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10 YEARS ON

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LIGHT STEEL FRAME BUILDING ASSOCIATION

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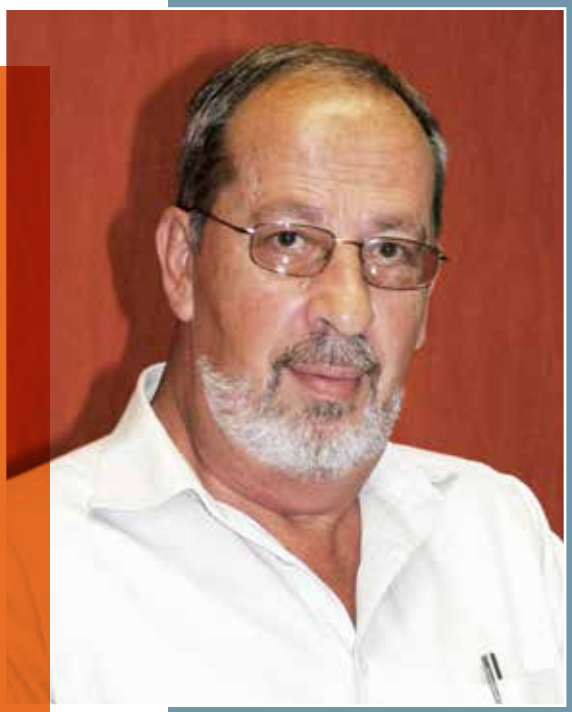
SASFA: 10 YEARS ON ...



It feels like yesterday when Dr Hennie de Clercq, then CEO of the South African Institute of Steel Construction (SAISC), and myself returned from a fact finding visit to Australia on Light Steel Frame Building. We were absolutely convinced that this building technology had to be introduced to Southern Africa.

Two years later, in 2006, meetings were arranged with interested parties from industry, and it was decided that an association needed to be established to coordinate the development of this industry, to set industry standards and to facilitate acceptance of this new building method by local building authorities and the banks.

We started out by formulating mission and vision statements and preparing marketing and business plans, to enable us to approach the major material suppliers to this industry – steel (ArcelorMittal), fibre-cement board (Everite), gypsum board (Saint-Gobain and Lafarge) and insulation (Saint-Gobain) – for basic funding. SASFA was established as a division of the South African Institute of Steel Construction to limit administration costs. SASFA invited applications for different categories of membership, in order to form a coherent industry, and during the next few years membership numbers grew to exceed 80 companies.

SASFA reports to an Exco, consisting of elected light steel frame industry executives, and arranges regular meetings of the Technical and Training Committees, consisting of industry specialists.

Codes and standards

A draft building code was compiled, making use of the SANS timber frame standard, and the acceptance and support of the NHBRC was obtained for light steel frame building. Work was immediately started on a comprehensive building standard, referred to as the SASFA Building Code. We decided not to reinvent the wheel, and got support from NASH, the National Association of Steel Housing in Australia, and the Steel Framing Alliance from the USA. The SASFA Code was published in November 2007, and handed over to the SABS to turn it into an official national standard. SANS 517 was published two years later.

In the meantime, meetings were held with the banks to get support for bond applications – ABSA was the first on board, followed by the other major banks.

> *"I believe that the process of the establishment of light steel frame building in South Africa would be an exceptional business school case study. It demonstrates how many things have to be done and how many issues have to be addressed if you want to establish a technology in a new market. And if it is a disruptive technology, enemies and detractors can be expected, and they did materialise. SASFA is a living demonstration of how a good strategy, vigorously executed by a strong association and an industry standing together, can achieve success despite the difficulties."*
>
> ***Dr Hennie de Clercq, former CEO of South African Institute of Steel Construction (SAISC)***

The next important hurdle to clear was the lack of competent builders in South Africa. We contracted an Australian specialist to put together a training programme and to present it to a group of trainers. We subsequently expanded the course to cater for the needs of the local market, and have since presented it on 24 occasions. A training course was developed for building inspectors, and another to cover all the facets of the SANS 517 building standard aimed at all interested parties, including the professions, developers and property owners. Most courses are presented in the major centres in RSA, and we attract attendees from the RSA and abroad.

"The National Association of Steel-Framed Housing Australia (NASH) is delighted to congratulate SASFA on its 10th Anniversary.
It has been heart-warming to see and hear the progress that the cold-formed steel industry has made during SASFA's short life. Some of the highlights include the development of steel framing standards, the introduction of cold-formed steel into building façades, the acceptance of the benefits of steel framed homes and the growing number of steel frames being supplied into the market.
SASFA's ongoing education programme for builders is proving to be very effective in growing the awareness of steel framing and providing the skills needed to efficiently install steel frames. Of particular note, SASFA has been raising and supporting the steel framing industry through the whole of Southern Africa.
NASH looks forward to continuing to work with SASFA and wishes you all the best for the future."

Ken Watson, Executive Director, National Association of Steel-Framed Housing Inc (NASH).

Awareness

We also arranged awareness raising seminars, aimed at the professions, authorities, builders and property owners. Overseas speakers were involved. These seminars were held in the major centres in South Africa, and were very well attended. In order to keep the market informed about developments, an ongoing series of project articles is published in the media. It reflects the growth in scope of LSF projects – from a modest two bedroom holiday cottage on the Cape coast, to upmarket houses, blocks of flats, office buildings and most recently the façade wall of the Mall of Africa.

SASFA also arranges annual industry feedback meetings in the major centres.

As the building volumes grew, we attracted the attentions of the masonry industry who started publishing denigrating media articles on this threat to the status quo in the building industry – when we asked our Australian colleagues whether they ever experienced such reactions, their response was "you must be doing something right!"

Category in the Steel Awards

A category for LSFB was established in the SAISC's annual Steel Awards, and a growing number of high quality entries are received. To the credit of South African designers – they have taken the basic philosophy and are moulding it into a new style of energy efficient buildings, in combination with heavy structural steel, reinforced concrete or masonry building, or on its own.

We have had energy efficiency research carried out by the CSIR on residential buildings, who found that one would need less than half the electricity to heat and cool well insulated LSF houses to comfort levels, compared with masonry buildings.

New products

New products are being developed to serve this growing industry. ArcelorMittal SA has developed thicker gauge (1,0 and 1,2 mm) high strength galvanised steel sheet for higher LSF buildings, and Saint-Gobain and Marley Building Systems have expanded their ranges of cladding and lining materials. The design freedom offered by the ETICS external cladding system from Saint-Gobain is being used by leading architects to create exciting curved façades and gravity defying inclined curtain walls for commercial and office buildings. Design engineers are pushing the envelope to make these buildings structurally viable.

Developments have also extended into the use of LSF for shorter and long span light steel roof structures – up to 35 m spans. In the process LSF competes with both timber and heavy steel trusses.

LSFB has been established in the Southern African building and construction industries, and has been proven as a viable alternative building method for the 21st century. Watch this space!

