessively heavy stainless steel tanks with stainless steel external stiffeners and supports. The Roymec design approach utilised a heavy prefabricated mild steel ring beam which was fully fabricated and welded in the workshop and then split for transport after painting.

The ring beam was designed with a wetted stainless steel internal flange and mild steel non-wetted web with an external flange and stiffeners. Mild steel permanent load spreaders were incorporated into the detail to ensure accurate alignment of the thin walled stainless steel tank to the top of the ring beam to support the tank during and after construction and to allow the attachment of pipe and instrument supports after erection.

The plant was laid out in 2-D CAD before the agreed dimensions were passed on to the detailers. The pin bed clarifiers were modelled in AutoCad Inventor.

The following additional design criteria were applied in arriving at the construction sequence that was finally used:

- The design of the tank had to comply with the requirements of API 620/650.
- FEA was used to test and demonstrate that elements of the tank never exceeded the specified maximum stress conditions of API.
- Escorted transcontinental abnormal loads are prohibitively expensive. All tank components had to be suitably detailed to be packed onto a Superlink truck with maximum packing efficiency and without overhang.
- Wetted components of the tank elements are fabricated in 316 and 304 s/s. It was preferable to carry out a maximum amount of stainless steel welding in South Africa.
- The cone development and layout was tested with trial assembly per size of cone.

The top of the tank is almost 20m above ground level.

- All cone sections had to be uniquely identified to facilitate collection and installation.
- After cutting and rolling, tank and cone components were transported to site in fabricated lifting cradles of 5 to 10 ton batches to prevent pilfering or loss of material and to allow quick, sequenced picking of material for erection.
- All mild steel was fully blasted and painted in South Africa.
- As many highly stressed welds as were practical were carried out in South Africa. The remainder of stressed welds, such as the final assembly of the ring beam and the attachment of the cone to the ring beam, were then carried out on site at ground level, where they could be supervised and inspected and then painted.
- Cutting and welding on remote sites are invariably restricted to manual processes.
- Most of the detailed steel work was designed, prefabricated and welded with allowance made for erection tolerances, so that the erector could either marginally trim to suit or weld without alteration.
- Mild steel was painted to the three coat project specification, resistant to erection handling, suitable for site repairs and compatible with heavy occasional splashing by acidic solutions.
- Handling and weld damage to coating systems on mild steel were repaired after construction. Mild to stainless steel welds were painted after welding to minimise the opportunity for galvanic corrosion.

project team

Developer/Owner:

Freeport-McRan Copper and Gold, the Lundin Mining Corporation and the government of the Democratic Republic of Congo, through Gecamines

Structural Engineer:

KS Szymczak

Project Manager:

GRD Minproc

Main Contractor:

GRD Minproc (Perth)

Steelwork Contractor:

Group Five

Detailing and Erection:

Roymec Technologies

Load spreaders were used to ensure accurate alignment of the tank to the ring beam to support the tank for the attachment of the pipes.

The final erection procedure entailed development, cutting and rolling of all shell sections of the tank, followed by trial assembly and witnessing in South Africa. The erection of the equipment was carried out successfully and the equipment was commissioned in 2009.

The success of this project was due to careful project management, shipment and fabrication which allowed Roymec Technologies to bypass many of the pitfalls in commissioning projects in Africa. These included:

- Engineering management of the project to reduce any error later on in the erection of the equipment.
- Careful planning during the shipment phase
- Technical attention to detail during the fabrication phase.

ZIBULO COLLIERY

THE LONGEST SINGLE FLIGHT CONVEYOR IN AFRICA

The Zibulo Overland Conveyor is the longest single flight overland conveyor in Africa, and the second longest in the Southern Hemisphere. It is one of the longest single flight overland conveyors in the world. It features three horizontal curves and several convex and concave vertical curves. The very long length of 15.9km necessitated comprehensive static and dynamic analysis of the entire system.

A colliery becomes beautiful at night.

Have you ever wondered what goes on at a typical South African colliery?

Some of you are probably now thinking well who cares? But for those of you who are interested...read on!

We have a choice of two types of mine in SA. Mines dig coal out of the ground either from the surface (so called open cast or open pit mining where coal could be as close as 20 metres below the surface) or by sinking a shaft (underground mining). In SA the shafts will be of the order of 200 metres deep). In underground mining continuous mining mechanical equipment is used to recover the coal, crush it down to sizes suitable for conveyor handling up an incline shaft to the surface for further treatment and storage.

In the case of an open pit mine (In this case we have used Mafube colliery as the example on which what follows is based), the overburden (i.e. natural soil/rock layers that lie on top of the coal layer/s) is removed by blasting and/or using enormous earth moving equipment. The overburden is stockpiled so that after the coal seam has been removed the original overburden can be replaced to reinstate the surface back to as close as original condition as possible as required by the law of the country.

