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Volume 37 No. 4 2013

IN THIS ISSUE:

Mining and Industrial Projects

OFFICIAL JOURNAL OF THE SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION

Total process optimization

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

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EDITOR'S NOTE

The SAISC is busy with a 'buy local' campaign and you will soon see the visual aspects of it. Steel Construction has published numerous articles on the multiplier effect and the negative impact of cheap imports on the local power pylon industry. Kobus de Beer has been our champion in this regard negotiating with Eskom and working with the dti to get import duties in place to level the playing fields for our local steel construction industry.

It is a tough cookie to crack and we are in the same boat with many other countries. In the second issue of this year, our SteelFuture issue, we read what the Australians have been up against and how they are trying to keep their local industry alive. The situation is complicated and how decisions are ultimately made remains a bit of a mystery to me, but I believe information and awareness are the keys to turning it around.

When you look at what the country is losing by importing goods that we are more than capable of producing ourselves it is hard to understand why not more is being done. One only has to page through this issue to realise how capable our own steel construction industry is. We feature some of the mining and industrial projects entered for Steel Awards 2013. Some of the projects show very innovative South African designed solutions that are already attracting foreign interest. Some of them are world class projects showing excellence in the use of structural steel. Some of them are run-of-the mill warehouses, but with clever and cost effective solutions that ultimately save the client money. And that is the bottom line.

Remember to book your table for Steel Awards 2013 and come and see which one of the 'beauties' on pages 11 and 12 wins the crown for our local industry.

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Illovo Sugar national distribution warehouse entrance

Photo: Grant Pitcher

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SAISC COMMENT

By Dr Hennie de Clercq,
Chief Executive Officer, SAISC

The market for steel and steelwork for the African continent is large. At a guess, some 2 to 3 million tons of steel are used for structural applications per year. Stripping out the South African and Northern African parts would still leave us with at least a million tons per year, much more than what is consumed in South Africa.

INTO AFRICA

The theme of this year's Steel Awards is 'Into Africa'. Not the Africa of 1 000 years ago with wild animals and near-naked tribal dancers, but the continent of today with its bustling population and the variety of its cultures, marked by colour, music and dynamism. On one level choosing this theme was just a question of selecting something that lends itself to a bright, optimistic and exciting event, and surely the African theme inspires all manner of creativity.

But on another level we did not choose Africa as we could just as well have chosen a Caribbean or South Sea Islands theme. Observing the process that led to the choice made me aware of a special feeling towards this continent among all of us. Africa has been denigrated by many and even today most come to our continent and move through it as in a capsule of perfumed air, taking pictures while trying not to touch anything or be bitten by anything (as though we have any competition for the mosquitoes or black flies of places like Canada or New Zealand!). It may be quite surprising to such people to see how emotionally partial and loyal we Africans are to our continent.

Of course, the SAISC is an industry-based organisation, so commercial considerations should never be excluded from our decision making process. It is thus quite clear that 'into Africa' should also be construed as seeing the continent as a marketplace for our industry. This it has historically been. Over the years we have come to see those countries to which steel can be delivered by truck, which includes everything up to the Congo, as being just part of the South African playing ground.

Unfortunately, that is no longer the case. Maybe we dropped the ball during those heady years prior to the FIFA World Cup when our industry was so busy that we could not even supply all of the steelwork for the stadiums, much less go looking for work in other countries. So while we were inwardly focussed, companies from Europe, South America and Asia appeared on our doorstep and established themselves as suppliers to this market. The result is the somewhat embarrassing situation that while the theme of Steel Awards 2013 is 'Into Africa', the only project entered for the competition located outside South Africa is on the island of Saint Helena.

The market for steel and steelwork for the African continent is large. At a guess, some 2 to 3 million tons of steel are used for structural applications per year. Stripping out the South African and Northern African parts would still leave us with at least a million tons per year, much more than what is consumed in South Africa.

It is interesting to observe the trends that have been noted worldwide in the consumption of steel. When a country is in an underdeveloped state little steel is used, less than 100 kilograms per person per year (the world average is about 200kg). During the development phase of a country the intensity of steel use increases rapidly, as one can see in China, where the consumption per person has shot up to about 400kg. As an economy matures, steel intensity decreases again, as exemplified by the USA (300kg) and the UK (170kg). Exceptions are countries like South Korea that have developed very steel intensive industries like shipbuilding and consume more than 1 100kg per person. South Africa lies at approximately 110kg per person per year, decidedly on the left side of the developmental hump. This is an indication of the fact that a large part of the

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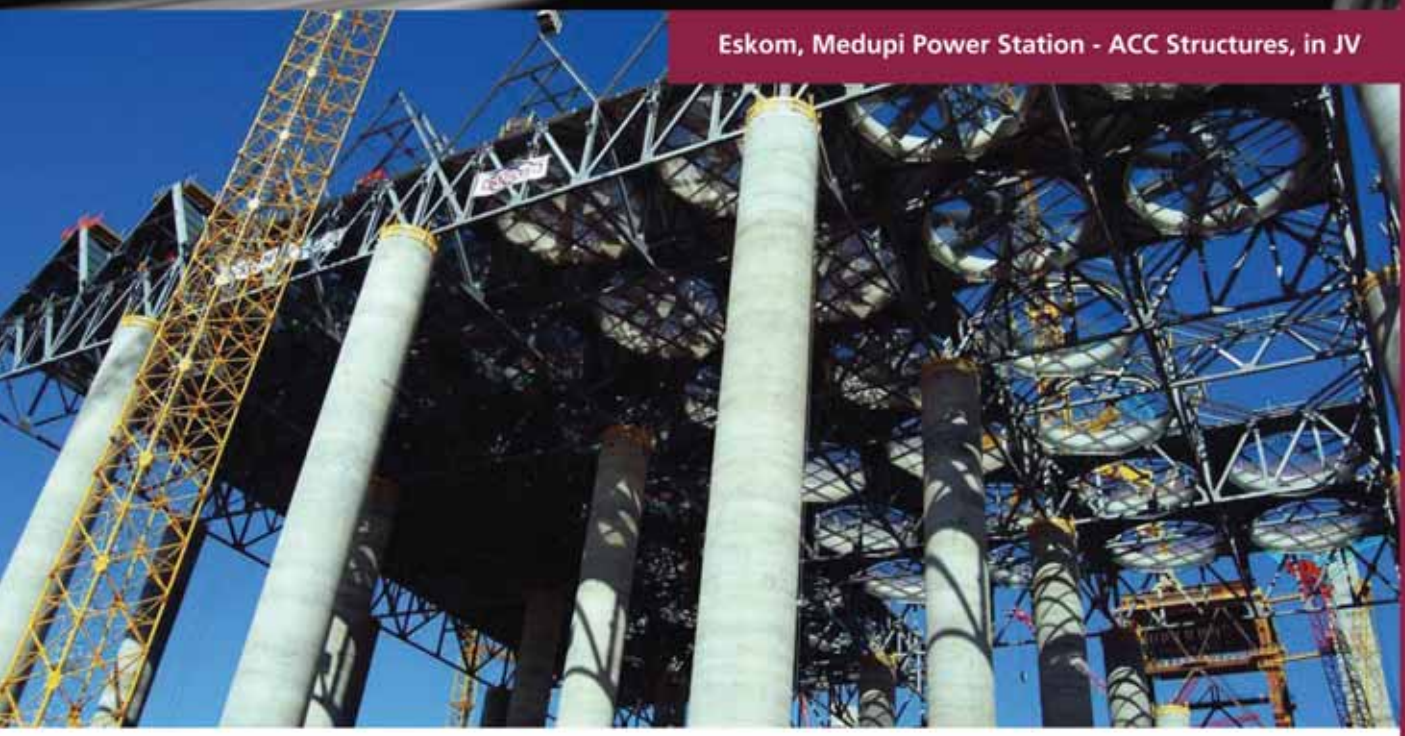
STEEL CONSTRUCTION AND ENGINEERING



Eskom, Medupi Power Station - ACC Structures, in JV

Established in 1987, Cadcon, as a vibrant and reputable entity, has grown into a leading steel construction, designing and engineering organization involved in major projects in and around Southern Africa and internationally. Cadcon operates from their 15 400 m² workshop and office facilities in Centurion, Pretoria, housing state of the art machinery and latest technology CNC plate, beam, angle, cutting, drill and saw facilities serviced by 20 overhead cranes. Cadcon has also implemented the FabTrol System providing drawing management, material nesting, purchasing, inventory control, production and CNC management, shipping and more.

Eskom, Medupi Ducting Supports, Lephalale

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

Overall Winner SAISC Steel Awards 2011
Sandton City - Protea Court Rooflight, in JV

Furthermore, Cadcon's unique packages include the design and supply of buildings through Mictec, Cadcon's in-house engineering design department. Additional services include crane, truck and trailer hire.

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

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population is not yet fully integrated into the economy. What is very disconcerting is that the total consumption of steel in South Africa has been stuck in the 4 to 5 million tons per annum range for some 40 years, even as the population grew, so that our consumption per person has actually diminished. This makes one wonder whether we are actually making much progress going up the development ladder.

Africa's consumption of steel lies in the 10 to 20kg per person range. This implies that the continent still has a long way to go in terms of development. I believe that this should be seen as that there is huge scope for growth. As African economies develop with more people entering the middle class and diversification of industries, more steel will be consumed and from such a low base the impact will be huge. Moreover, during earlier development phases structural steel tends to be quite prominent.