John Barnard, Director SASFA
May 2017

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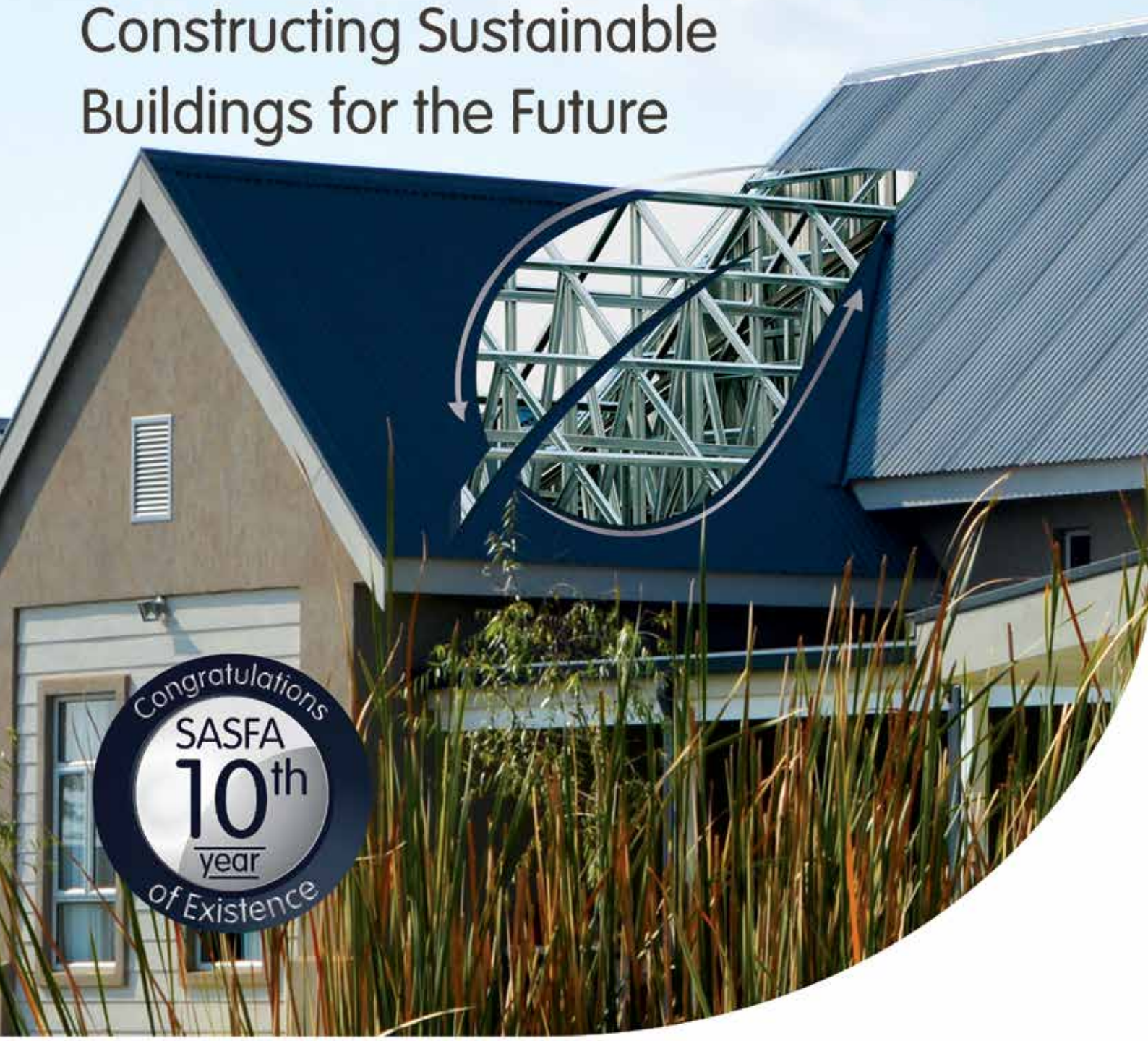
Constructing Sustainable Buildings for the Future



Southern Africa Light Steel Frame Building Association (SASFA) director John Barnard says it can be argued that light steel frame building (LSFB) is no longer an alternative building method in South Africa, as it has become the preferred choice of many leading contractors, developers and architects. This has largely been influenced by the global lifestyle shift to more energy efficient building methods.

Manufactured from cold-formed, light-gauge galvanised steel sections, the LSFB method is a more flexible construction alternative that uses structural steel roof trusses and steel wall frames to construct any envisioned shape or design.

ArcelorMittal South Africa has recently expanded the traditional galvanised thickness range available for light steel frame building. The new thicknesses available include 1.0mm and 1.2mm developed in the structural grade EN10346 SSSOGD, Z275 galvanised.

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MALL OF AFRICA
– LIGHT STEEL FRAME EFFICIENCY AT ITS BEST

History was made for the light steel frame (LSF) industry in South Africa when Ohlhorst Africa Lightweight Building Solutions were appointed contractors for the design, supply and installation of the lightweight steel façade wall and parapet structure at the Mall of Africa (MOA) in Midrand.

Project Team:

- **Client/Owner/Developer:** Atterbury Waterfall Investment Company
- **Architect:** MDS Architecture
- **Structural Engineer:** HAGE Consulting Engineers
- **Quantity Surveyor:** NWS
- **Project Manager:** GHC Africa
- **Main Contractor:** Group Five/WBHO
- **Steel Contractor:** Ohlhorst Africa Lightweight Building Solutions (appointed Design, Supply and Installation for Façade and external walls)
- **Steelwork Supplier:** Clotan Steel
- **ETICS cladding supplier:** Saint-Gobain Weber

"This was one of the largest single phase shopping mall building projects ever undertaken in South Africa and certainly the biggest and most prominent LSF project to date in this country," says Southern African Light Steel Frame Building Association (Sasfa) director, John Barnard.

The fact is there have been several projects in recent times all over the Southern African region that have confirmed the acceptance of light steel frame building (LSFB) as a mainstream construction method for a wide range of building solutions. None, however, is more significant than the massive MOA structure, which required 220 tons of LSF steel and 25 000 m^2 of Saint-Gobain Weber ETICS (external thermal insulation and cladding system) cladding.

Ohlhorst LBS technical and marketing manager, Jacques van Zyl, says that there are many benefits of LSFB and the main considerations in choosing it at the MOA were the speed of the build – the programme required that the building envelope be closed within a few months – and the long-term cost savings. "The LSF/ETICS system ensures weight reduction on the superstructure resulting in significant cost saving on structural steel and concrete. It also provides a durable external cladding with low maintenance requirements further reducing costs over time," he says.

Quantum of weight reduction

The quantum of weight reduction is well illustrated by comparing brick with LSF/ETICS. A brick wall has a mass of 450 kg per square metre translating into a weight of 11 300 tons over the 25 000 m^2 at the MOA. The comparable LSF weight is a mere 10% of this – 1 130 tons. Add to this that it would take 1 100 truckloads of bricks against 110 loads of LSF and the logistical advantage of LSF/ETICS on the entire construction process becomes abundantly clear," says Van Zyl. The steel used was cold-formed thin gauge light steel frames and, according to van Zyl, what made this project unique was the architect's requirement for 30 mm and 60 mm protruding, horizontal bands (some in excess of 100 metres in length) to wrap the

building and to be accurately in line at a height of up to 25 m above ground level.

The LSF/ETICS system was used to create the bands and the accuracy of the system made this complex specification readily achievable. "It worked well even where covering the brick portion of the building, as the LSF/ETICS system can accommodate between 50 mm and 70 mm in surface irregularaties.

Overall, it was just much easier to create the bands this way rather than regular plaster bands, which are not as accurate as LSF, and are notorious for creating water traps affecting the longevity of the structure," he says.

Speed of installation

Tia Kanakakis of MDS Architecture, the MOA architects, says that the speed of installation was a major benefit on the project and that the LSF/ETICS lightweight walling system is a far more expedient construction methodology than traditional masonry walls. "Being a lightweight product, it is beneficial for use where there are slab loading limitations. I would definitely recommend the system to other architects or engineers – its benefits far outweigh its limitations, which can always be managed," she says.

MOA's challenges

Gert Visser of HAGE Consulting Engineers, who worked closely with Ohlhorst LSB, says that, from an engineering perspective, one of the biggest challenges on the MOA project were the extra-large openings and unusually high parapet walls – the LSF walls exceed 6 m in height and the parapets are just short of 4 m-high, and span 8 m between columns. The wind load on the roof parapet walls was a serious issue, which was overcome by reinforcing the LSF wall panels with LSF web joists.

"There is no doubt that use of LSF has opened a whole new world for engineers and architects who are now challenged to become more innovative and creative with their specification of LSF. The Mall of Africa is now the benchmark

for what is possible for LSF in construction," says Van Zyl.

An important requirement on the MOA project was a high R-value (measure of thermal insulation) for the external cladding in order to meet the energy efficiency and energy saving requirements of the project. In the case of LSF/ETICS system at MOA the R-Value was approximately 3.6 as opposed to the R-value of less than 0.6 for a double brick wall. "Apart from the substantial energy savings over time these R-value levels give the architects the freedom to be as creative and as inventive as possible while, at the same time, reducing thermal losses and keeping ambient temperatures comfortable throughout the year at low cost," Van Zyl says.

He adds that in the middle of summer – and even while it was still a building site – it was palpable how cool the building was.