The coal then gets dislodged by blasting and or earth moving equipment producing so-called run of mine (ROM) coal.

Enormous tipping trucks (120 ton capacity) transport the coal from the open pit mine to the coal receiving steel bins which could have a capacity of 400 ton. As these bins sit above ground, road ramps are built for the trucks to reach the tipping level of the bin (16 metres from ground level).

On the top of the bin is a static grizzly which allows the coal that is small enough to be handled by the next process to pass through. Bigger items would be broken above the grizzly when necessary.

At the bottom of the bin is a feeder which assists the coal to be fed into the primary crusher.

project team

Developer/ Owner:
Anglo American Inyosi Coal

Mechanical Engineer:
Roymec (Pty) Ltd

Structural Engineer:
Roymec (Pty) Ltd

Main Contractor:
Roymec (Pty) Ltd

Engineering Contractor:
Roymec (Pty) Ltd

Sub-Contract Fabricator:
IVMA Engineering

The primary crusher breaks the coal down to lumps of a nominal 300mm size at a rate of 1750 tons per hour. From the primary crusher the coal is fed onto a conveyor that moves the material to the crushing building which houses the secondary and tertiary crushers.

The secondary crusher breaks the coal down to 100mm nominal size which then feeds into the tertiary crusher breaking it down further to 50mm nominal size.

The crushers are designed to run 24/7 when the mine is operating at peak production. The crushed coal is then taken to an open circular stacker stockpile with a 60 000 ton capacity. The product is blended at this stage to get a homogeneous mix of coal.

From the stockpile, the material is reclaimed and conveyors take the coal to the coal washing plant.

The coal washing plant sorts the coal into the two products, i.e. coal for Eskom and export quality. Discard coal is transported to waste.

Each product then travels along its own conveyor system. At the Mafube colliery the Eskom coal and export coal go into a linear stockpile system. Each stockpile is about 90 metres long and has a storage capacity of 40 000 tons.

Through a series of coal gate chutes and a 26km long overland conveyor system, the Eskom coal goes to the Arnot Power Station and export coal to a final load-outstation. At the load-out station there is an export silo which is 60 metres high with a live capacity of 8 000 tons. The loading system is capable of loading 100 train wagons with a capacity of 80 tons each in two hours.

ZIBULO COLLIERY AND THE ZIBULO OVERLAND CONVEYOR

Coal from Zibulo Colliery is processed at the Phola processing plant – an Anglo American Inyosi Coal/ BHP Billiton joint venture operation. Zibulo Colliery is connected to the Phola Processing Plant by means of the long, undulating and

A gantry spanning a wetland is designed for no spillage.

Attention to detail: every bolt in its place.

curved overland conveyor which transports 1 650 tons/hour of ROM coal.

The Zibulo Overland Conveyor is the longest single flight overland conveyor in Africa, and the second longest in the Southern Hemisphere. It is one of the longest single flight overland conveyors in the world. It features three horizontal curves and several convex and concave vertical curves. The very long length of 15.9km necessitated comprehensive static and dynamic analysis of the entire system.

THE SHAFT CONVEYOR SYSTEM

At Zibulo Colliery coal is brought from a depth of 176m to surface with an Incline Conveyor (CV001) carrying 4 200 tons per hour and is powered by 3 000 KW. It discharges into a 6 000 ton buffer silo. From the buffer silo coal is fed into a crushing and screening circuit by means of a second conveyor (CV002). The crushing and screening plants are similar to those supplied at Mafube.

The material is then accelerated to a predetermined speed by means of an acceleration conveyor (CV003) to match the speed of, the Zibulo Overland Conveyor (CV004).

This configuration allows the Zibulo Overland Conveyor to operate at optimal efficiency in conveying the coal to the Phola processing plant almost 16km away.

The Zibulo Overland Conveyor system was designed, erected and successfully commissioned

by Roymec in 2009. This followed the completion of the materials handling system at Phola Processing Plant, also executed by Roymec.

PHOLA PLANT

The Phola coal washing plant (beneficiation plant) conveyor system consists of 21 conveyors of which the longest are about 2 km long. The complexity of the system is due to the joint venture between BHP Biliton and Anglo American Inyosi Coal. The conveyor system feeds coal from both mine sites to the Phola coal washing plant.

The coal washing plant separates the coal into two products, i.e. coal for Eskom consumption and coal for export. From the product stockpiles coal is loaded into unit trains consisting of 100 wagons via 8 000 ton silos and load-out stations. The conveyor system can also bypass the product stockpiles and deliver the coal directly to the load-out silos for export use for both companies. The silos are 70 metres high for both Eskom and export purposes.