There was a time when steel mills were status symbols for countries – any self-respecting country had to have one, and many were built by governments. In time steel mills lost their shine as status symbols as they became associated with the smokestack industry, and things like national airlines took their place. Mr Lakshmi Mittal obtained much of his wealth by going around the world, buying up these ex-status symbol mills which were almost invariably not profitable, and turning them to health and profitability even as steel's image changed to being recognised as a material of the future. It is interesting now that while the possession of a steel mill is no longer a status symbol, steel is still an indicator of where a country stands on the developmental ladder, as we discussed above.

Steel consumption statistics don't paint Africa as being economically developed and they don't provide something to brag about. But it is quite clear that for us in South Africa the African steel construction industry is where our future lies. I also believe that we, as Africans, can bring something special along as we participate in the developing economy of Africa: we can create a partnership that will leave both us and the countries we deal with stronger and better equipped to handle our own development. When we export to another part of the world there can be only the normal commercial requirements: price, quality and schedule. When we are active in the African market, however, the aspect of development, and even of mutual development, should not be absent.

Then we can really, from deep in our hearts, say: "Into Africa!"

TUDOR ENGINEERING AND DRAUGHTING

By Viv van Zyl, SAISC Membership Consultant

Their expertise covers project management, preparation of shop detail engineering drawings, procurement, fabrication and corrosion protection of structural steel and plate work. From inception to handover of multifaceted projects they pride themselves on being a quality supplier of structural products and services to the industry.

Tudor's main undercover production facility comprises three well structured and flow functional lay-outs.

Tudor Draughting was established more than 25 years ago and initially only specialised in the preparation of shop detail engineering drawings. The vision of the owner, Braam Beukes, was to establish a structural and plate work fabrication company with modern day equipment and technology that would complement their draughting service. To realise their new capabilities a name change followed and Tudor Engineering and Draughting was born.

Braam's 35 years' experience in steel fabrication and his corporate exposure in the industry were of great value for Tudor's new endeavours. His main strategy was to acquire state-of-the-art equipment to overcome some of the challenges the industry faced. These included: low production output, the slow production cycle involved with manual fabrication, the rising cost of labour, and the scarcity of skilled and qualified labour.

The initial purchase of a Peddinghaus PCD 1100/3B beam line and DG-1100 band saw was a significant step to mechanise his medium sized operation. Tudor Engineering was one of the first medium sized companies to invest in such modern day equipment. Braam proudly states that the new equipment has contributed to

Another view of Tudor's modern day steel fabrication workshop.

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Braam Beukes, Owner and Managing Director of Tudor Engineering and Draughting.

the significant increase of Tudor's tonnage from around 30 tons per month, to over 350 tons per month. The additional acquisition of an AFPS 643 "0" Angle master further increased Tudors' capability and strengthened their opportunity of tapping into the larger structural projects in Africa and South Africa.

Tudor's facility is equipped with the latest in hardware and software to perform drawing and fabrication services for the structural, mining, petrochemical, power generating and industrial industries. With Tekla and StruCad engineering packages they are able to provide complete shop fabrication drawings, as well as general arrangement drawings, 3D lay-outs, cutting and bolt lists, paint areas and full scale templates.

Their initial motivation to increase production and reduce staff did not seem to be a viable option and he rather kept his dedicated personnel and cut down on double shifts and overtime. This option proved to be the better one and with their newly purchased machinery and motivated staff, their production increased, handling decreased and lead times were reduced. Bottom line profits have increased and they have managed to become more competitive in this challenging industry.

Their customers, which include local and international companies, are serviced by their facility in Benoni. Their expertise covers project management, preparation of shop detail engineering drawings, procurement, fabrication and corrosion protection of structural steel and plate work. From inception to handover of multifaceted projects they pride themselves on being a quality supplier of structural products and services to the industry. This is affirmed by their TUV Rheinland ISO 9001-2008 certification. It is their policy to develop and maintain a 'model' occupational health, safety and environmental programme.

Tudor's main undercover production facility comprises three well structured and flow functional lay-outs. An outside area of 4 000 square metres and a special plate shop complete the production site. Thirteen overhead cranes ranging from 5 to 20 ton capacity ensure the easy handling of work in progress, stock and completed fabricated goods.

Corrosion protection of the finished goods is currently outsourced. Tudor has acquired additional property and is planning to introduce an in-house shot blast and painting operation, which forms part of their expansion programme. They have their own fleet to assist in the transporting of finished goods to site.

Tudor Engineering and Draughting has an impressive list of customers which includes: Imbabala Contractors, MDM Engineering, Anglo Platinum, Murray & Roberts, Sasol, ELB Group, Bateman, SAC, Grinaker-LTA, Steinmueller and DRA.

MORE ABOUT THE MAN LEADING THIS SUCCESSFUL COMPANY

Braam has been married for more than 25 years to Sonya and they have two beautiful daughters, Bianca and Lindy. Their two daughters both studied at North West University (Potchefstroom) and Sonya runs her practice from her consulting rooms in Mulbarton.

His family is number one in his life and then follows his passion for steel and Tudor Engineering. As far as leisure and hobbies are concerned he loves hunting and enjoys a good game of golf. Together with Sonya, he is busy developing a prestigious lodge on their small farm in the Waterberg and hopes to accept their first guests by the end of the year.

Braam is very optimistic about the future and his company is proof that productivity, quality and automation go hand in hand. As a progressive fabricator in the industry he can offer any new customer service, quality, on time delivery and competitive pricing.

Braam and his family: (from left) Lindy, Sonya, Braam and Bianca.

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INDUSTRY NEWS IN BRIEF

THE ROLE OF CITIES IN AFRICA'S RISE

With a population of one billion and an economy likely to double in size from US$2 trillion to US$4 trillion before 2025, Africa has quickly emerged as the next economic driver for the global economy.

While the success of Africa's rise is well-founded, a far more granular approach to grasping the nuances and realising the opportunities is essential. This goes beyond country-by-country assessments. A deeper assessment of this economic energy and growth reveals that it will be largely driven by Africa's emerging cities. The nature of the business environment in Africa will increasingly demand a far more city-oriented investment approach.

De Buys Scott, KPMG Head of Global Infrastructure and Projects Group in Africa, notes that we cannot afford to ignore cities. "Close to three quarters of African people will be living in African cities by 2050. African cities and megacities already have a larger population than all of Europe".

"There's greater growth of urbanisation in Africa than anywhere else in the world. Over 50 percent of the African population is already urbanised, and expected to grow to approximately 70 percent in the foreseeable future. Historically, city infrastructure has been viewed in silos – with cities looking at projects on a one to one basis where they would just build a hospital or a school or a road or power station. With so much pressure on the cities, as a result of this massive urbanisation, it is critical to assess their infrastructure needs from a much broader perspective. Cities have to consolidate all the infrastructure needs and must develop the measurement tools to assist them in prioritising their capital allocation that will lead to long-term sustainable cities," adds Scott.

Nairobi, Kenya.

Cities are quickly becoming the economic engines of entire national economies and they need the tools to deliver a product that can withstand the test of time. While cities bring with them great economic growth prospects and coordinated development, they are not void of challenges. The role of urbanisation as the most significant driver of the economies of our countries cannot be denied, but it can also play one of the most divisive roles in our society.

Laser-cladding of an ArcelorMittal concast rolls.

Scott believes that it is important "to step back now and assess how we want these cities to develop in order to use their potential to drive the economic and social expectations of Africa".

CSIR LASER PROCESS GIVES SA STEEL-MAKER AN ADDED ADVANTAGE

ArcelorMittal SA – Steel Awards 2013 Partner Sponsor

The CSIR has signed an agreement with South Africa's largest steel producer, ArcelorMittal. The agreement follows the development of a unique laser-based process by CSIR laser engineers for the ArcelorMittal South Africa continuous caster foot rolls.

The process is based on a special alloy developed by laser manufacturing experts at the CSIR and which is laser-cladded on the rollers. The new layer, which is metallurgically bonded, has much-improved wear and corrosion resistance properties.

"These casting rolls are exposed to harsh operating environments," explains CSIR welding engineer, Corney van Rooyen. "As opposed to conventional welding, the laser process is faster, and with the customised metal coating and low heat input, it is possible to apply coatings that can extend the operational lifetime of these rollers."

The technology will assist ArcelorMittal South Africa in reducing its operational costs. The process allows for maximum reuse of the rolls, with the added advantage that it extends the operational life of these rolls by at least a factor of two before resurfacing is required on rolls which are otherwise scrapped after use.

The agreement signed with ArcelorMittal covers the development aspects of the process. The CSIR has over the past five years developed the technology, but has in the last year installed test rollers at one of the continuous casters at ArcelorMittal Vanderbijlpark Works to have their performance monitored and documented by welding engineers at the company. The results are very encouraging. "The evidence from the operational tests clearly indicate that the process and metallurgy developed by the CSIR will have a significant contribution in reducing ArcelorMittal's maintenance costs, as well as to improve the production of the plant," explains Van Rooyen.

Previously, the steel producer used conventional welding processes to refurbish its continuous caster foot rolls.

The agreement sees the CSIR continuing its work on refurbishing worn-out rolls on other sections in the plant, using laser technology. "ArcelorMittal is very satisfied with our work and as a result, it is has begun with implementation of this technology on one of its lines," notes Hardus Greyling, Operations Manager at CSIR National Laser Centre.

CONSTRUCTION BOOM AT COEGA AS PROJECTS UNDER PRODUCTION AMOUNT TO R1.2-BILLION, OVER 2500 JOBS CREATED

Building projects in the Coega Industrial Development Zone (IDZ) have injected over R1.2-billion into the Nelson Mandela Bay construction industry over the past two quarters.