"Those working inside frequently commented on this characteristic."

Benefits

Barnard says the facts are indisputable. "LSFB is a cost-effective building method, with financial savings emanating from significant time savings to complete building projects, less rework, reduced logistical costs – which are of growing importance due to the escalation of transport costs and general construction inflation – and a drastic reduction of rubble on building sites, when compared with the brick-and-mortar alternative. The piles of broken and unused bricks from the brick sections at the MOA were a glaring example," he says.

He explains further that LSFB is significantly more energy efficient than more traditional construction methods – both with regard to 'embodied energy' of the materials and components, as well as 'operational energy' relating to heating and cooling of the building over its design life.

"Furthermore, from an environmental perspective, steel is infinitely recyclable."

Barnard says that the steel consumption of the LSFB industry has achieved double digit annual growth rates over the past five years. "The biggest growth area is in multi-storey office and commercial buildings, where it is replacing heavy masonry curtain walls and, looking at the advantages and the successes of LSFB at the MOA, one can understand why this is the case."

A major winner

Van Zyl says the entire team is extremely proud of this award-winning achievement (the MOA was a joint winner of the Light Steel Frame category at Steel Awards 2016). "This was a project of real class and will remain an example of the massive advantages of the LSFB method in a changing world where costs are spiralling and construction efficiency is the name of the game."

"Being a lightweight product, it is beneficial for use where there are slab loading limitations. I would definitely recommend the system to other architects or engineers – its benefits far outweigh its limitations, which can always be managed.

Case study: Bullfrog Pan – residential building, Benoni.

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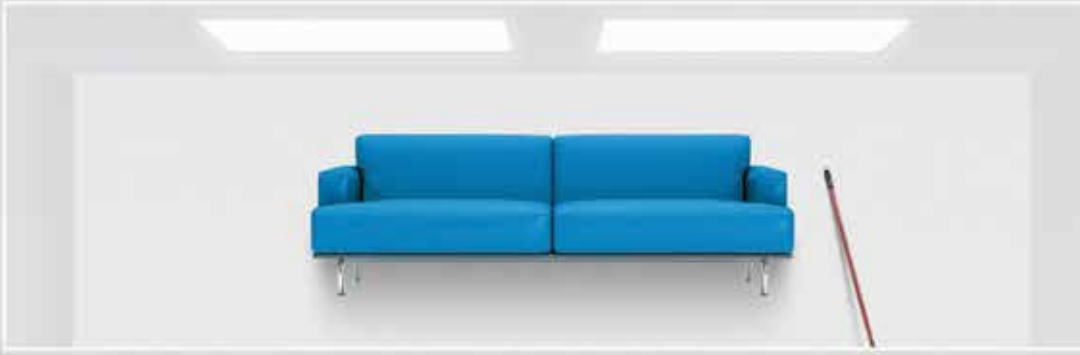

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LSFB – THE GREENEST BUILDING SOLUTION?

'Sustainability', 'energy efficiency', 'green building' and 'carbon footprint', are words that are often used in the construction industry. "It is clear that sustainability is a fundamental consideration and design requirement in most construction today," says John Barnard director of the Southern African Light Steel Frame Building Association (SASFA).

According to Barnard sustainability with regard to buildings is essentially based on three criteria: social acceptability, affordability and energy efficiency. He claims that Light Steel Frame Building (LSFB) for low rise structures rates highly on all of the sustainability considerations:

Light steel frame buildings appear no different to 'conventionally' built structures, except that the quality of finishes is typically better with the former. It has found acceptance for 'affordable' as well as up-market buildings in South Africa.

- It is a cost-effective building method, with financial savings emanating mainly from significant time savings to complete building projects, less rework, reduced logistical costs – which is of growing importance due to the escalation of fuel prices – and a drastic reduction of rubble on building sites, when compared with the brick-and-mortar alternative.
- Light steel frame building is significantly more energy efficient than heavy construction methods – both with regard to 'embodied energy' of the materials and components, as well as 'operational energy' relating to heating and cooling of the building over its design life.

Barnard says that embodied energy of materials and components used for LSFB is calculated to constitute some 20% of the total energy consumption of a 200 m^2 house over a 50 year period with the other 80% being the operational energy. "These figures," says Barnard, "are in line with internationally accepted standards. While the embodied energy of the high strength galvanised steel sheet (used for the light steel frame) is significantly higher per kg than conventional building materials, a significantly lower mass of steel is used, rendering LSF wall assemblies vastly superior in this regard – double brick walls contain more than four times the embodied energy per m^2 when compared with a LSFB wall," he says.

Barnard adds that the low mass of light steel frame buildings offers another advantage – logistics. "The walls of a 200 m^2 brick-built house will have a mass of some 178 tons including clay bricks, mortar and plaster, compared with the 10,2 tons of an identically sized light steel frame building. The cost savings in transport is obvious, but with another benefit to all road users – at least a 60% reduction in heavy transport traffic on the national roads," he says.

Also LSFB structures are insulated to specification pertaining to each climatic zone in SA and, according to SANS 204, they have been found to offer at least a 10% saving in electricity used for heating and cooling, when compared with a brick building.

"While the 10% saving in operational energy over the life of the building serves as a strong motivation for the use of LSFB, the massive savings in embodied energy, albeit only 20% of total energy consumption, offers an advantage, especially in developing countries where electricity generation capacity is under pressure," he says.

CSIR Research supports the notion

Research by the Built Environment Division of the CSIR (BED) confirms that a light steel frame (LSF) dwelling, built to SANS 517, will result in significant savings in electricity used for heating and cooling of the building, compared with a conventionally built heavy masonry building.

A typical 120 m^2 single-story house was used for the comparison. The LSF and the masonry houses were specified to be geometrically identical, with identical orientation.

The results indicated that the LSF house will be warmer than a base-case masonry building in summer, as well as in winter. If the hours of discomfort due to high and low temperatures are added together, the LSF house performs somewhat better than the masonry alternative in all locations but Durban.

Findings

The analyses indicated that electricity required to heat the base case brick building to comfort levels will on average be *double* that required for the LSF building, ranging from 89% more in Pretoria, to 112% more in Bloemfontein. If cooling to comfortable temperatures is required, it will take on average three times more electricity to cool the brick building down to thermal comfort levels compared with a LSFB.

Conclusion

The CSIR's comparative thermal analyses indicated that LSFB offers improved energy efficiency compared with conventional masonry buildings – this means significant savings (between 20% and 90%) of electricity required for heating of residential buildings.

TRAINING – A CRUCIAL ELEMENT IN SASFA'S SUCCESS

The extensive training undertaken by SASFA over the years is certainly one of the reasons for the growth in the awareness of light steel frame building as an environmentally friendly and sustainable building method in Southern Africa.

Recently, when SASFA conducted a 5-day training course to SANDF contractors, it was the 23rd time the course had been run. This time the aim of the course was to qualify SANDF foremen and artisans in LSFB, in preparation for a building project comprising five three-story blocks of flats and offices. More than 300 people have been certified through the contractors training course and it has been key to the growth of LSFB in this country as it teaches contractors how to build with the product!

Training course for light steel frame building (LSFB) contractors

The course is split into two main sections:

- *Steel frame materials, components, and erection* (4 days). This includes: steel making process and properties of coated steel sheet, foundations, manufacturing of light steel frames and trusses, construction tools, wallframe set-out, handling, loads, floor and wall framing, roof structures, planning and the installation of services.
- *Internal lining, external cladding and insulation* (1½ days). This covers the properties, manufacturing and benefits of glasswool insulation, acoustics, energy efficiency, environmental issues, storage and handling of glasswool and tools and installation methodology.

This is followed by a section on gypsum plasterboard, covering properties, storage and handling, cutting, tools and application for walls, ceilings and finishing.

Finally fibre cement board for external cladding is addressed, including the installation of the vapour permeable membrane, sizes and availability of fibre cement – boards and planks, fixing accessories, installation guidelines, and door and window frame installation detail is presented.

The other core training programme is a series of CPD-accredited courses – *SANS 517 Light Steel Frame Building* and Cold-formed steel and LSF design to SANS 10162:2 – which have become increasingly popular in line with the excellent growth in popularity of LSFB in South Africa which is estimated to be worth about R1-billion per annum.