All these projects mentioned are situated in sensitive environmental areas and the conveyors are designed to eliminate spillage so as to prevent contamination of surface run-off water.

Some technical information about the coal and the Zibulo Overland Conveyor

Material	Coal
Bulk Density	850kg/m^3
Nominal Capacity	1 750t/h
Length	15.9km
Lift	-16.9m
Belt Width	1 200mm
Belt Fill	76%
Belt Speed	4.71m/s
Power (Absorbed)	2 286kW
Power (Installed)	3 000kW
Drives	6 x 500kW
Drive Configuration	2 dual x Head, 1 dual x Tail
Horizontal Curve 1	5 000m radius
Horizontal Curve 2	5 000m radius
Horizontal Curve 3	6 000m radius
Belt Class	ST 2500

The Zibulo conveyor is the longest conveyor in the southern hemisphere.

ABOUT ROYMEC

Roymec employs a number of professional registered engineers both in the mechanical and structural fields. They have been in business for 31 years. They started as structural steel contractors who manufactured their structural steel themselves.

All mechanical and structural designs are done internally by Roymec. They are assisted by civil and electrical consultants. Material flow and platework is also designed in-house. All fabrication drawings are produced using Tekla 3-D packages (X-Steel). Roymec is the largest licence holder of Tekla in South Africa

They subcontract the fabrication of all their steelwork requirements, but always supply all the fabrication drawings. They have an extensive quality control and expediting department to ensure fabrication is done to specification and exact requirements when expedited to site. Wherever it is possible, most of the steelwork Roymec supplies or specifies is hot dipped galvanized.

Heavy civil engineering works are sub contracted to major civil engineering contractors.. The installation of structural and mechanical components is done by their own construction workforce. The systems are commissioned by Roymec.

A view of the conveyor coming out of the 'hole' on its way to the screening building.

CAMP PEMBA – MOZAMBIQUE

The remote location of the site made the use of conventional building methods not only uneconomical, but also time consuming because, like most projects, the camp had to be built within a limited time period.

Simple detailing and design allowed the project to be completed within the time frame.

FACT FILE

Completion date: August 2009

Tons of steel used: 17 Tons

Type of cladding: 9mm fibre cement flat board was used as external cladding.

SA content: 100%

Total cost of project: Approximately 800 000 USD

Cost of steelwork: R580 000

Structural framing: 0.8mm Gauge Lightweight steelframe braced with strap bracing.

project team

Owner:
Anadarko

Architect:
Len Lategan Management Services cc

Structural Engineer:
JNJ Richter

Main Contractor:
Remote Site Solutions

Steelwork Contractor:
Innosteel (Pty) Ltd

Innosteel was approached by Anadarko Petroleum Corporation to design and provide a 50 man camp with entertainment and gymnasium facilities for their staff. The camp was located in the heart of Pemba, a coastal town in the northern parts of Mozambique.

The first challenge and opportunity for lightweight steel was the client's requirement that the camp be of a higher quality and more permanent nature than the normal refrigeration panel type camps. The lightweight steel frame in a flat packed format proofed to be more cost effective to transport from Johannesburg to Pemba in Mozambique, a distance of approximately 4 000 kilometers.

Key considerations for choosing the lightweight steel frame building method, were the following:

- Cost efficiency of the method,
- Speed and ease of erection on remote site,
- Energy efficiency (good insulation for extreme temperatures)
- Compact and lightweight material minimises transport costs.

THE BUILDING PROCESS

The remote location of the site made the use of conventional building methods not only uneconomical, but also time consuming because, like most projects, the camp had to be built within a limited time period.

Although the camp has no breathtaking aesthetics to mention, it was designed compact and practical to minimise the costs of services such as plumbing, electrical and air-conditioning. The 28 single rooms were divided into three blocks between eight and ten rooms per block. Each block were designed with four to five rooms 'spined' together with a row of double bathrooms in the middle.

The camp also included six 40m^2 small flatlets to serve as the managers' accommodation. An entertainment building with a small gymnasium and ablution facilities also formed part of the camp.

The compact design of the camp minimised the cost of the air-conditioning.

The total project covering almost a 1 000m^2 were fabricated in Johannesburg.

Certain sections were assembled as sample units and the rest were marked and flat packed into containers to minimise the transport costs. With the necessary documentation and detailing, the camp were packed and transported on seven Interlink trucks consisting of two container loads and five open truck loads.

The project was completed with ease within the allowed timeframe due to the simple detailing and lay-out design. Taking into consideration the remoteness of the site and the some use of unskilled local labour, it was quite an accomplishment and a feather in the cap for light steel frame building.