Six major construction projects are currently underway in the Coega IDZ including erection of:

- Chinese car and truck manufacturer First Automobile Works' (FAW) plant;
- Famous Brands' cold storage plant;
- DCD Group's wind tower manufacturing plant;
- The addition of Coega Cheese onto the Coega Dairy outfit;
- Agni Steels' R400-million smelter facility; and
- Rehau's extension in the Nelson Mandela Bay Logistics Park (NMBLP).

Industrial gas company, Air Products South Africa, is also about to begin construction of its R300-million state-of-the-art air separation unit in Zone 3 in July, bringing the total number of projects being built to seven.

"The global economic climate is still not stable, yet investment continues to flow into the Coega IDZ and is literally taking root in the construction projects underway," said Ayanda Vilakazi, Coega Development Corporation (CDC) head of marketing and communications. "We currently have 20 operational investors, and once these seven construction projects are complete, we will be up to 27 operational investors by mid-2014."

A snapshot of the inside of the Agni Steels plant in Zone 11 of the Coega Industrial Development Zone.

INDUSTRY NEWS

Vilakazi said the activity meant major spinoffs not only for lead contractors, but also sub-contractors, suppliers and the whole built environment supply chain: "At a time when there is industry malaise at a national level, the Coega IDZ is experiencing a construction boom to the value of R1.2-billion.

"The unaudited results 2012/13 financial year also show that construction jobs in the Coega, IDZ and the NMBLP for April 2012 to March 2013 amount to 1 722 and investor jobs created are at about 856 – so just over 2 500 jobs created directly through activity in the Coega IDZ," said Vilakazi, adding that it was through these major investments that the CDC was delivering on its mandate to create jobs.

JLG DELIVERS A HEIGHT OF OVER 40m IN LESS THAN TWO MINUTES

Eazi Sales & Service - Steel Awards 2013 Partner Sponsor

Eazi Sales & Service has extended the capabilities of working at height during the construction of mines and petrochemical sites across southern Africa with the JLG 1250AJP Ultra Series Articulating Boom Lift which features an up and over height of over 18 metres and a horizontal outreach of over 19 metres, bringing a platform working height to over 40 metres.

Delivering a productive work at height solution, the JLG 1250AJP's boom can be extended safely to its maximum height in less than two minutes with the unique JLG QuickStick, which raises the tower boom and main boom simultaneously.

Versatility on site is further achieved with the JLG-developed JibPLUS, which enables the platform to reach around structures by up to 2.44 metres, allowing operators to get to difficult to reach areas safely. "The JibPLUS further allows for more precise handling at height, which reduces the risk of coming into contact with structures, and provides more user comfort with reduced sway when the boom is rotated at significant height," says Eazi Sales & Service's Managing Director, Larry Smith. The platform offers an unrestricted capacity of 230 kilograms and 450 kilograms – restricted at a slightly reduced working envelope.

The JLG 1250AJP Ultra Series Articulating Boom Lift, available exclusively in SA from Eazi Sales & Service, helping people get to height on a steel erection site.

"These features make the JLG 1250AJP ideal for construction, steel erection, as well as mining and petrochemical plants where high-reach versatility is required for maintenance projects. Its popularity is extended to power plants, construction of large industrial facilities, ship building and various other applications where getting the job done faster and safer is of paramount importance, not to mention the substantial cost savings to our customers," says Smith.

"Murray & Roberts is currently using several JLG 1250AJP boom lifts, along with several other MEWPs at the Medupi and Kusile power plants to help workers safely brace, position and weld steel sections into place at height, paint and conduct procedures previously only possible with expensive and often cumbersome scaffolding systems," says Smith. "Our access solutions have forced the industrial market to rethink what is achievable when working at height."

With such incredible platform heights, the JLG 1250AJP is built with safety in mind. It is designed with appropriately-weighted counterweights, extending axles, automatic platform levelling, and an automatic work envelope management system which automatically limits the boom to operate within safe tolerances.

The diesel-powered platform further comes standard with an auxiliary electric motor, which safely lowers the platform in the event of an emergency decent, as well as a sophisticated engine distress warning system.

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1. Saint Helena Workers Village

2. Paarman Foods New Factory

3. Namakwa Sands Expansion Project – Foundation Portion

4. NTT Audi New Showroom – East London

5. House Coetzee

11. House van Antwerpen

12. Grantleigh Titanium Learning Centre

13. Rooiels Beach House

14. Department of Public Works, District Office Mkuze

15. Additions to Existing Hall for Afrikaanse Hoër Meisieskool Pretoria

21. Additional Bays and Offices for VRN – Macsteel Trading Cape Town

22. King Edward VII School New Library

23. Macsteel Tube and Pipe Value Added Facility

24. Corlett Drive – Commercial Offices

25. Project Lumen

31. Medupi Power Station Coal Conveyors

32. The University of Pretoria Engineering 1 Study Centre

33. Natalspruit Hospital

34. BRT Tshwane

35. Green Point Athletics Stadium Refurbishment

41. Ncome Museum

42. House Mistry – Waterfall Estate

43. The Tree House: Addition to House Barratt Phase 01

44. House De Beer

45. House Sewchurren

6. Telesure Headquarters

7. Unisa Phase 2

8. Tyger Valley Centre Master Development Phase 1

9. University of Pretoria New Plant Sciences Complex

10. Rooftop Studio

16. Standard Bank of South Africa – New Office Facility, Rosebank

17. Elution Plant Gold Room

18. New Sports Facility for Afrikaanse Hoër Meisieskool Pretoria

19. House Jones

20. SBS 3.3ML Sheet Steel Water Tank

26. Mall of Rosebank Refurbishment

27. BRT Dobsonville – Head Office and Workshops

28. Nelmapius Bridge

29. Belt Filter and Cooling Systems for Tronox Namakwa Sands

30. Medupi Power Station Main Frame

36. Grootegeluk Medupi expansion project – bucket wheel reclaimer

37. Alexander Forbes – 115 West Street, Sandton

38. Illovo Sugar – New National Distribution Warehouse

39. House Enslin, Xanadu Estate, Hartebeespoort

40. House Lavarone Waterfall

46. House Badenhorst

47. House Zayed Extension

48. House Pepler

49. House Webb

50. House Laurens

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1st June 2013 – day 26.

The previous episode ended with "Our builder started by installing the floor joists and the shutterply floorboards, and by 11 May some of the floor joists were up." (4 days after starting on site).

This was followed by the lightweight floor construction: 18mm shutterply (plywood), followed by a 3mm thick layer of closed cell foam rubber and finished off with 15mm high density fibre cement board.

The floorboards were screwed down into the floor joists using special self-drilling screws. Due to the narrow spacing of the floor joists and the double layer of floor boards, the floor felt remarkable solid – as was expected. The mass of this composite floor, including the floor joists, comes to some 50kg/m². Now compare that with 450kg/m² for an in-situ cast reinforced concrete floor slab!

By 24 May the floor was completed, and the first LSF wall panels were erected, and suddenly the building started taking shape. By 1 June, most of

4th June 2013 – day 29.

THE LSFB INDUSTRY TAKES ON THE CHALLENGE OF BUILDING IN FRONT OF TV CAMERAS!

THE REST OF THE STORY...

By John Barnard, SASFA director

We are amazed at the level of awareness about LSFB created by the TV series, as enquiries for LSF projects continues to flow in. The South African light steel framing industry will reap the benefits of this project for years to come.

the wall panels were up – a mere 26 days after arriving on the site! The architect described the process as very exciting, as new spaces were created on a daily basis.

The roof joists were designed to fit exactly into rectangular openings left in the wall panels, easing the elevated assembly work. Cold formed, top hat, galvanized steel purlins were fixed to the roof joists using self-drilling screws. By 4 June, the Chromadek s-rib roof sheeting, with heat reflecting pigment in the paint, was installed.

The next step was to fix the external cladding to the frames. The wall frames were first covered by a vapour permeable membrane, followed by polystyrene strips on the studs and noggins to act as thermal break – as required by SANS 517. Then the 10mm high density fibre cement boards were fixed using special self-drilling wingtip screws. It required a total of more than 3000 screws to fix all the boards – fortunately the task was eased by the Quik Drive equipment supplied by Simpson Strong-Tie – it attaches to the front of a screw gun, and uses cartridges of screws collated in strips of plastic.

By 8 June most of the external cladding was done, and the jointing of the gap between the chamfered edge fibre cement boards got under way. With the external shell in place, the insulation and internal lining boards and ceilings were quickly installed and fixed.

15th June 2013 – day 40.

8th June 2013 – day 33.

After some delays due to other building activities, water pipes for the three bathrooms were installed by Speedfit Africa within a day or two – using multi-layered plastic pipe and clip on fittings.

By 15 June, 'skimming' of the gypsum board walls and ceilings with a thin layer of gypsum plaster was under way, presenting a perfectly smooth finish for the painters.

And finally, only a week later than planned, external finishing started.

By and large, the LSF shell of the building was completed in 47 days. Given the challenges of the site, the team felt that it was 'mission accomplished'.

We subsequently arranged a 'post mortem' meeting to identify where in the process time was lost, and to formulate solutions to improve the LSFB process even further.

23rd June 2013 – day 47.

We are amazed at the level of awareness about LSFB created by the TV series, as enquiries for LSF projects continues to flow in. The South African light steel framing industry will reap the benefits of this project for years to come.