The *SANS 517* 1-day code course consists of an introduction to LSFB, as well as an overview of the development of this building method and industry in Southern Africa.

The advantages of LSFB are discussed and explained – ranging from speed of construction, enhanced insulation and the resulting energy efficiency, low mass and the corresponding logistical cost advantages, through to accuracy, ease of installation of services and durability.

The correct terminology is dealt with, the major LSF elements described and the properties of the major materials used in LSFB are presented.

The second 1-day course, *Cold-formed steel and LSF design to SANS 10162:2*, is aimed specifically at design engineers who have to ensure the structural adequacy of LSF buildings.

The course begins with the fundamentals of plate buckling theory, and contextualises this with thin-walled structural elements as encountered in LSFB. Three buckling mechanisms are generally considered: member buckling, local buckling and distortional bucking.

The second half of this course is more practical in nature, covering the design intent when dealing with LSF structures, and highlights the design criteria provided in SANS 517.

Barnard says that education has been the foundation for getting the advantages of the LSFB method understood in South Africa. "It has also been essential in protecting and enhancing the quality of building through its growth phases and beyond," he concludes.

ULTIMATE FLEXIBLE BUILDING METHOD

It took a short while for the market to realise just how flexible light steel frame building (LSFB) is as a building method. Ten years ago when SASFA brought LSFB to South Africa, the market's mind-set was that it was for simple, single storey residential buildings. Today the plethora of different projects in various sectors have demonstrated its versatility and flexibility.

FROM FAST FOOD OUTLETS TO WAREHOUSES, OFFICES AND FACTORIES ...

The Dabmar manufacturing plant in Dundee, KZN is an excellent example. It amply demonstrates the diversity – in this case a high-end office block in tandem with a factory – of light steel frame (LSF) building and cladding.

Factory

The contractor's (Shospec) scope of works on the factory included the exterior wall cladding comprising 90 mm LSF C-sections bracketed to structural girts on the main steel structure. The walls were then cladded with 200 mm pre-painted fibre cement shiplap planks over 18 mm tongue and groove OSB board and Tyvek Membrane. The internal cladding was 15 mm Firestop Gypsum board with 102 mm cavity batt insulation in the wall cavity. The total cladded wall area was approximately 1 300 m^2.

Shospec's Björn Kähler says that the 10 m-high factory walls with pre-painted Shiplap cladding was an unusual product for an industrial building, selected to achieve the clients brief for a 'softer finish' and energy efficient wall as opposed to the norm of brick and IBR cladding.

Project Team:

- **Client:** Dabmar Manufacturing
- **Main contractor, QS, project manager and steelwork contractor:** Shospec
- **Architect:** Architecture Fabrik
- **Structural Engineers:** Martin and Associates (LSF component)
- **LSF supplier:** Steel Frame Developments
- **Cladding supplier:** Capco Ceiling and Partition Components
- **Roof cladding:** Four Seasons Roofing

He added that the LSF/cladding solution was also the best way to fulfil the basic brief, which was to create a comfortable working environment in the factory, conforming to European standards.

Office block

The entire office was an LSF structure, which comprised 1 200 m^2 over both floors and a 230 m^2 entertainment deck. It has a modern feel with large glazed openings, clean cut lines and dramatic structural features. Double volume areas with overhead walkways and a cantilevered boardroom make this office block unique.

The LSF deck, built over a parking area, included a sunken fire pit with walkways connecting the internal and external spaces.

The aesthetic imperative

Dabmar wanted the building to be different from a typical industrial structure and the brief was to create a 'modern, softer continental look' while maintaining the highest levels of construction standards and finishes.

It is to Dabmar's credit that they had the foresight to accept that LSF was the perfect building method to achieve the desired result especially given that the architect, Martin Kluger of Architecture Fabrick, was originally from Australia and had extensive experience in designing and building with LSF.

The green imperative

Another factor that made LSF the obvious choice was Dabmar's wish that establishing a year-round comfortable indoor temperature for the employees must be achieved as energy-efficiently as possible.

It is a well-known fact that LSFB is significantly more energy efficient than heavy construction methods – both with regard to 'embodied energy' of the materials and components, as well as 'operational energy' relating to heating and cooling of the building over its design life.

Embodied energy of materials and components used for LSFB is reported to constitute some 20% of the total energy consumption of a building over a 50 year period, the other 80% being the operational energy.

To further enhance the green nature of the building, the following were incorporated: factory and office roofs are insulated; all ceilings have additional 100mm insulation; solar water heating; under floor water heating and insulation; double glazed windows; LED lighting; insulated factory roller doors; natural lighting and a water harvesting system.

Challenges overcome

According to Kähler, the height of the buildings was a challenge. "The average height of both buildings is 10 m, which was resolved by hiring two very large scissor lifts. Also, from the design stage, special attention was required to achieve the large floor spans and window openings specified by the client," he says.

Another challenge was that the first floor structure needed to incorporate under-floor heating water pipes. This was achieved with an 18 mm OSB base board and then fitting timber batons at 250 mm centres followed by polystyrene insulation panels with grooves for water pipes. Once the pipes were laid, a 15 mm fibre cement board was fitted with bamboo flooring to finish.

In conclusion

The wide spans, the unusual walkways, the cantilevered boardroom and entertainment deck are all constructed with standard LSFconstruction.

"This demonstrates the diversity of the LSF building method," Kähler says. "The sky is the limit with LSF."

"We are extremely proud of the end product. The 2-in-1 factory and upmarket high-end office block demonstrate the diverse and flexible attributes of the LSF building system on complex, high-end developments," Kähler concluded.

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EFFICIENT. FAST. HIGH PROFILE

High profile brands that need both speed and long term energy efficiency are increasingly embracing Light Steel Frame Building.

McDonald's

McDonald's South Africa has changed the way it builds its restaurants and has embarked on rolling out sustainable light steel frame building (LSFB) restaurants across the country.

McDonald's opened its first light steel frame restaurant in Goodwood, Cape Town in 2013, making it the first LSF fast food outlet in South Africa.

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

The Southern African Light Steel Frame Building Association (SASFA) says that the speed of construction while maintaining quality is one of the biggest factors in the rapid growth of the LSFB method in Southern 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 façade 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 +-5 mm," SASFA explains.

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.

This programme, known as 'Project Green and Growing', 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.

McDonald's opened its first steel frame restaurant in Goodwood, Cape Town on 29 June 2013, making it the first LSF fast food outlet in South Africa. More than two dozen outlets have since been built using LSF.

C.A.T. Motors, the Delta Motors dealership in Cradock, has built a state of the art 1 800 m² facility in less than six months, using the light steel frame building (LSFB) method.

C.A.T. Motors

Delta Motors added its name to the growing list of companies that supports the light steel frame building (LSFB) method.

C.A.T. Motors, a General Motors dealership in Cradock, built a state of the art 1 800 m² facility in less than six months, which is approximately three months faster than conventional building methods – a 30% saving on construction time. The project began in January 2013 and was completed on 30 June 2013.

The Southern African Light Steel Frame Association (SASFA) explains that the building is a light steel frame structure cladded with fibre cement boards with external walls filled with a lightweight concrete mix. The internal walls are cavity walls with ISOVER insulation.

The light frame steel was delivered flat-packed and after assembly was erected within seven days. With strong winds – often 65 km per hour in the Eastern Cape – the structure was designed with additional bracing which was well worth it.

Turning to the floor, 15% of a building's energy is lost through the floor and in this case the floor was built using a Geoplast Flooring Module which consists of recycled plastic modules which raises the slab off the ground and creates a ventilation 'space', which can also be used for services.

Burger King

The Burger King chain has used light steel frame building for its restaurant in Norwood in the northern suburbs of Johannesburg.

The project was a turnkey project. The contractor did the civil work, building construction and all finishes and even fenced the building.

Fast-food chains are using LSFB because they support sustainable building methods as far as design, energy efficiency and the optimal use of natural light is concerned and because, by using LSFB, material wastage is reduced.

John Barnard, Southern African Light Steel Frame Building Association (SASFA) director, says LSFB is definitely much more energy efficient than more traditional construction methods – both with regard to "embodied energy" of the materials and components, as well as "operational energy" relating to heating and cooling of the building over its design life.