The use of the lightweight steel framing system enabled the project to be completed accurately and neatly, which would not have been possible with conventional building methods.

To those spoiled by aesthetic beauty this might seem unattractive and basic, but this camp is 'heaven on earth' for the workers who spent days at sea hammered by wind and rain while pumping oil from the depths below.

John Barnard, SASFA director.

LSFB EXPANDS INTO AFRICA

By John Barnard, SASFA director

The advantage LSFB offers the developer is that the design and manufacture of the light gauge steel frame are typically carried out at a centralised manufacturing facility, packed in a container and shipped off to site, where the assembly and erection operations are carried out.

Due to the low mass and robustness of light steel frames, SASFA realised right from the outset that LSFB will find a place in the export market, at least into overland Africa markets. The advantage it offers the developer is that the design and manufacture of the light gauge steel frame are typically carried out at a centralised manufacturing facility, packed in a container and shipped off to site, where the assembly and erection operations are carried out.

It is important to note that most of the quality assurance is incorporated into the manufacturing process, reducing the need for QA on site. While the light steel frames are eminently transportable, manufacturers may for large projects elect to ship their manufacturing equipment, in a container, to site where the profiling and assembly can be carried out.

Here follows four SASFA members' export success stories:

MITEK INDUSTRIES

Since the introduction of their Ultra-Span light gauge steel roof truss system almost 10 years ago, MiTek has been very successful in developing an extensive export market for their product throughout the African continent. In fact, some 50% of their production of light gauge steel trusses is being exported.

After designing the roof trusses, MiTek profiles the steel sections required at their factory in Midrand, using high strength galvanized steel sheet in thicknesses ranging from 0.8mm to 2.0mm. ArcelorMittal SA is their preferred supplier. The profiled sections are bundled and packed into six-metre containers – material for trusses for up to 2 000m^2 of roofing can be shipped in a single container. Their customers cut the sections to length, and assemble the trusses for each project.

MiTek has focussed their attention to sub-Saharan Africa, as shipping to Northern Africa can be onerous. The entire central and southern African market, as well as the islands, can be readily supported from South Africa. Over the past year the supply of Ultra-Span light gauge steel roofs has been augmented with the supply of light gauge steel wall framing – complete house structures are being exported in kit form.

MiTek's Nova-Vida Village project, Angola.

SOUTHERN AFRICAN
LIGHT STEEL FRAME BUILDING ASSOCIATION

Safintra Building Solutions' 800m² warehouse project in Uganda.

The types of roof structures that are being exported are extremely diverse, ranging from ordinary individual houses to complete housing estates, including institutional projects such as hospitals, schools and churches as well as commercial projects such as offices and warehouses.

Materials for roof trusses and wall panels for use in warehouses, churches, houses, offices, schools, hostels and shopping centres are exported to 20 countries in Africa, as well as Seychelles, Madagascar and Mauritius.

SAFINTRA BUILDING SOLUTIONS

Safintra Building Solutions has also entered the export market, as is illustrated by a 800m² warehouse project in Arua, Uganda. The design and manufacturing were completed in Durban, and the light steel frame was packed into two containers. They sent an erection team consisting of four artisans to the site, who employed nine local labourers, and they erected the entire frame – including the 15m span roof trusses – in a mere three weeks. Erection of the cladding took three months, and the total project was completed in six months. This project has led to several other enquiries, which is being pursued at present.

KWIKSPACE MODULAR BUILDINGS

Kwikspace Modular Buildings is another SASFA member exporting into Africa, as illustrated by the Bechtel project in Soyo, Angola. They made use of structural insulated steel panels, with light steel frame trusses to support the roof of the training centre. The use of pre-painted steel for the sandwich panels meant that very little finishing needed to be carried out after erection – an ideal solution for a building project in a remote area.

LIGHT FRAME HOMES

Light Frame Homes tendered successfully for a project in the Seychelles, consisting of a larger (350m²) and a small (120m²) house. The light steel frames, including the roof trusses, were manufactured at their factory in Cape Town, packed into one six-metre container, and shipped to Seychelles. A building team of five artisans went to erect the steelwork and do the external cladding, which was completed in only eight weeks – remarkable when considering that almost all the material had to be shipped from South Africa. Needles to say, people queued up to go and do final inspection!

Light Frame Homes' residential project in Seychelles.

Kwikspace Modular Buildings' Bechtel project, Angola.

A wide angle shot of one of the four halls occupied by the IBC.