SASFA hosted a 'roofwetting' cocktail party on 10 July 2013 to celebrate the successful completion of the project and to thank all parties that contributed to the project.

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Galvanized steel for frame, Chromadek for roof cladding

Saint-Gobain SA
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Everite Fibre-cement
External cladding, floor boards

Lafarge Gypsum
Gypsum board (lining and ceilings)

Trumod
Steel frame design and manufacture

OTHER SPONSORS

Mike Hull
Consulting engineer

Global Innovative Building Systems
Rubber mat and strips

Trowel-on-Textures
External render and paint

Kare
Fasteners, frame and roof

Speedfit Africa
Plumbing and installation (pipes)

Clotan Steel
Profiling of roofing, slitting of galvanized steel

Marshall Hinds
Vapour permeable membrane (Tyvek)

Simpson Strong-Tie
Fasteners, bracketry, tooling

Plascon / Terraco
Sealing of external joints between Nutec boards

McDONALD'S SEES VALUE OF LIGHT STEEL FRAME BUILDING

One of the main advantages of LSFB is that McDonald's restaurants built in this fashion will cool down and warm up faster than with conventional buildings, increasing the comfort levels of its customers.

McDonald's South Africa is changing the way it builds its restaurants and has embarked on rolling out sustainable light steel frame building (LSFB) restaurants across the country. This is according to Greg Solomon, McDonald's South Africa's managing director.

McDonald's opened its first steel frame restaurant in Goodwood, Cape Town on 29 June 2013, making it the first LSF informal 'eating-out' restaurant of this kind in South Africa.

"We will continue to improve, evolve and pioneer," says Solomon. "The new restaurants are built using light steel frames (LSF) and energy efficient cladding and insulation systems. This decision stems from our philosophy to support sustainable building methods as far as design, energy efficiency and the optimal use of natural light is concerned," he says.

7 April, external cladding is progressing on schedule.

By using LSFB on this building, material wastage was reduced by 30%, transport costs by 80% and the carbon footprint was significantly reduced. On top of this, McDonald's was able to cut back the construction period required, opening the outlet four months earlier than if more traditional building methods had been used.

One of the main advantages of LSFB is that McDonald's restaurants built in this fashion will cool down and warm up faster than with conventional buildings, increasing the comfort levels of its customers.

The Silverline Group, a SASFA member, built the McDonald's LSF building in Goodwood, Cape Town. After careful planning, they started on site in mid-March 2013. Project manager and co-owner of the Silverline Group franchise, Robbie Meyer, who had previous experience with LSFB in the USA, knew the benefit of detailed planning and meticulous design and he was able to optimise the light steel structure to save costs and speed up construction.

After casting the concrete for the foundations and then the lower floor, the wall frames and floor joists were erected and the first floor was completed in four weeks. The wall cladding was then installed: fibre cement board on the outside, with glass-wool insulation in the wall cavities, followed by 15mm fire resistant gypsum board on the inside. While internal walls were being clad, steel sheeting was installed on the first floor to act as shuttering for the in-situ cast lightweight concrete floor.

Silverline completed the entire shell of the building, including internal walls and exterior painting in a mere two months. Road works and the installation of kitchen equipment took a further month, to give a total construction period of only three months!

"A comparable double-storey building using traditional construction methods would have taken at least seven months', says Charl van Zyl, managing director of the Silverline Group. "Moreover, the project ran very smoothly indeed. We actually enjoyed the process!"

At the official opening of the building McDonald's said that they were astounded by the speed of construction, and were very satisfied with the quality of the finishes.

Even before this project was fully completed, Silverline Group started the next McDonald's outlet in Silver Lakes, Pretoria, using a similar floor plan and structure. They are again planning to finish the project in two months, and may

even shave a further week off the construction time!

The speed of construction, while still maintaining quality, is one of the biggest factors in the meteoric growth of the LSFB method in South Africa. The lightweight steel frame goes up quickly and once it is in place you can enclose the building. That means that internal finishes, such as partitions, ceiling grids, tiling and painting, as well as the installation of services, can start sooner.

The method also saves time because it allows different disciplines to work concurrently. It is not necessary to wait for a completed facade before finalising accurate measurements for windows, for example. Window apertures can be agreed upfront with the glass and aluminium contractor, even before the light steel frame walling is installed, since the system is extremely accurate. With lightweight steel one can work to a tolerance of ±5mm.

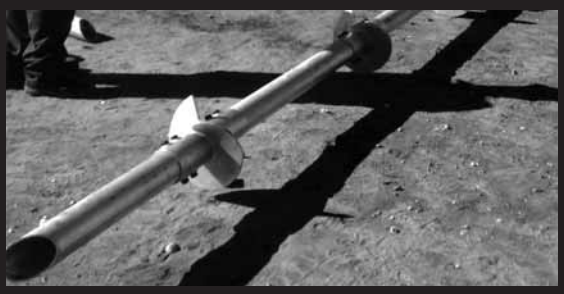
McDonald's has invested in many sustainability measures in its restaurants over the past two years, which have included building design, making sure that natural solar light and heat complement a minimum air-conditioning design, which is part of a programme Solomon refers to as "Project Green and Growing". This visionary programme targets a 20% saving in water consumption, a 20% saving on electricity consumption, 20% saving on costs and 20% saving on construction time as the brand continues on its strong growth path.

14 May, shell of the building almost completed, ready for finishing.

"It is our responsibility to lead in this way as a big corporate, and we understand the importance of sustainable business practices to minimise our impact on the environment. We are very excited to roll out these new LSF restaurants," he concluded.

The final product, on 26 June!

Industrial projects



NAMAKWA SANDS EXPANSION PROJECT

FOUNDATION PORTION

project team

Developer/Owner
Tronox Mineral Sands (Pty) Ltd

Structural Engineers
Bateman (Structural and plant design), C&S Projects cc (Screw pile and grillage design)

Project Manager
Tenova-Bateman

Main Contractor
George Stott and Company (Pty) Ltd (Screw pile design, manufacturing, and installation)

Steelwork Subcontractor
MM&G Mining and Engineering (Pty) Ltd (Foundation grillages manufacturing)

Detailers/Detailing Company
Tenova-Bateman (Structural detailing to grillages), C&S Projects cc (Screw pile and grillage design)

Although screw piles are routinely used as a foundation system in the UK and USA, this project was one of the first large and complicated screw pile foundation installations undertaken in South Africa.

The Namakwa Sands expansion project near Brand-se-Baai in the Western Cape consists of six separate plant areas, with equipment and buildings, connected by conveyor systems. This provided a challenge in terms of aligning equipment and building footprints, and the positioning of the actual screw piles. A foundation grillage was developed which could effectively connect the equipment and buildings with the screw piles. Tolerances on equipment and building connections to the grillage were extremely tight, and dictated that the screw piles be positioned exactly.

Screw piles can be loaded to full capacity directly after installation, so no major civil work need to be undertaken and they are completely removable should the site be decommissioned. The UMM plant's expected lifetime is a mere three years, after which the plant will be decommissioned thus the screw pile system appealed to the engineers.

A screw pile's physical construction resembles that of a self-tapping screw. The pile consists of central shaft which has helix-shaped bearing plates attached at specific distances from each other and the expected ground level. When installed the screw pile forms a virtual cylindrical shape between helixes which offers shearing resistance whilst the top and bottom most helixes' exert bearing resistance to tension and compressive forces.

The supported structures can either be connected to the screw piles directly or alternatively a simulated foundation can be constructed from structural steel sections on which the structure can be mounted. This project required 167 individual piles along with 32 tons of grillage work. The screw pile construction was designed to withstand a 10 ton/100KN tension load and a 15 ton/150KN compressive load.

The 3m screw piles were installed by fixing the 25mm driving plate head of the screw pile to an 80Kn.m torque motor. The torque motor was attached to a 22 ton PC200 Komatzo tracked excavator. The effectiveness of each pile was tested by means of a 30 ton hydraulic test rig.

All 167 piles and their related grillages were installed in 34 working days which was shortened from the initial 75 working days planned.

SBS 3.3ML SHEET STEEL WATER TANK

This innovative sheet steel water tank consists of laminated sheet steel walls supported on the ground with a supported reinforced PVC liner and a sheeted steel frame roof cover.

SBS have used various types of steel water tanks for a number of years but difficulties with maintaining service levels; limitations on tank capacities, increasingly long supply lead times and increasing costs led them to explore the idea of developing their own tank system.

High tensile sheet steel is used for the walls of the tanks, profiled and cut into regular size panels to build together for the tank walls. The use of steel meets the technical requirements; allows the flexibility to provide a wide range of tank capacities; is economical and readily available.

The tank cover structure is fabricated from a combination of square hollow sections (top chord) and angle sections (bottom chord and internals). The trusses are supported on the top of the tank walls, with a 'hold-down' system working via the vertical stiffener ribs down the walls of the tank to the foundation ring beam. Square hollow sections and angle members form the structural frame for the roof cover structure. Corrugated roof sheeting is affixed to the frame to form the roof cover.

The sheet steel wall panels act in hoop tension to resist the horizontal water pressure. The tensile forces in the wall panels vary with the height (water depth) and the diameter of the tank – this is accommodated with differing thickness of sheets and number of laminations. The bolt system is designed to transfer the tensile forces from sheet to sheet in the 'hoop' without tearing of the sheets and/or shearing of the bolts.

The taller tanks (more than three rings high) are built with the roof cover structure installed on top of the three rings, and then the whole structure is raised on a jacking system and the additional rings added in from below.