Speed of construction is especially important to Burger King as they are new players in the fast food market in South Africa and they are currently planning to expand their South African footprint. In the case of the Norwood building the entire turnkey project took an incredibly short 12 weeks to complete.

The Burger King Norwood has total floor area of 300 m² and both the internal and external walls were built using LSF. For external cladding, the contractor (Silverline Group) used OSB board, protected by a vapour permeable membrane, with mesh and stucco plaster providing the durable external finish.

The building was plastered to achieve the required Burger King external look, as specified in the USA. One of the contractor's challenges was to get the right type of brick appearance for the bottom part of the building. These are not real bricks although they look like the real thing. The solution was to customise the brick cladding and to clad it directly onto the plastered walls.

A MiTEK Ultra Span roof was designed to enable a reduction in heavy steel columns and baseplates due to its longer span capability and the additional strength of the MITEK light steel frame trusses.

The entire turnkey project of the Norwood Burger King took an incredibly short 12 weeks to complete.

BEAUTIFUL WITH LSFB

As aesthetically pleasing as any building method

Turning heads above Hout Bay harbour

Nestled among indigenous vegetation, with spectacular views of Chapman's Peak and Hout Bay harbour, a new development will alter the Hout Bay skyline for ever.

This eco-friendly 340 m^2 triple-storey house, was built using light steel framing and took approximately four months to complete. It has drawn attention from tourists and locals alike.

The LSFB method produces very little waste and has a much smaller carbon footprint than conventional building practice and saves significantly on construction time. This project started at the end of February 2014 and was largely completed by the end of June 2014.

The low mass of the structure and walling allowed the engineers to design a shallow concrete raft foundation with outer beams 450 mm deep and 250 mm wide and a 70 mm thick slab cast in recycled PVC Modulo Blocks. Compared to the heavy reinforcing and thick concrete for conventional building techniques this LSF house saved costs on materials and labour associated with the foundation and floor slab construction.

Once the foundations were completed, the ground floor walls were erected using LSF panels made from high-strength galvanised steel sheeting. The engineer specified the use of chemical anchors to bolt the structure to the concrete foundation. A LSF joist floor was erected on top of the walls and covered with fibre cement boards as the new floor.

Comparing the 3.2 R-value of the light steel frame external walls consist of 9 mm fibre cement board, fixed to the light steel frame through a thermal break layer and a Tyvek vapour permeable membrane, Cavity Batt glasswool insulation installed in the wall cavities followed by a 15 mm fire resistant high impact gypsum board on the inside.

This assembly provides a R-value of 3.2, and when compared to a standard uninsulated double brick wall with R-value of 0.26, clearly shows the superiority of the composite wall system that LSF offers.

Internal walls consist of light steel frame panels clad with high impact 15 mm fire stop gypsum boards with a more than 30 minutes fire rating, and glasswool cavity batt insulation in the cavities, to enhance acoustic insulation.

"According to the CSIR, energy required for heating and cooling a well-insulated LSF dwelling will be less than half of that needed to keep the internal temperature of a uninsulated masonry dwelling at a comfortable levels," adds John Barnard, Director of the Southern African Light Steel Frame Building Association (SASFA).

To make the house even more environmentally friendly, the owner will be using solar heating and recycling rainwater which he will use to water the plants in his garden.

An award-winning house

Past executive director of SAISC, Dr Hennie de Clercq and his wife Helena's new house in Cape Town earned itself a commendation in the Residential category at Steel Awards 2015. In view of Hennie's many years of involvement with structural steel and LSF, it followed logically that he would use steel to build their new house.

The key notion behind the De Clercq house is that of outside living, with 'outside' incorporating essentially everything on the ground floor, with as few boundaries as possible. Thus the single, large living room, encompassing the kitchen dining and lounge area, opens to the patio on the one side and onto a wide 'stoep' without columns on the other, bordering on the fynbos garden.

A structure consisting of heavy I-section beams and columns enables the open plan and the cantilever 'stoep', while carrying most of the storey above. Much attention was given to the details and finishes of this structure as it constitutes a key architectural feature.

Just as the ground floor is intended to be as open as possible, so the first floor, containing the bedrooms and study area, is intended to be a safe, warm refuge. Light steel framing was used for the floor joists, walls and roof structure. The roofs are clad with concealed fix sheeting.

The balustrade of the staircase is made of 4,5 mm thick steel plate, unpainted, supporting the wooden handrail. The two parts of the face of the house facing the street, on first floor level, were covered with 2 mm thick steel sheet, consisting of unpainted CQ. These sheets have now rusted to a dark, reddish-brown colour.

Contemporary. Award-winning. Stylish. This house is proof that LSFB can be used with great success in the domestic market.

Using the light steel frame building (LSFB) method, this eco-friendly 340 m² triple-storey Hout Bay house, took only four months to complete.

PERFECT FOR INFRASTRUCTURE BUILDINGS

The LSFB building method lends itself to a wide range of building types, from residential and commercial, to offices, hospitals and clinics.

"The ability to achieve complex and aesthetically pleasing designs with LSFB is no longer in doubt and, given LSFB's significant contribution to a growing movement of sustainable and cost-effective building, the advantages of LSFB to developers and the environment at large, can no longer be discounted."

– John Barnard

In the SADC region, Light Steel Frame Building (LSFB) is increasingly becoming the preferred building method for those interested in energy-efficient buildings that can be built fast and with minimum waste, and Swaziland is no exception.

The first notable LSFB project in Mbabane, Swaziland, is an out-patient clinic for the Ministry of Health, built by Razorbill Properties under instruction from the principal agent (PA) Ramashka Architects Swaziland. Razorbill is a Large Manufacturer Member of SASFA, and also undertakes turnkey LSF building projects.

The main purpose of the facility is to serve as a day clinic, which will alleviate the patient load from the neighbouring main hospital. Provision was made for a link bridge between the clinic and the main hospital to facilitate a free flow of pedestrian traffic between the two facilities.

"The benefits of opting for the LSFB route was highlighted to the client," says Chris Smith Razorbill CEO. "These included the speed of construction, an imperative for this project; thermal insulation complying fully with SANS 10400XA ensuring energy efficiency over the lifetime of the building; site neatness and a building process that would minimise interference with patients and ongoing main hospital operations, and more."

Smith says that the project site had some challenges in terms of the topography, site access roads, sewage lines, storm water systems and available space on site for the offloading and storage of building materials.

The scope of works included the rolling of about 100 tons of 0,8 mm and 1,2 mm LSF sections in Vereeniging and transporting it to Mbabane (ArcelorMittal's ISQ 550 high strength galvanised steel sheet was used for the LSF sections); the assembly and erection of all the LSF panels including 16,5 t of heavy structural steel; the installation of 3 700 m^2 of fibre cement board external cladding supplied by Everite, and 14 200 m^2 of internal lining comprising 15 mm thick fire stop and moisture resistant Saint-Gobain gypsum board; and the erection of the roof consisting of ArcelorMittal's Chromadek roofing, profiled by Safintra.

The hot-rolled steel sections were used in the project to achieve the heights and spans required in the building. "This was designed by South African engineers and the manufacturing was outsourced to local Swaziland engineering firms," Smith says. He adds that a significant amount of materials were also procured in Swaziland, including paint, cement, boards and tiles. "And furthermore," Smith says. "Razorbill trained and employed more than 110 local Swaziland people for the project. This job creation for locals is consistent with Razorbill's strategy of maximising sustainable benefits for the local communities in which the projects take place."

The news of the energy efficient LSFB method has travelled fast in Swaziland. "The Ministry and Ramashka Architects are delighted with the project and the obvious advantages of LSFB. We have already been approached for another important construction project in Swaziland where the developers are very interested in LSFB," says Smith Furthermore, SASFA has had two senior building inspectors from Swaziland attend its 6-day training course for building contractors, which was presented in March 2016 in Gauteng.