NASREC 2010 INTERNATIONAL BROADCAST CENTRE (IBC)

The Hage team faced a daunting challenge: they had to come up with a system that could be procured (available locally) and erected in a very short space of time, be easy to erect and dismantle, be 'good looking' and strong at the same time, be able to disguise a multitude of services from the end users' eyes, be adaptable to meet sound and space specifications for a project that was given a 'non-negotiable' requirement – succeed in the time available.

South Africa is still riding the positive wave the Fifa World Cup 2010 created for the country's international image and for business. A lot of the success of the World Cup depended on the logistics of getting the spectators to the stadiums smoothly, but what about the viewers at home? The final alone was watched by more than 700 million viewers on television (and listened to on the radio).

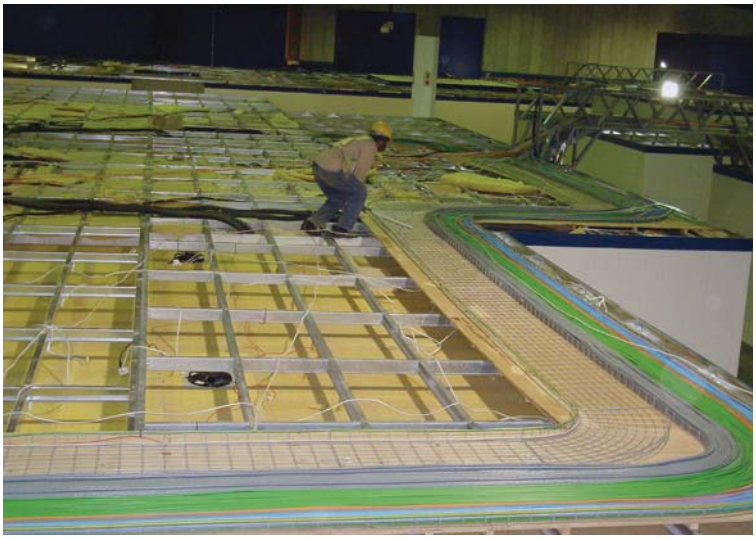
The logistics of creating a hub, where the various international media companies could broadcast the games, conduct studio interviews and do game post-mortems were less talked about. But if you look at the numbers, making sure the broadcasting went without a hiccup could have been a tad more important.

The requirements of this project speak for itself – it had to be quick, soundproof, structurally sound to withstand the loads of the equipment, dismountable in a short time and acceptable for international media to occupy.

The solution – Lightweight Steel Frame Building

THE BUILDING METHOD SELECTION PROCESS

Three main contracts were to be awarded to the architectural, electrical and air-conditioning components respectively. Competitive tenders were invited for the architectural contract and a number of different proposed systems were received.



The LSFB structure had to support the loads of the electrical and optical cables for broadcasting purposes.

Construction team meeting in Hall 7.

The final competing systems were based on a full LSFB solution with a number of different combinations of LSFB, dry walling and wooden frames and boards as well as a 'green' system based on recycled plastic insulated wall panels.

The client, Host Broadcast Services (HBS), the official provider of broadcast services to international football events, requested Molapo Projects (their name was recently changed to HAGE Projects) to tender.

The Hage team faced a daunting challenge: they had to come up with a system that could be procured (available locally) and erected in a very short space of time, be easy to erect and dismantle, be 'good looking' and strong at the same time, be able to disguise a multitude of services from the end users' eyes, be adaptable to meet sound and space specifications for a project that was given a 'non-negotiable' requirement – succeed in the time available.

The directors, Gert Visser and Hardus Visser, both structural engineers, immediately identified the potential to use a combination of LSFB and the Kwikspace panel system – now called 'The Hage system'. This was the first time the LSFB system was to be used to design studios and production rooms, so HBS required that a prototype be erected for testing. This was done in October 2009, to leave sufficient time should design changes and re-testing be required.

Hage erected the prototype studio in conjunction with Clotan Steel (a well known supplier of LSFB systems) and Kwikspace. The client was suitably impressed with the prototype as well as with the well-organised Kwikspace factory on the door step of the NASREC venue where the IBC was to be constructed. Kwikspace agreed to become the main contractor for the project, with HAGE Projects as the consulting structural engineers.

The crucial success factors that won the tender were:

- Speed and ease of erection and dismantling of both LSFB and Kwikspace systems;
- The Hage system had the ability to be adopted to satisfy the stringent technical sound engineering requirements;
- The Kwikspace system offered a clean, finished product that does not need painting or a lot of finishing activities;
- The Hage system offers a lot of flexibility in terms of meeting special client requirements such as raised floors, ceilings, etc.
- All structural elements are lightweight and can be handled by humans without the help of cranes;

One of the panels in the African Plaza.

LSFB lent itself to cater for special requirements.