The main challenges for the design were to cater for varying site conditions, different countries/regions, production requirements and transportation (containerisation). An agency has been set up in Malaysia, orders have been received from Africa and Australia, and there have been enquiries from the United States.

project team

Developer/Owner
SBS Water Systems (Pty) Ltd

Structural Engineer
Martin & Associates Consulting Engineers

Main Contracto
SBS Water Systems (Pty) Ltd

Steelwork Contracto
SBS Water Systems (Pty) Ltd

Detailers/Detailing Company
SBS Water Systems (Pty) Ltd

ELUTION PLANT GOLD ROOM

The Gold Room is a structure purpose designed for the storage and processing of gold. It is located within the premises of the gold plant at Harmony's Kusasalethu shaft in the Carletonville area. It was designed with security in mind since it will house the reserves of gold in the time between processing and collection by helicopter.

The structure is fabricated predominantly from UB406 x 178 x 67 sections that were specifically chosen to enable precast concrete panels to slide down inside the bay sections to accelerate the erection process. Compound corner columns were fabricated by welding two beams to each other (flange to web) to allow two precast panels to meet at 90 degrees to form the corner. The complete structure was fabricated in the Steel Services factory in Carletonville and trial assembly was carried out to ensure a perfect and trouble free erection process on site.

Fabrication was completed using Steel Services' newly acquired set of automated steel fabrication machines that includes a drill line, plate line, bandsaws, angle master and shot blaster. These machines are driven by CNC files that are produced in Tekla structures and ensure a perfectly accurate and repeatable end product.

Corrosion protection was achieved by sand blasting and the three coat painting system. Quality and material traceability was assured through steel production management software.

Thanks to trial assembly and the CNC machines, site erection was rapid and accurate. Columns were lifted and braced and then precast concrete sections were slid down inside the beams to create the cladding. These panels were then grouted and secured in position. This method of construction proved fast and efficient. Once in place, the remaining steel sections were installed and the structure finally torqued up.

After installation of the steel and precast concrete panels was complete, the roof was cast using permanent shuttering. The result is a structurally sound and secure building that is fit for purpose.

This method of steel construction proved to be fast and efficient. Care was taken to ensure accuracy during fabrication and together with the trial assembly and the use of precast concrete the cost savings that were realised during site erection were significant.

project team

Developer/Owner
Harmony

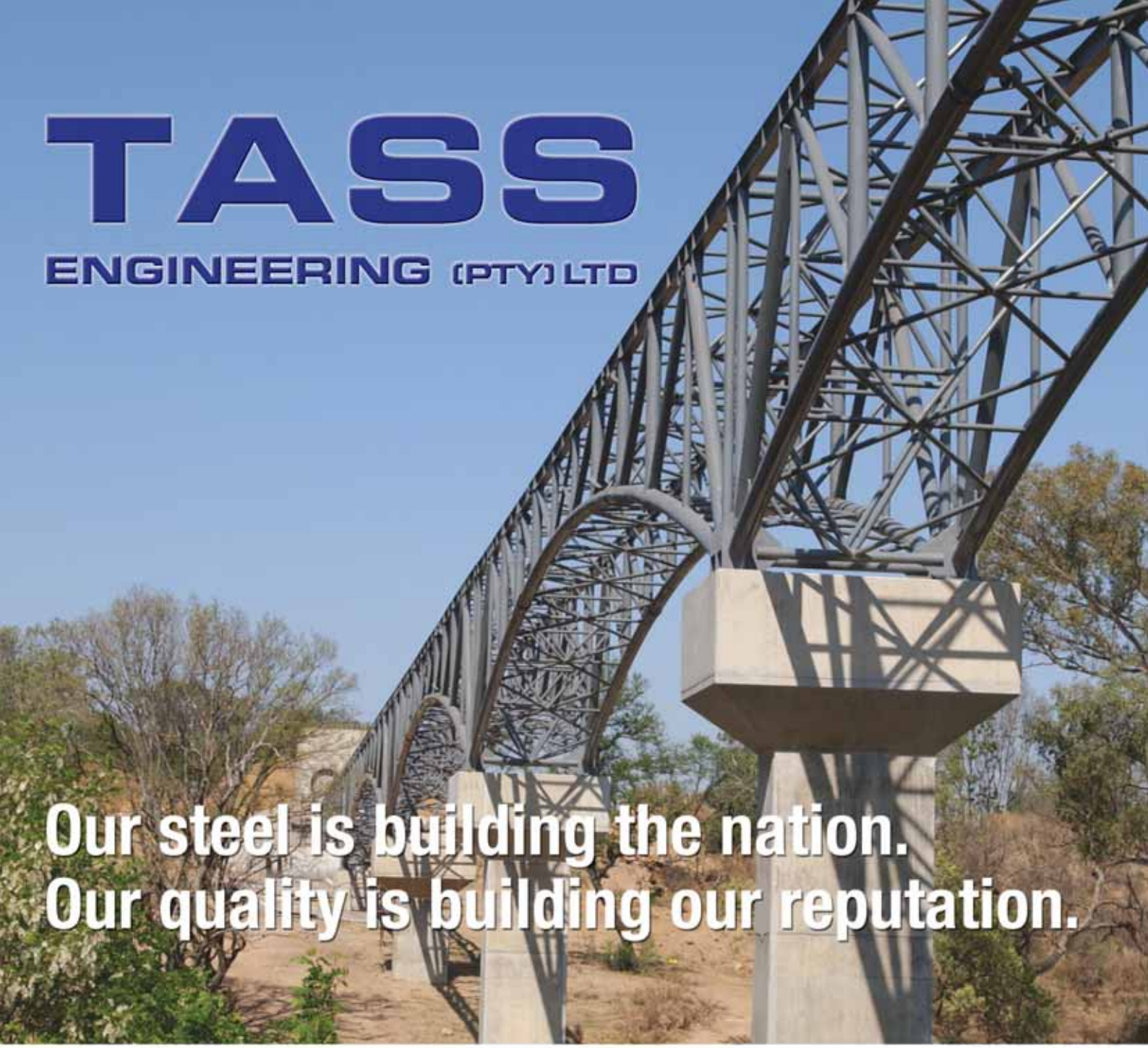
Structural Engineer
Tenova Bateman

Project Manager
Stefanutti Stocks

Main Contractor
Stefanutti Stocks

Steelwork Contractors
Steel Services, Steel Trading, Nyala Steel

Detailers/Detailing Company
Cadhouse



TASS Engineering has been actively involved in structural and architectural steel fabrication and erection for more than four decades.

Current projects:

- Dischem Warehouse - Dischem
- Sandton Atrium on 5th Cladding - Liberty Properties
- Kwale Mineral Sands, Kenya: Conveyor and tripper car structures - Base Titanium
- Polyoak Aeropark: New steel roof - Polyoak Properties
- Sedibeng Brewery: Bottling Bay extension - Sedibeng Brewery
- Standard Bank Rosebank - Standard Bank
- Telesure Head Office - Steyn City Properties
- Medupi Coal & Ash Terrace - ELB
- Cradlestone Mall - Sasol Pension Fund
- Sci-Bono Discovery Centre - Gauteng Department of Education
- Gate Houses - Steyn City Properties
- BRT Tshwane - SANRAL

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ADDITIONAL BAYS AND OFFICES FOR VRN – MACSTEEL TRADING CAPE TOWN

project team

Developer/Owner
Macsteel (Pty) Ltd

Architect
Gordon Hart Architects

Structural Engineer
Dahcon

Quantity Surveyor
Mitchell du Plessis Projects (Pty) Ltd

Project Manager
Mitchell du Plessis Projects (Pty) Ltd

Main Contractor
Power Construction (Pty) Ltd

Steelwork Contractor
Union Structural Engineering (Pty) Ltd

Roofing & Cladding
Skye Africa (Pty) Ltd

Due to the ongoing expansion of the non ferrous steel business by the Macsteel subsidiary, VRN, and with the desire to house that business within a Macsteel owned premises, Macsteel decided to develop a new facility, in keeping with the original service centre.

Macsteel's brief, supported by VRN, was initially for one additional bay with internal offices and one overhead gantry crane. The intention was to create a facility that incorporated green technology lighting as well as the latest requirements with respect to natural lighting, ventilation and smoke evacuation. But above all the building fabric needed to showcase the use of steel in industrial buildings.

Within two months of commencing the planning, the scope of the project had expanded to two full gantry bays with a total of five overhead gantry cranes ranging from 10 to 20 ton capacity each.

Constructing the increased size of the facility had to be undertaken while equipment was being installed in order to meet the requirement of a terminating lease at previously occupied premises and to also ensure that production downtime was reduced to a minimum.

The engineer was able to initiate a change in the roof of the old structure by the incorporation of cellular beams for the rafter portals. The balance of the steelwork was made up using universal beams for the columns, plate girders for the gantry rails, angles and circular hollow sections for the different bracing frames, IPE sections for the roof monitors, circular hollow sections for the rainwater launders and cold formed lipped sections for the purlins and rails.

Cellular beams were introduced in South Africa by Macsteel Trading. This new facility was the perfect project to showcase the use of this innovative technology.

The use of cellular beams with their high strength to weight ratio permits considerable weight saving compared to plain sections. The large circular openings accelerates smoke dispersion at high level as compared to solid-web beams and also makes provision for service integration within the depth of the beam when compared to the more traditional castellated beam.

The new facility has 9 000m² of high-bay space, with crane rails, and with 352 ton of steel came to just 39kg/m².