"This project is yet another excellent example of the benefits of LSFB," says Barnard. "Even if you take only the advantage of being able to construct a substantial building right next to a hospital without interrupting the daily operation of that hospital, it would be reason enough to choose LSF instead of dusty, noisy, heavy, labour intensive masonry construction. LSF allows for a neat, organised and clean building site with low traffic density. If you add the other benefits such as speed of construction and long-term energy efficiency, one can understand why this method has grown so quickly in popularity in Southern Africa and why the PICC (Presidential Infrastructure Co-ordinating Commission) has decided to encourage the use of IBT's (Innovative Building Technologies) for all new hospitals, clinics, schools and student accommodation.

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SHOWCASE OF EXCELLENCE

In 2008 a category for LSFB was established in the SAISC's prestigious annual Steel Awards. Nothing emphasises more the coming of age of light steel frame building in South Africa than the growing number of LSFB project entries for Steel Awards. In 2016, LSFB constituted a third of the number of all the entries for Steel Awards. This overview of the winner/s of each year illustrates the divergent range of excellent projects.

AMANZIMTOTI HOUSING ESTATE

2008

Antigua Estate in Amanzimtoti was named the winner in the Light Steel Frame Building Category of the 2008 Steel Awards.

Typifying light steel frame construction's excellent attributes, Antigua Estate demonstrated why this revolutionary building system was fast becoming as recognised a building solution in South Africa.

Antigua Estate is ideally situated, with a view of the sea in the distance on the one side and the rolling hills of Kwazulu-Natal on the other. Started in August 2006, the development was completed in mid-2010.

While similar in many respects to other luxury developments in the vicinity, Antigua, through its extensive use of light steel framing, is a development with a difference.

The total floor area added up to 19 800 m^2, averaging about 300 m^2 per house. It required 6 000 linear metres of light steel sections per unit, totaling 240 000 linear metres. Some 200 tons of steel was used for all the wall frames and trusses.

The developer's decisions about how to build, clad and insulate the houses reflected their quest for top end quality and they reported that compared with similar up-market finishes in houses built using more conventional methods, steel frame houses are only slightly less expensive than brick and mortar, but extensive savings are made in labour and speed of construction. The judges were astounded by the fact that it is possible to complete a 250 m^2 double-storey upmarket house in only 22 working days.

AWARD WINNING COMBINATION

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MASTER BUILDERS ASSOCIATION

EXCELLENCE

BREEDEZICHT DEVELOPMENT

In a year when the number of entries in the Light Steel Frame Building (LSFB) Category of Steel Awards 2009 grew significantly, it was not a single house that stood out from the rest but rather three houses in the same estate – the Breedezicht Estate in Witsand, Western Cape.

The judges said that the award-winning houses showed professionalism comparable to anywhere in the world. Their finishes are incredible with straight and level lines and vertical and square corners. Add to this the simplicity of running services in a cavity wall ready to receive them and in double quick time, and this project demonstrates in a world-class fashion one of the most exciting building technologies for the future.

At Breedezicht the environmentally conscious developer opted to introduce LSF construction in addition to conventional brick-and-mortar and decided on architecture reminiscent of the Vermont and New England styles to compliment the coastal environment.

As each structure is a uniquely engineered product, the LSFB system produced a home of exceptional strength and solidity while affording easy, fast and accurate installation.

The double-storey luxury house on Stand 1090, erected on a standard engineer-designed slab, took only four months to complete from start to finish while the Vermont style, single-storey on Stand 1081, took only three and a half months to complete.

The judges noted some of the cost-saving qualities of LSFB. Firstly, because installation is so fast, there is saving on labour. Secondly, numerous trips were required to deliver materials to the brick and mortar sites while an entire LSF unit was delivered in one trip saving significantly on input costs.

Thirdly, considering the typical climatic conditions of a coastal town on the Garden Route – cold and rainy winters, hot and sometimes humid summers – good thermal insulation, which keeps the house cool in the summer and warm in the winter is an enormous cost-saver.

2009

AFRICA GAMES ATHLETES VILLAGE

Light Steel Frame Building's growing popularity in the Southern African region was confirmed when the high-profile All Africa Games Athletes Village in Maputo won the 2011 LSFB award at the Steel Awards.

The judges said the Athletes Village project exemplified a number of the advantages of LSFB and was the driving force that enabled the project to meet 'incredibly tight project deadlines and produce a high-quality end product'.

The Athletes Village, with a total living space of more than 97 000 m^2, consists of 27 four-storey apartment buildings, with a total of 848 apartments. The project team says that the main challenge of this project was the extremely tight time frame in which the 27 structures had to be completed. This was due to the fact that in April 2009, Mozambique took over the hosting of the 10th All Africa Games from Zambia, which was forced to pull out because of the global financial crisis.

While All Africa Games hosts typically have four years to plan and implement such events, Mozambique only had two and, in addition to the construction of

ZAMBEZI MALL

2010

The Zambezi Retail Mall Extension project was been named the winner of the Light Steel Frame Building (LSFB) category at the 2010 Steel Awards.

The judges commented that often, when LSFB is expertly and appropriately utilised, it becomes clear that it was the only solution for that particular job.

The sheer size of the roof structure – three separate roofs each spanning between 7,5 m up to a maximum of 30 m clear, covering an area of 7 700 m^2 including overhangs – was one of the main reasons for the professional team entering this project. "At the time of erection, it was the biggest lightweight steel roof in South Africa," they said.

The northern portion of the roof – with a clear span of 22,5 m – had to cover a cinema area, and was supported on 12 m high concrete columns along the northern edge. The columns were fixed to the concrete supporting slab and columns below, which were stabilised by applying a 5 kN force through the tie beams of each of the lightweight steel trusses.

The cinema area – six small movie theatres added after the original construction of the mall – provided a significant challenge in that the weight of the walling had to be kept very low while, at the same time, an acoustic insulation of 85 dB had to be achieved between theatres.

This was achieved, inter alia, through the 2 450 m^2, 12 m high external wall, which resists wind forces and provides the necessary thermal and acoustic insulation for the internal spaces and a solution comprising a multi-layered fire-stop Gypsum board, stone wool insulation, extruded polystyrene insulation and an air-gap system to meet the relevant technical and strength requirements.

sports facilities and infrastructure, one of the primary tasks was the Athletes Village project.

The only way to accomplish this in time was LSFB.

The project team says that by utilising load bearing LSF members (wall studs and floor joists) this project was able to take advantage of steel's greater strength-to-weight ratio versus traditional methods of construction such as poured-in-place concrete. This framing system incorporates innovative time-saving techniques, resources, and engineering to produce a quality structure on a grand scale.

The Athletes Village Project was part of the main Games complex in Zimpeto, a suburb of Maputo the capital city of Mozambique. The purpose of the Village was to house the majority of the 6 500 athletes from 48 African countries who competed in the Games. Upon conclusion of the Games, the buildings were converted to residential housing for the people of Zimpeto.

2011

EXCELLENCE

DELOITTE HEAD OFFICE

The Steel Awards 2012 judges broke with tradition and combined the historically distinct 'Architectural' and 'Light Steel Frame Building' (LSFB) categories, presenting the combined award to the Boogertman + Partners Architects-designed Deloitte Head Office, which is situated at the Riverwalk Office Park in Pretoria.

The unprecedented move was motivated by the unique qualities of the building, which unites excellence in the use of architecturally exposed steel with cutting-edge application of the Light Steel Frame Building (LSFB) method in commercial buildings.

Judge Lemaseya Khama, representing the South African Institute of Architects, said that "having understood the material makeup of the envelope" the judges' particular interest was to "see how it stood up to its application. The product outcome is one of high quality.

"The design details were simple yet achieved complex and pleasing forms, while the detail resolution belies a concerted team effort. With the knowledge that the LSFB product is relatively new in South Africa, this is laudable."

The site of this development slopes severely from west to east, where it connects to the Wolwespruit River, which separates it from the existing three office buildings in the complex.

"The fact that this year a LSFB project has reached the point of excellence where it can also be an 'Architectural' category winner, sends a very strong message about the LSFB industry and how much it has developed in this country," the project team said.

The eye-catching deep-orange exterior was achieved using 60 mm-thick EPS (expanded polystyrene) lightweight cladding, fixed to a light steel framework which is bolted to the reinforced concrete structure.