- The inherent structural strength of LSFB compared to other systems. The largest studio was 12m x 18m x 7m high – normal steel or wooden truss would have to be quite large and heavy to span 12m.

THE TIME CHALLENGE

The total project (a usable area of 22 000m^2) had to be completed in four months. The walls, ceilings and LSFB cable bridges had to be completed in two months to allow other services such as electrical supply, signal cables and air-conditioning to be installed. The contract made provision for very stiff penalties should the end date be overrun. The first penalty was already applicable on the 10th of March! So, there was no time to correct errors, as the success of the World Cup would depend on the timeous availability of effective broadcast facilities.

To add to the contractors' stress levels the complete broadcast centre has to be dismantled and removed within a period of six weeks after the World Cup.

An example of the soundproof panels used in the studios.

OTHER CHALLENGES

The success of the IBC would be measured on the satisfaction of the end-users, not only if the centre offered good accommodation, but also if the sound specifications were met. The sound proofing and acoustical properties of the studios, technical rooms and production rooms were designed in conjunction with Derick Louw from A Sound Choice. He did such a good job that the specified sound-proofing and reverberation properties were already achieved during the first round of the 'mock-up' testing.

THE IBC LSFB STRUCTURE

The architect, Riaan Visser from +27 Architects was the South African architect appointed by Kwikspace. The South African and international architects liaised continuously during the whole planning stage that kicked off in March 2009. The space allocation and overall layout of the IBC were done by HBS France, while +27 Architects were responsible to create detailed design drawings for the individual television and radio stations.

Special elements in the African Plaza, the heart of the centre, were designed by +27 Architects to create a sophisticated and modern feel such as the large boxed windows and help desks.

For Gert as the 'traditional structural steel engineer' the LSFB system opened a new world of possibilities. For example, the combined use of light steel elements such as light steel joists and hot rolled sections can offer large savings.

On this project the roofed environment inside the Nasrec exhibition centre allowed the designer to exclude the effect of wind loading and other forces of

nature on the structures. Use was made of the lightest materials available locally that still met the required insulating and other properties.

This resulted in a very lightweight LSFB roof panel structure over the office and production room areas. Where large rooms demanded free span roofs, additional LSFB web-joists spanning between walls were added to which the roof panels could be tied. Square hollow sections were used as columns where possible. The use of anchor bolts was not allowed, so the whole broadcast centre was stuck to the floors with double sided sticky tape.

The wall structure for the studios consisted of a normal LSFB stud system, while a LSFB joist system was used for the roofs. The studios were designed to carry additional lights and sound equipment. Lighting frame structures, made up of normal scaffolding pipes, were fixed to the roofs of all studios to allow end-users to attach their lights and equipment.

The Kwikspace system can be described as a wall panel system consisting of a 40mm thick sandwich of two Chromadek sheets with a polyurethane foam filling. A C-shaped bottom channel is fixed to a concrete slab along wall lines. The panels fit side by side into the bottom rail. The vertical sides of the panels are shaped with male and female joints to fit seamlessly into each other. A C-shaped top channel is fitted on top of the panels to provide an additional tie-piece/stiffener which serves as a wall plate to support the roof structure. Windows and doors can be fitted in the factory or if required be cut out and fitted on site very easily.

project team

Client:
Host Broadcast Services (local and international)

Architect:
+27 Architects

Structural Engineer:
Hage Projects

Main Contractor:
Kwikspace

LSFB Frames and Web-joists:
Clotan Steel

Mechanical and Electrical Engineers:
Ingplan Mechanical & Electrical Consulting Engineers

Electrical Supplier:
ADL Electrical

Air-conditioning:
Centravac air-conditioning

CONCLUSION

After dismantling the IBC, care will be taken to re-use and recycle the material where possible. The Kwikspace panels will be recovered for re-use. The materials used for the studios and other areas will be recovered as far as possible and a large quantity of OSB boards, carpet tiles and ceiling panels will be available for sale from Kwikspace. The LSFB frames and web-joists could be re-used or recycled as steel scrap.

The system used for the 2010 IBC has definitely made a statement in efficiency, and as an esthetical pleasing way to deliver a very large facility in a very short time period. Hopefully this South African system will have an influence on the decision for the IBC of the next World Cup in Brazil which will be planned and prepared in the next four years.

ABOUT HAGE PROJECTS (previously Molapo projects)

Molapo Projects (Pty) Ltd was established in 2002 in Vanderbijlpark by Gert Visser (Pr.Eng) with three partners. In 2010 the company changed its name to HAGE Projects (Pty) Ltd, after another company who owns the Molapo trade name forced them to do so.