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Madupi Power Station

Python X

Madupi Power Station

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- Works with a variety of roofing solutions, from small portal frame-type structures, through to 60-metre-span lattice girder designs.
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BELT FILTER AND COOLING SYSTEMS FOR TRONOX NAMAKWA SANDS

project team

Developer/Owner
Tronox Namakwa Sands

Structural Engineer
Midgley Consulting Engineers

Project Manager
DemcoTECH Engineering

Main Contractor
DemcoTECH Engineering

Steelwork Contractor
Union Structural Engineering Works (Pty) Ltd

Detailers/Detailing Company
Union Structural Engineering Works (Pty) Ltd

Piping
PSV Projects

Painting
Nu Nation

The project provided a belt filter and cooling system for the processing facility at the Tronox Namakwa Sands heavy minerals mine near Brand-se-Baai.

At Namakwa Sands, the ilmenite is recovered from run-of-mine (ROM) ore, using magnetic separation in a primary and secondary plant, as magnetic ilmenite slurry. This slurry is dewatered using a cyclone and then stockpiled in drying bays in the ilmenite storage shed. DemcoTECH inserted a belt filter into the ilmenite drying process, to both increase the drying speed, and allow a drier product to be produced. This has enabled the ilmenite to be reclaimed immediately after stacking by means of a tripper conveyor, while unwanted salt contamination is removed and fresh water consumption reduced.

The belt filter building was constructed adjacent to the existing ilmenite storage shed. The new tripper conveyor had to be constructed above the roof of the existing shed, without disrupting the ongoing process within the shed. The conveyor is housed in five off 22m long gantry sections. The tail end of the conveyor is situated in the belt filter building and the head and take-up of the conveyor is situated in a dedicated structure on the opposite end of the ilmenite shed. Intermediate supports for the gantries consist of four sets of concrete columns constructed within the boundary wall of the bays within the shed. Lattice trestle structures straddling the existing roof rafters were erected on top of the concrete columns to provide the support points for the gantries.

The structural design was carried out by Ritchie Midgley Consulting Engineers. DemcoTECH awarded the structural fabrication as well as the structural and mechanical erection contract to Union Steel.

The remoteness of the location added logistical challenges to the project. Union steel opted to do the assembly of the five gantries at their works in Epping, Cape Town. The fully assembled units were then transported as abnormal loads to the mine, approximately 400km North of Cape Town. The gantries were lifted into position using a 130t hydraulic mobile crane within a period of less than two shifts.

MEDUPI POWER STATION UNIT 6

MAIN FRAME AND BOILER GRID STRUCTURES

Medupi is a six boiler x 800MW Power Station, of which Unit 6 was the first to be constructed and commissioned. The main frame is a braced structure, 30m x 28m on plan x 105m high, which supports adjoining structures carrying boiler machinery and equipment and provides stability for the boiler house, bunker and air pre-heater buildings. The boiler grid sits on top of the main frame from which boiler elements (about 12 000 tons) are suspended.

The main frame generally comprises box section members with 2.1m square columns, up to 85 tons each, 1.5m to 1.8m deep beams and 0.8m square vertical bracing. The main frame height is split into five erection phases, i.e. +19m, +45m, +60m, +80m and 105m. The boiler grid steelwork has four 6.1m deep x 28.5m long girders, 90 tons each, the combined mass being 3 920 tons with some 288 members.

Up to 40mm thick plate was used, except for specific conditions, such as the 120mm thick column base plates and the boiler grid support beams with 65mm thick webs.

Erection of the main frame on site commences with phase 1, which is aligned, levelled and fully bolted up. Once the four column bases are grouted, the major part of the boiler grid steelwork is erected on the +16m level box beams using temporary supporting brackets.

The complex erection of the upper phases of the main frame continues simultaneously until phase 5, at +105m Level, is completed, and is square, level and aligned. The object of erecting the boiler grid at the lower level is a combination of safety and the lesser effort (and time) of lifting the 110 structural members and other temporary and permanent items the extra 90m.

Using temporary, reusable lifting steelwork and specialised strand jacking equipment, the boiler grid with a combined mass of 1 200 tons, is slowly lifted through 90m, inside the main frame structure, until the whole boiler grid is suspended over the main frame.

The grid lift is possibly the biggest and heaviest structural steel erection exercise that has been undertaken in the last decade in Africa.

project team

Developer/Owner
Eskom

Architect
Eskom

Structural Engineer
Hitachi Power Europe

Quantity Surveyor
Genrec Engineering (Pty) Ltd

Project Manager
Hitachi Power Africa

Main Contractor
Hitachi Power Africa

Steelwork Contractor
Genrec Engineering (Pty) Ltd

Detailers/Detailing Company
Genrec Engineering (Pty) Ltd

Site Erection
Murray & Roberts

MEDUPI TRANSFER COAL GANTRIES

project team

Developer/Owner
Eskom

Architect
Eskom

Structural Engineer
Hitachi Power Europe

Quantity Surveyor
Genrec Engineering (Pty) Ltd

Project Manager
Hitachi Power Africa

Main Contractor
Hitachi Power Africa

Steelwork Contractor
Genrec Engineering (Pty) Ltd

Detailers/Detailing Company
Genrec Engineering (Pty) Ltd

Site Erection
Murray & Roberts

The transfer coal system for Medupi Unit 6 consists of three main structures namely the Inclined Coal Conveyor (ICC), the Coal Transfer Tower (CTT) and the Coal Conveyor Bridges (CCB's).

These three structures house the coal conveyors, which transport the coal from the coal storage areas to the bunker structures at a rate of 2 288 tons of coal per hour per boiler structure.

The ICC conveys coal, via three conveyor belts, to the CTT, which is at an elevation of 60m above ground. The ICC is 310m long, and has a total mass of approximately 748 tons. The ICC consists of 12 separate gantries, each 9.5m wide, the smallest weighing 38 tons, the biggest 80 tons, and a total of 6 277 items.

The individual gantries were pre-assembled on the ground, roof sheeting and floor plates fixed. Then early in the morning, the gantries were lifted into position, after which the wall cladding, conveyor supports and other mechanical components were added.

The CTT, as the name implies, transfers the coal between the ICC and CCBs, for delivery to the individual boilers. The CTT has a total mass of approximately 700 tons. It consists of a tower section, and the transfer house on top, weighing 340 and 360 tons respectively, and a total number of 1 360 items of steel.

The tower walls were pre-assembled and lifted into position. Similarly, the transfer house's three floors were pre-assembled at ground level, before being lifted into position, with a maximum lift of 80 tons.

The CCBs transport the coal from the CTT to the individual boilers, along a bridge spanning across three boiler units. For Unit 6 the four bridge parts have a total mass of approximately 1 840 tons, and 5 633 individual items.

These bridges sit at an elevation of 52m above ground, essentially being supported by a trestle weighing approximately 450 tons. This trestle consist of 36 box sections, some as big as 1m x 1m, and weighing about 38 tons each.

The gantry section supported on top of the trestle, weighing 360 tons, was pre-assembled in floor, wall and roof panels, before being lifted into position, significantly reducing the erection time.

















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GROOTEGELUK MEDUPI EXPANSION PROJECT – BUCKET WHEEL RECLAIMER

The Exxaro Resources Limited (Exxaro) Grootegeluk mine expansion project was initiated to supply coal to Eskom's new Medupi power station near Lephalale. This project will, in terms of an agreement with the power utility, enable the Grootegeluk mine to supply the Medupi power station with an average 14.6Mtpa of power station coal over the next 40 years.

On completion of the expansion project, Grootegeluk will be the largest coal operation in the world, producing some 33Mtpa of power station, coking and steam coal.

The bucket wheel reclaimer project forms part of this larger expansion project. FLSmidth designed the bucket wheel reclaimer and Aveng Steel Fabrication was responsible for fabricating the lower ring girder (70.8 tons), equalizer beam (14.6 tons), upper ring girder (62.8 tons) and the pylon section (96.7 tons).

The challenges on this project were:

- The programme and progress were always a focal point, due to pre-defined machining dates.
- Assembly preparation had to be very accurate due to stringent tolerances.
- There was limited access, so it was important to understand the welding methodology. Crucial to the success and to limit distortion was the planning of the assembly as well as the welding sequences.
- As the project was fabricated during winter, cold and windy weather had a huge influence on maintaining a constant pre-heating temperature of 120°C, as well as the interpass that had to be controlled and monitored.
- Full penetration welds in a vertical up position, of 25mm thick shell plates to 80mm connection rounds, tested the Aveng Steel Fabrication team's most experienced welders' skills.
- Due to the volume of welds and time constraints, it was required at times to have up to 20 coded welders welding simultaneously on either the lower ring girder or the upper ring girder.
- Although the machining was executed by a nominated sub-contractor, the fabricator needed to ensure that the areas to be machined were in a state of flatness as well as roundness to meet tolerances.
- Although the loading of these items were not a problem, all loads were abnormal, as the individual items were transported already assembled.

project team

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Structural Engineer
FLSmidth Wadgassen Germany