These façades, which simply could not have been built with more conventional building methods, ensure excellent insulation, providing comfortable temperatures all year round and so reduce the demand on air-conditioning for cooling in summer and heating in winter.

"What has been left in the minds of the judging panel," concluded Khama, "is the extraordinary potential of this system to be used in a highly aesthetic, all-steel superstructure, with all the attendant benefits of precision and time-saving, not to mention the environmental considerations."

2012

EXCELLENCE

NTT AUDI NEW SHOWROOM

2013

Audi's new showroom in East London, part of a roll-out of new Audi showrooms worldwide, won the Light Steel Frame Building (LSFB) category at Steel Awards 2013.

This was a top-end motor showroom, which was certainly a departure from the norm and certainly required closer inspection. It came through with flying colours demonstrating the unique attributes of LSFB. In this case – instead of straight and square lines, we were treated to dramatic curves that illustrated the versatility of the product," he said.

As expected, the interior of an upmarket car showroom must be unique and classy to, after all, show off one of the most respected German-made car brands. The client wanted curved walls and bulkheads to get the right effect and usually this would have been done in concrete. But, as with most retail and commercial projects, time is money and the LSFB method was the perfect solution given this scenario.

The LSFB contractor responsible for the interior curved walls, bulkheads, skimmed ceilings and metal pan ceilings said that this project – entailing three curved walls at a 60 degree incline – was one of its most technical and challenging projects in 20 years pushing its design and fitting teams to new heights.

Light steel frame wall beams formed the sub structure for the curved walls which were then double cladded with full skim finish. Very technical detailing was involved with junctions to different areas and curves needing some custom-made solutions.

Due to the very tight project programme as well as the size and height of the curved walls, the LSFB method was the perfect system to use in place of standard dry-walling. Furthermore the use of pre-assembled structural beams and joists allowed for very quick on-site erection of curved walls with the added advantage of consistent sizes and accuracy.

The majority of steel wall joists were erected in the first two weeks on site. The contractor also used the speed of LSFB to avoid high accommodation and transport costs since the site was 600 km away from their offices and workshop, which are in Pietermaritzburg.

MCDONALD'S

2014

There were many first-rate examples of light steel frame building (LSFB) projects entered into Steel Awards 2014 – especially some of the residential projects. However the judges decided that the McDonald's entry of seven fast food outlets – Goodwood, Rustenburg, Silverlakes, Somerset West, Epping, Tembisa and East London – displayed excellence in the use of light steel framing.

Why McDonald's chose LSFB

Firstly because it met their goal of an energy efficient building and secondly because speed of construction is one of light steel framing's main characteristics.

McDonald's has invested in many sustainability measures in its restaurants over the past two years. 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.

The LSFB model was just the right system to address these targets.

They not only reduced material waste by 30% and transport cost by 80%, but the insulating layers reduced the building's energy requirements by 17% to 20%, compared with those of more conventional designs.

The time saving on the construction period has also been far better than with brick and mortar, which has enabled McDonald's to serve their customers earlier than expected – surely a win-win for them.

EXCELLENCE

HOUSE DE CLERCQ AND COTTAGE and MEDICLINIC (JOINT WINNERS)

Because of the exceptional standard in two projects, the judges had difficulty in choosing between them so they opted for Joint Category Winners.

House De Clercq and Cottage, KZN

Set in an agricultural estate, surrounded by sugar cane, this house is a perfect example of what LSFB methods are meant for. "It is true to the material and does not look like a LSF house trying to look like a brick home and the early involvement of the contractor with the design team enabled them to push the limits of LSFB," the judges said.

One of the advantages of LSFB is the speed of erection and even the industry strikes in July 2014 did not delay handing over the 900 m^2 house, as promised, by December that year.

Some of the features:

Hot-rolled steel: Structural steel H-sections form the structure of the centre living area, main facade and three patio areas.

- A mono-pitch roof structure required 1 250 m^2 of roof sheeting and necessitated varying heights of LSF walls.
- Exposed LSFB construction, finished in black paint. Even in the double garage there is exposed LSF in its original galvanized finish with a light steel frame storage rack hanging off the roof – such a simple practical idea
- Large glazed openings to capture the stunning view. Glazing and opening sizes were a challenge as the client wanted maximum clear views and wide-opening spans. This was achieved using a combination of doubling up LSF joists and plating them with 1 mm thick galvanised sheet L-headers.
- Exterior wall cladding was done with flat fibre cement board with a fine texture plaster finish and imported tongue and groove Shera plank. Interior walls were cladded with Gyproc 15 mm Firestop boards and 102 mm cavitybatt insulation in the wall cavity.
- No direct water or electrical supply was available for the first four months on site thus water tanks and generators were required. As LSF is a dry building method, minimal water was required during this stage.

2015

Mediclinic, Midstream, Centurion

Due to the early involvement of the LSF contractor and profile supplier, the architect was convinced that the design should include a LSF roof structure to reduce the total load on the supporting structure.

The Ultra-Span (a pre-fabricated light gauge steel roof truss system by MiTek) roof structure covers 9 100 m^2 of the roof structure and weighs in at almost 68 tons of steel. This comes to just below 7,5 kg per square metre, including purlins, which is very, very light considering some of the roof trusses span 19 metres with considerable live load and bottom chord loading requirements. The design also allowed for supporting 100 mm-thick insulation between the truss top chords and the purlins.

The long-span Ultra-Span trusses were assembled on site eliminating transport problems of the large components. Smaller units were assembled in the factory and delivered to site.

Clusters of four large trusses were assembled on site into braced roof sections before hoisting into position by the site tower cranes. This combined process ensured overall completion in just five months despite quite poor weather on average, and significantly reduced the danger of working at height.

EXCELLENCE

MALL OF AFRICA FAÇADE AND PARAPET WALLS and THE NEW OUTPATIENT DAY CLINIC FOR MBABANE HOSPITAL IN SWAZILAND (JOINT WINNERS)

Mall of Africa, LSF Façade & Parapet Walls

See pages 4 - 6 for a detailed overview of this impressive project.

2016

Temporary Opd Unit At Swaziland Government Hospital, Mbabane

See page 20 for a detailed overview of how LSFB was used to build a new hospital in Swaziland.

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CONTRACTUAL PROTECTION VITAL

By Uwe Putlitz, CEO of the Joint Building Contracts Committee (JBCC)

In an ideal world there would be no need for contracts. Parties may make any agreement provided it is enforceable by law.
In common law, almost any agreement may be enforceable – with a whole lot of additional obligations that may not suit the parties.

Uwe Putlitz, CEO of the JBCC: "Disputes and difficulties inevitably crop up when contractual parties do not follow the correct procedures," he warns.

Hence 'standard' agreements have been developed for use in different industries, to limit some obligations imposed in common law. Standard contracts are:

- Usually negotiated between different bodies that make up the industry;
- Designed to spread risks equitably;
- Worded to avoid the cost and time of individually negotiated contracts (act as checklist); and
- Structured to allow fair comparisons of tender prices.

Decisions have to be made from time to time about such essential matters as the making of variation orders, the expenditure of provisional and prime cost sums and extension of time for the carrying out of the work under the contract.

The various building and construction agreements have similar headings in much the same order:

- Definition and Interpretation;
- The parties;
- Design criteria;
- Risk allocation;
- Works description;
- Specialist contractors;
- Completion and adjustments;
- Payments and adjustments;
- Suspension;
- Dispute resolution; and
- Agreement … where the parties sign the agreement.

Most agreements now use a 'contract data' form to record the variables applicable to an agreement.

All JBCC building contracts are designed for use by the employer and the contractor with a third party, the principal agent, appointed by the employer, to administer the contract. Where the employer or the contractor have acted as principal agent such contracts have generally not been successful with the parties disputing almost every action – with consequent delays and cost overruns.

The JBCC Principal Building Agreement is used for all types of building work – to be used in conjunction with the Nominated/Selected Subcontract agreement.

A 'nominated subcontractor' performs specialised work – and is chosen by the employer and/or the principal agent without input from the main contractor.

Conversely a 'selected subcontractor' is chosen from a list compiled by all parties, i.e. including the contractor. Subcontractors are appointed by the main contractor on instruction from the principal agent.