The company is now owned by Gert and his civil engineering son, Hardus joined him in 2009 after a few years at Murray & Roberts Construction. Gert involved his other son Riaan who runs his own architectural practise (+27 Architects) in Hatfield Pretoria.

It is evident that the trio made a very good team for the IBC project!

The light steel frame for one of the sound studios going up.

SOCIAL SNIPPETS

By Marlé Lötter, Events Manager, SAISC

A BIT OF STEEL 'GEES' DURING WORLD CUP 2010!

If you visited the SAISC offices in June 2010 you would have been welcomed by a cheerful flag display and many signs of national pride. Our staff, including the directors, regularly sported our soccer shirts and shortly before the official kick-off day we even stood on Empire Road along with hundreds of other proud countrymen in support of Bafana Bafana. Most memorable for us, however, may be kicking a few balls in the car park with the security personnel.

After all, we had every reason to celebrate this event – even though Bafana fell out after a brave fight, the brilliant engineering contained in the stadiums and broader infrastructure of airports, bridges, roads and the like left a real legacy for South Africa. You will certainly remember the remarkable steelwork that featured in Steel Awards 2009. We are bound to see more of that in Steel Awards 2010 on 15 September this year!

BUILDING TEAM SPIRIT AT DANIELSRUST GAME FARM

23 June 2010

Busniness-wise everything indicated that the World Cup month of June would be different than usual. SAISC used the opportunity for a spot of team building. For a single afternoon we locked the doors and left behind... the technical queries... answering the telephone calls... selling the books... setting up meetings and events... judging Steel Awards projects... training the draughtsmen... and shining up the office to go quad-biking at Danielsrust Game Farm near the Cradle of Humankind. Quad-biking through fields in close proximity of zebra, wildebeest, blesbok and eland on a beautifully clear afternoon was exhilarating, yet safe for even the most inexperienced drivers among us.

This was certainly one time 'the wheels did not come off'!

In the driving seat! From left: ISF Director, Neels van Niekerk with SAISC Directors, Hennie de Clercq and Spencer Erling.

The staff of SAISC, ISF, SASFA and the DSE/SAISC Draughting School* had great fun at Danielsdrift. From left: Patricia Khunou, Hennie de Clercq, Roelf Lizemore*, Debbie Allcock, Spencer Erling, Dennis de Nysschen*, Tiana Venter, Marlé Lötter, Jenny Claassens*, Neels van Niekerk, John Barnard, Pamella Mnyanda, Kobus de Beer, Viv van Zyl.

HOW TO ENSURE YOU DO NOT WIN A STEEL AWARD!

By Spencer Erling,
Education Director, SAISC

Bad workmanship is an absolute no-no! This includes steel designed and/or detailed with obvious structural errors. We have seen many a project where clearly the strong axis of the steel is facing the wrong way or where there is obviously no overall torsional stability for a building or has not been properly braced with an obvious load path for all forces.

Steel Awards really is a big annual issue for the Institute. We have just come out of phases I, II and III of the 2010 process, namely to get the entries submitted, processed into our system and adjudicated.

And before you ask, yes I do know the results, but I won't pass them on to you, do not try bribery either!

The judging process starts with a review of each of the entries. We really do have some very tardy people who submit the entries. At the time of writing, some nine weeks after entries closed there are still two hopefuls that have not submitted their motivations or entry forms. You can guess what has happened to those entries. At least we do sort and recycle our scrap paper, thanks for your contribution!

The judging team, many of whom have been doing the job for a good few years (and in one case probably decades), all agree we learn new and useful bits of knowledge each year during the process. These might be structural, clever design, contractual and sometimes just plain interesting facts!

What we tend to do in the process is highlight (after all that's what the awards are about) excellence in the use of steel. Those projects that stand out above the rest – the really excellent ones. We also tend to minimise the exposure of the 'not so excellent' and some cases downright poor entries. But we do have the good grace not criticize those poor projects publicly and stick to our promise that we do give every entry some mileage.

Let's talk about some of the features of entries that 'turn our judges off'.

For starters, remember it is that first impression that's going to catch the judges' eye. It is those pictures you submit that usually decide which projects will make the short lists. And don't think that we have not already worked out years ago that it is those pictures that can be and often are the most misleading parts of an entry.