Project Manager
FLSmidth (Pty) Ltd

Main Contractor
FLSmidth (Pty) Ltd

Steelwork Contractor
Aveng Steel Fabrication

Detailers/Detailing Company
FLSmidth Wadgassen Germany

SA ROOFING & INSULATION 2014

PROFESSIONAL USER'S GUIDE

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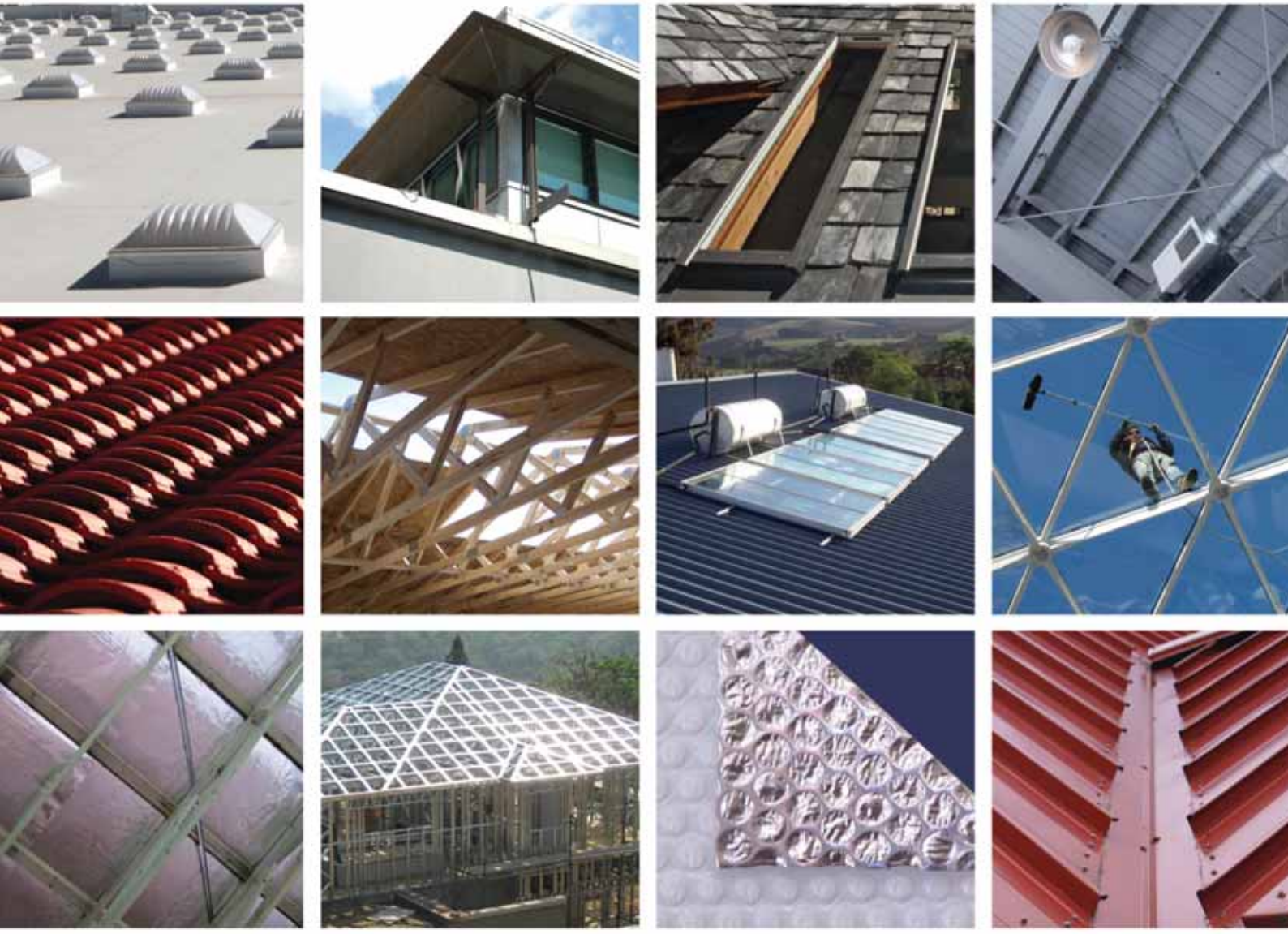

Presented in categories and sub-categories, the SA Roofing & Insulation Professional User's Guide connects suppliers, manufacturers, architects, specifiers, installers, contractors, developers, commercial and industrial property owners as well as key industry professionals, including associations, institutes and other leading industry representative bodies.

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The warehouse was designed around the logistical needs of the client, which required wide open areas for the high volume pyramid stacking of sugar, and high wide and narrow isle racking areas. The creation of natural light and ventilation also formed an important aspect of the client's brief.

The structure has an eaves height of 18m to underside of truss, and an apex height of 25.5m. The steel roof is a staggered sectional roof design, comprising of a lattice truss design spanning 28.15m. The staggered roof heights made it possible for natural light to flow into the warehouse, and at the same time allowed for smoke channeling and extraction in the higher areas.

The roof is sheeted with Novotexi and the vertical is cladded with IBR. The western facade is fully insulated behind the sheeted areas for the length of the structure.

The warehouse is 288m on the eaves, and 168.75m on the gables, creating a space of 48 600m² under roof. Tied into the warehouse is 1 000m² high quality office space, where some creativity was used in the tubular design of the office entrance to represent the idea of sugar cane.

The warehouse is fitted with six 20 ton overhead cranes, spanning 32m clear, letting to the pyramid stacking of the bulk sugar. The crane gantries are 1.250m high, and are dwarfed by the 1.95m end stop assemblies. The crane take-up cradle system is the first of its kind in South Africa for this type of bulk handling. Pick-up of the sugar is about speed and efficiency. The pick-up cradle hooks ten 1 ton sugar bags, and seamlessly places them by stacking the bags onto a 12m high pyramid.

In total, 2 308 tons of structural steel went into the construction of this warehouse and were transported via road from Gauteng to Pietermaritzburg.

The enormous steel lattice columns not only add to the aesthetics of the structure, with the walk through concrete columns, but the engineering design coupled with the crane loads added for some inventive engineering.

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ADAPT OR DIE:

WHAT S.A. STEEL FABRICATORS MUST DO TO REMAIN COMPETITIVE IN AFRICA

By Neels van Niekerk,
CEO, International Steel Fabricators,
South Africa

To remain competitive in the African market, South African structural steel fabricators must ensure they add more value to steel products and move away from the current commodity model. Instead a solutions-based model should be used, which offers a turnkey fabricated steel solution.

The key future focus point needed for South African steel fabricators to win market share in Sub-Saharan Africa and further on the continent, is to offer a competitive, turnkey value-added solution.

South African structural steel fabricators need to offer markets steel solutions in much the same way as the local agricultural industry has exported South African steel-based agricultural products. Here, the successes are based on South African companies not only supplying the product but also a complete and relevant engineering solution – from producing the product to the establishment of overseas markets for these products.

South Africa's steel industry should, over the next 10 years, also have a stronger focus on supplying its fabricated structural steel to infrastructure projects, including the construction of numerous road and rail bridges and, inter alia, the thousands of kilometres of electricity transmission lines that will be built in Southern Africa.

This focus will be supported by the ISF and other marketing structures, which are actively and successfully marketing South African-manufactured products throughout the Southern Africa region.

In fact our efforts have not been confined to only the Southern African region. In the first half of this year, the ISF increased its efforts and directly marketed South Africa's structural steel industry in Mozambique, Ethiopia, Sudan, Burkina Faso, Uganda, Rwanda and Burundi by visiting existing and prospective clients, as well as by attending industry exhibitions and Department of Trade and Industry-supported missions.

To further market its member companies as potential suppliers of African projects, the ISF is taking its largest-ever delegation to the Africa Down Under mining convention in August 2013, which is held annually in Perth, Western Australia, where most new-mine construction decisions for Africa are made. The ISF will exhibit at the event and will also have pre-conference sessions with major potential clients.

ADDING VALUE AND COST REDUCTION

But marketing alone will not suffice – adding value and cost reduction are also imperative.

To remain competitive in the African market, South African structural steel fabricators must ensure they add more value to steel products and move away from the current commodity model, which is based on supplying ex-works fabricated products. Instead a solutions-based model should be used, which offers a turnkey fabricated steel solution.

Where South Africa once found success in the flexibility, quality, aesthetics and punctuality of its structural steel exports, the demand for these characteristics has decreased, as they seem to be not quite what Africa increasingly requires.

Moreover, African countries typically use structural steel only where it is absolutely necessary and, excluding mining and roofing applications, Sub-Saharan Africa, for example, has largely a concrete-only construction culture.

This is evident not only in construction activities at numerous sites in the region's capital cities, but also when comparing the large number of cement factories with the small number of small, scrap-based light-steel mills in these cities.

Example of a pre-engineered steel building.

Therefore, if the benefits of steel offerings from South Africa are not to be lost, we need to consider moving to more optimised Middle East and Far East pre-engineered, metal building models, which focus on both adding value and the reduction of cost throughout the value chain thereby resulting in cost-effective alternatives. In fact, true competitiveness in the South African context can only be achieved by critically examining all of South Africa's fabrication cost factors.

Implementing the concept of pre-engineered metal buildings, which typically use 30% to 40% less steel, while providing the same strength as conventional steel and other buildings, is gaining support in Africa and is spreading quickly from the north to the south.

GALVANIZED BOLTS – AN UPDATE

PART 2

By Spencer Erling,
Education Director, SAISC

In part 1 of the article (Steel Construction Vol. 37 No. 3 2013) we looked at some background and history of galavanized high strength bolts as well as a brief look at the requirements of SANS EN 14399 parts 1-10 High strength bolting assemblies for pre-loading.

Grade 8.8 HD bolt with batch number for traceability.

WHAT IS HYDROGEN EMBRITTLEMENT?

We used the term a number of times in part 1 without defining the term. Thanks to Wikipedia for the following definition:

Hydrogen embrittlement is the process by which various metals, most importantly high-strength steel, become brittle (and or a decrease of toughness or ductility) and fracture following exposure to hydrogen. Hydrogen embrittlement is often the result of unintentional introduction of hydrogen into susceptible metals during forming (molten state) or finishing operations (elevated temperature treatments and could include hot dip galvanizing or electroplating), together with high stress levels (which could be residual stresses from manufacturing processes or induced stress such as stretching during the tightening of bolts or increase in loads in the structure) and (increases) cracking in the material. This phenomenon was first described in 1875.

The mechanism starts with lone hydrogen atoms diffusing through the metal.

In broad terms hydrogen embrittlement can be prevented through:

1. Control of stress levels (not possible with 14399 bolts due to the very nature of the pre-loading process)
2. Lower levels of hardness (ditto)
3. Avoidance of the hydrogen source(s)
4. Making the finished product to remove hydrogen

CAN CHEMICAL COMPOSITION AFFECT HYDROGEN EMBRITTLEMENT?

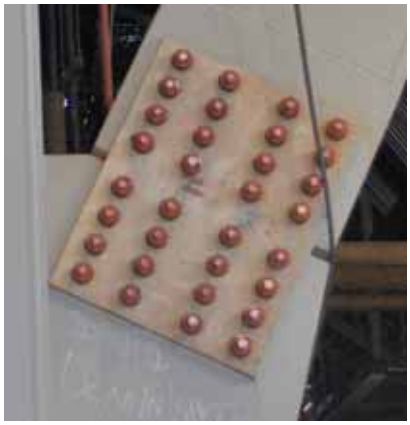
Whilst SANS EN 898 part 1 does define in broad terms chemical composition of the bolts, the compositions listed are sometimes in ranges of percentages (i.e. between minimum and maximum). So whilst a steel maker could well conform with the ranges, there are schools of thought that are suggesting that having the maximum percentage of one or more alloys could make the steel more susceptible to hydrogen embrittlement. It appears as if a lot more research is required in this regard.

WHAT IS THE INFLUENCE OF THE INSTALLER OF THE BOLTS?

There is nothing specifically documented in this regard. What we know is that some time after installing and apparently correct tightening of bolts we have had bolts snapping (admittedly a minute percentage in any one project of the bolts do actually fail).

An example of what could cause failure is abuse by the installer. Imagine an end plate to a large (deep) plate girder. It is common knowledge that end plates are never totally flat after welding and handling. By definition, for our standard range of South African beams, end plates are described as flexible end plates to allow for rotation of the 'simply supported' beam. So they are usually designed as relatively thin material (8mm plates).

However for plate girders it is common practice to use thicker plates. When they are installed, by definition the end plates should pull up flat with the component it is attaching to. When they do not pull up flat erectors often use the connection bolts to do this flattening work (which really should have been done before



One of hundreds of friction grip bolts on the power station - not galvanized.

One of hundreds of friction grip connections – galvanized.

An interesting friction grip splice with a cruciform shaped column below the splice, and plate girder column above

erecting). It is anyone's guess how much effort goes into pulling up the plates to be in contact and what stress they have induced.

If the turn-of-the-nut-method is used it is very likely that tightening is way beyond snug tight (by definition in SABS10094 as 10% of proof stress load). The additional part turn therefor stresses the bolt way above the intended tension, leading to who knows what happens when live loads come on to the structure.

The least a contractor should do in this circumstance is to replace the bolts he has used to pull the plates up to flat tight contact with new bolts which should then be tightened using the correct procedure.

I sincerely hope that bad procedures on site have not been responsible for the unbelievably expensive, both

in time and money terms, for those projects affected so far.

WHAT ABOUT HOLDING DOWN BOLTS?

The current version of the Red Book (The SA Steel Construction handbook) recommends that when HD bolts are required to conform to 8.8 or 10.9 mechanical requirements, EN19 material should be used. After machining, the HD bolt should be heat treated to the correct hardness value to ensure a suitable ultimate tensile strength equivalent to 8.8 and 10.9.

Whilst the instruction is sound, what we did not warn users about was that it is critical not to weld (even tack weld) such hardened bolts unless using a properly prepared prequalified weld procedure (as envisaged by the AWS D 1.1 welding specification), with a lot of emphasis on the pre and post heating of weldments.

There have in the last two years been two HD bolt failures directly related to no preheating of weld areas (including a tack weld in once instance). In both cases the bolts were hot dip galvanized. We do not know if the process (in particular the pickling process which is dipping in acid) exacerbated the problem.

The SAISC now recommends the following for HD bolts.

1. For most static structural applications use commercial quality round bar (reinforcing bar) up to the loads at which bolt diameters do not exceed 30mm (200 MPa yield).
2. For diameters exceeding 30mm, graded material (S355JR) is available.
3. These two materials are easily machined, welded and hot dip galvanized.
4. For dynamic situations the grade 8.8 or 10.9 equivalent described above can be used and pre-tightened to an agreed specification.
5. We strongly recommend eliminating of welding to these materials if possible by:
   a) Instead of welding a pull-out plate at the bottom of the bolt for casting into concrete, we suggest cutting a thread and bolting the pull-out plate between two nuts.
   b) We also suggest that templates be attached by bolting once again with two nuts, one of which will be under the template and one above.
   c) All of these loose components can be galvanized taking the same care and processes one would use for grade 10.9 bolts.

CONCLUSION

There is no doubt that hot dip galvanizing is still a great value for money corrosion protector in the correct environment. For grades 4.8 and 8.8 bolts as stated above there are no issues relating to the galvanizing of these bolts.

However, readers should ensure that when they are purchasing grade 10.9 bolts in hot dip galvanized finish that they clearly spell out the standards applicable i.e. ISO898 and EN 14399. They should purchase bolts from reputable suppliers and ensure that the manufacturer's fully traceable certification accompanies the bolts at all times.

CALENDAR OF EVENTS

SAISC BREAKFAST MEETING AND LAUNCH OF THE POWER LINE ASSOCIATION OF SA
15 August 2013
Country Club Johannesburg, Auckland Park

VISITING ARCHITECT: Mels Crouwel
2 September: Pretoria
3 September: Cape Town

LSFB ERECTION COURSES (6 Days)
9 – 14 September: Gauteng
28 October – 2 November: Cape Town
For more info go to www.sasfa.co.za or contact John Barnard at john.barnard@saol.com

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

STEEL AWARDS 2013
19 September 2013
Gauteng: Emperors Palace
KZN: Docklands Hotel
CT: Cape Town International Convention Centre
Dinner enquiries: marle@saisc.co.za

PACIFIC STRUCTURAL STEEL CONFERENCE
8 – 11 October 2013
Singapore
http://www.pssc2013.org/

SAISC, ISF AND SASFA AGM 2013
7 November 2013
Country Club Johannesburg, Auckland Park

SAISC COURSES – 2013
Please contact Tiana Ferreira for more information about these *(see right)* and possible other courses: tiana@saisc.co.za

Topic	Date	Where
Design of light industrial buildings	5, 6, 7 August	JHB
Design & construction of composite steel-concrete floor systems	19 August	DBN
Quality Assurance for Engineers	20 August	DBN
Design & construction of composite steel-concrete floor systems	26 August	JHB
Quality Assurance for Engineers	27 August	JHB
Design & construction of composite steel-concrete floor systems	30 September	NAM
Quality Assurance for Engineers	1 October	NAM
Design & construction of composite steel-concrete floor systems	3 October	CPT
Quality Assurance for Engineers	4 October	CPT
Knowledge of steel	10, 11 October	CPT
Knowledge of steel	17, 18 October	DBN
Knowledge of steel	21, 22 October	JHB
Steel in Architecture Workshop	12 November	DBN
Steel in Architecture Workshop	13 November	PE
Steel in Architecture Workshop	14 November	CPT

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SOCIAL SNIPPETS

By Marlé Lötter, Events Manager, SAISC

CONNECTIONS COURSE

APRIL 2013

BELOW: Delegates at the course on Connections in Structural Steelwork, 11 & 12 April 2013, Durban. Also presented in Johannesburg, Cape Town and Windhoek, sponsored by CadexSA.

SAISC BREAKFAST TALK: CHARLES DEDNAM

25 APRIL 2013

LEFT: Charles Dednam talked about the consumption potential for steelwork in Africa at the SAISC breakfast of 25 April 2013 at Country Club Johannesburg.

BELOW: Guests at the SAISC breakfast of 25 April 2013.

SAISC BREAKFAST TALK, COUNTRY CLUB JOHANNESBURG

13 JUNE 2013

RIGHT: Guest speaker Willem Esterhuyse, MeerKAT Project Manager, addressed guests about the incredibly powerful Square Kilometre Array (SKA) radio telescope of which the major part will be built in South Africa. *(Read more about this proud project: www.ska.ac.za).*

ABOVE: Guests at the SAISC breakfast of 13 June 2013.

THE SAISC STAFF COMMIT TO 67 MINUTES ON MANDELA DAY

BELOW LEFT, ABOVE LEFT AND RIGHT: SAISC CEO Dr Hennie de Clercq and members of staff managed to paint a substantial part of the orphanage of a church in Orange Farm in 67 minutes on Mandela Day 2013, making some difference to the building, but wishing they could do more!

The congregation is lead by Rev Paulus Ntshumayelo and Rev Jantjie Mokoena. The orphanage is home to 14 children aged 3 - 17. It receives no government funding and could really use all kinds of help, also for the crèche on site – structural, food, clothes and funds. (Rev Paulus: 082 823 2201)

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