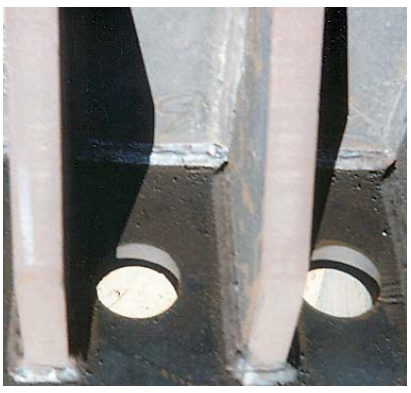
By way of example, how can you capture and do justice to a project the size of, say, the Moses Mabhida Stadium (last year's overall winner) on just a few pictures. Mission impossible! But then, of course, high profile projects of that nature are so well known and covered in daily, weekly, monthly press and TV that they just automatically move themselves onto the short lists.

We also know that strategically selected photos can (and do) avoid the bad parts of some projects. Do you remember that old 'nice from far, but far from nice' expression?

So, knowing that photographs do not do justice to the project either in a positive or negative way, we always make our best effort to get to see the short listed projects. Sometimes this is logistically impossible like the Marion Island project of

Bad welding.

Fire that guy with the grinding machine!



Missing bolts.

some years ago and even then Hennie got to see it during construction and could give us good feedback.

We also make an effort to go and look at projects that did not make the short list. I can think of at least two projects that we visited this year just because we were round the corner from the project while visiting other sites. We try not to do an injustice to any entry by not having someone from the judging team or institute staff member from making a draai to see the site.

On many an occasion we have had one of our Institute members from those faraway places to go and be our eyes just to make sure we have not read it wrong. From time to time our judges have been involved in one or more projects and have been heard to say "that's one of ours, I will keep quiet... but really it's not great..." kind of thing.

However, I have a theory: For the experienced judges, after the first viewing of all the entries, they are very close to the end result right away. This year we ran a small competition to test the theory. We made the team of judges each select their overall winner based on the first viewing of all the entries. We kept their selections till after the final adjudication. The theory was proven to be pretty accurate, they all chose either the overall winner or a category winner that ran a close second!

There is no doubt that the special projects jump out at you and raise claim for recognition on their own.

Back to bad things that turn our judges off.

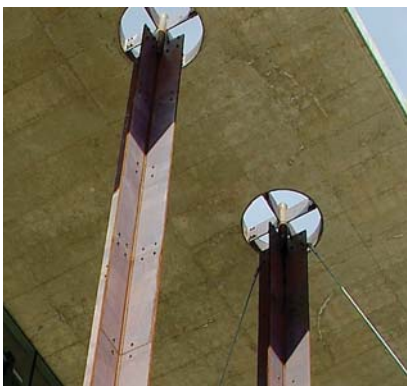
Bad workmanship is an absolute no-no! This includes;

- Steel designed and/or detailed with obvious structural errors. We have seen many a project where clearly the strong axis of the steel is facing the wrong way or where there is obviously no overall torsional stability for a building or has not been properly braced with an obvious load path for all forces. Inadequate connections fall into this category!
- Cantilevers made out of 'T' bars with no compression flange! We have even seen buckled weld in this situation. We usually raise such short comings with the design engineer in question. Sometimes they are very grateful for our comments (they should be after all he has received, free of charge, a very high powered inspection team go over his job!) Only once in my eight years of awards judging involvement has the engineer been able to prove he was right – and of course received our apology for stirring the hornets nest.
- We have had at least two projects where the main portion of the job is excellent. Then we get to see the 'secondary' units. These units have been found to be in various stages of structural failure (fortunately not yet collapsing!). Needless to say we saved them from becoming terminal in a 'human deadly way'! But they were terminal as far as a steel award was concerned.
- Steel that obviously did not fit (this could either be fitted up in the works or on site), or has been erected in the wrong place, causing misalignment and/or poorly executed repair work are terminal. Unintentionally bowed steel is only too often present.
- Projects that have been presented warts and all – such as damaged flanges with no attempt to repair same, bent angles and the like. They just cannot rate being called 'excellence in the use of steel'.
- Poorly executed or presented welds (even though they might have been done on site) is a definite no-no!
- Poorly executed or presented painting (even if it is for corrosion purposes only and not for decorative purposes) is almost terminal but a project with rust sticking through paint work is crossed off the list. You might remember we visited some very special houses on the Garden Route last year. At least one of these houses fell by the wayside because it fell into that category.
- Whilst it is not strictly our concern, poor concrete always detracts from the overall nature of the project. And boy, have we seen some bad concrete, honeycombed, shutters kicked, misaligned, bolts in the wrong place to name but a few eyesores.

So a hint to the project teams working on projects to enter into next year's awards. Learn from others mistakes!

- Plan your entry photos and,
- Make sure your final presented project meets acceptable standards (that does not necessarily mean lots of spit and polish finish).
- Make an effort to tidy up shoddy workmanship.

Your chances of success will only get better and better.



Slender columns on the limit.

Rusted (already!).

'T' bar cantilevers – oops!