Specialist contractors and subcontractors have sadly not been treated equitably by some main contractors who tend to make part or late payments, and impose what are often unjustified contra charges for supposedly defective work.

The JBCC published various worksheets including 'certificates' to record the start and completion of a section of the work and the works as a whole.

There are certificates' to record interim and final payments as well as various 'guarantee' forms – the contractor provides a financial guarantee to the employer that may be called upon should the contractor not perform the agreed duties.

Similarly, the employer is expected to provide a payment guarantee to ensure uninterrupted cash flow to the contractor without holding back money.

All reputable building and construc-tion agreements have built a track record over the years of successful applications - if used correctly.

Where 'difficulties' have been encountered these largely relate to the parties not following procedures, partly out of ignorance, but sometimes deliberately to intimidate the other party. This includes 'modifications' to the text by users without realising the possible, even contradictory, implications thereof.

For more information and details about JBCC 2017 training courses, which earn CPD points, contact 086 100 5222 or visit www.jbcc.co.za

THE JOINT BUILDING CONTRACTS COMMITTEE NPC

JBCC®

The Joint Building Contracts Committee® NPC (JBCC®) was registered in 1997 as a Non Profit Company. The Committee is representative of building owners and developers, professional consultants and general and specialist contractors who contribute their knowledge and experiences to the compilation of the JBCC documents that:

- portray the consensus view of the constituent members;
- are published in the interests of standardisation and good practice
- with an equitable distribution of contractual risk
- for use throughout Africa - and elsewhere!

All JBCC® documents have been approved by the Construction Industry Development Board (CIDB) and for use by national, provincial and local authorities in South Africa.

Periodic revisions of the JBCC® contract documentation suite ensure that documentation remains current.

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SUSTAINABLE CIVIL CONSULTING AND PROJECT MANAGEMENT

HAGE Projects and Consulting Engineers was founded in 1996 with the vision to create a sustainable civil consulting and project management firm focused on delivering quality service. Since then the company has successfully serviced and created valued relationships with its clientele in the steel, petrochemical, commercial, industrial and mining industries.

With its origins in the Vaal, HAGE not only pursues regional growth, but have also completed some large projects country wide. This keeps the company in touch with national and international trends and engineering technology.

HAGE Projects believes in drawing on the diversity of our country's talent, from various backgrounds, to create a truly South African company, rooted in Africa and working to make Africa great.

Consulting engineering

HAGE Projects combines a team of specialised engineers and draughtsman with the most up to date computer design software to service clientele with an accurate detailed product in limited timeframe. It also prides itself in delivering a product to the client that meets not only all design requirements but is also easy to construct with various design innovations.

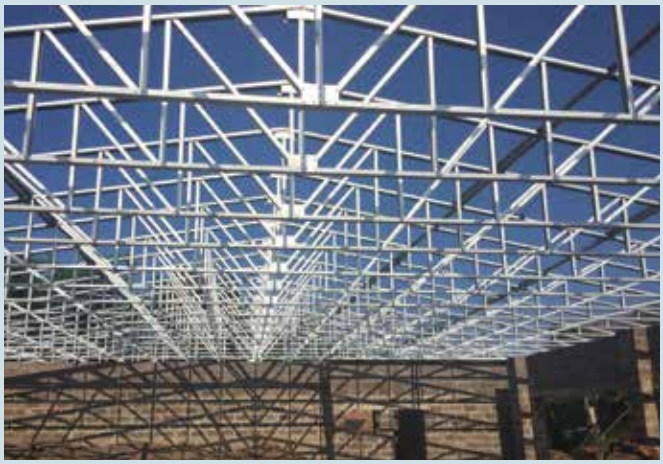
HAGE Projects are leaders in the design of light steel frame structures. They have been involved with this new industry since the initial stages it was introduced in South Africa.

They are registered with SASFA as a design consultant member and is the sole consultant for Clotan Steel, one of the leading LSF fabricators.

They were appointed as the structural and acoustical engineers for the highly successful 2010 World Cup

NEW HEIGHTS IN ROOFING SOLUTIONS

Whether you are looking to install or replace the roof of a residential home, a hotel, a rural school, a factory or even an army barracks, Dezzo Roofing has got you covered. Positioned at the forefront of lightweight steel roof trusses that have been mindfully created to carry concrete roof tiles, steel sheeting or fibre cement sheeting, it offers comprehensive roofing solutions as true as steel.



Roofing solutions

Specialising in lightweight steel roof support systems as a viable, and certainly cost-effective, alternative to conventional timber roof systems, Dezzo Roofing has reached new heights in terms of roofing solutions, having been involved in numerous international and local projects. It has built more than 3½ million square metres of lightweight steel trusses for projects that have been completed countrywide as well as in Angola, Mozambique, Indonesia, Zambia, Burkina Faso and Botswana. It supplies a knockdown kit that includes trusses, battens, tilting battens, beams and purlins.

All Dezzo Roofing steel components are manufactured from zinc and aluminium coated steel that ultimately ensures they are stronger, lighter and more economical to use than traditional roofing system materials.

A quality roof over your head

One of the first companies in South Africa to pioneer a lightweight steel roof support system which is engineer designed, it has extensive experience and ability in steel and timber roofing systems. Dezzo Roofing's steel division consists of eight roll-forming machines as well as a fully equipped cut-to-length line and bending facility, with the production capacity of the factory at around 500 tons per month and equating to roughly 90 000 m^2 of roof support material.

With its systems manufactured from aluminium and zinc coated steel, which offers excellent corrosion resistance, and the trusses manufactured by highly trained steel artisans, you can rest assured that you are presented with a quality, cost-effective finished product. Battens and purlins are cut to length to suit every roof, thus greatly reducing on-site cutting and waste.

International Broadcast Centre erected inside the NASREC Exhibition Centre.

Recent projects include the 'The Vantage' in Rosebank, Mall of Africa, Summit Place Office Complex along the N1 near Menlyn and Gateway Office building in Waterfall Estate.

Civil & building construction and concrete rehabilitation

HAGE Projects started a construction division as part of its growth strategy with the vision to fill the gap in poor skill and service delivery. HAGE is mainly focused on industrial projects, commercial projects, structural concrete structures, core drilling and industrial maintenance projects. HAGE has also been involved in various Light Steel Frame projects, which included the installation of the first floor within an existing studio for the Big Brother Africa House.

HAGE has a highly-specialised team for concrete rehabilitation & acid proofing in various industrial and commercial applications.

As it has a strong consulting background, turnkey projects can therefore also be done for clients with the benefit of reduced design cost and increased efficiency.

Build IT JEFFREYS BAY BUILDS AN ULTRA-ROOF

When confronted with the challenge of establishing a world-class education facility on a shoe-string budget, Build IT Jeffreys Bay and Associates had the perfect solution.

Build IT Jeffreys Bay took on this job just months after opening their truss plant, which showed its dedication and capacity by not shying away from a job that is out of the norm.

The involvement of the owner and his long history with MiTek gave him the advantage over his competitors and so secured him the job.

The initial plan

To have two 19 m hot rolled steel girders to support the three types of trusses spanning perpendicular to the supports. The disadvantage of doing this was that hot rolled girders are not always cost effective, especially over such a long clear span. The erection of such girders would have also been impractical, due to limited working space on site. An expensive crane would have been required to lift these heavy weight girders over a long reach.

MiTek's plan

Span all trusses parallel to the traditional supports, essentially producing enlarged rafter/purlin type trusses. Ultra-Span girders were created at the ends to support short span trusses to comply with the required minimum ceiling height. This idea was also adopted in the middle section of the roof to act as stability braces for the window panels.

Window panels were made with MiTek's wall framing product to allow for very specific window sizes, and to provide flat surfaces for fixing of such windows.

In typical long span Ultra-Span style, the 19 m trusses were preassembled in braced pairs and then lifted into their final position on the roof, to ensure fast erection of the roof structure skeleton and enabling other installation works to continue on a stable platform.

Satisfied customer, Stefan Kleyn from the Global Leadership Academy, says, "With the design and construction of the new school buildings for Global Leadership Academy in Jeffreys Bay, we were confronted with the challenge of establishing a world class education facility on a shoe-string budget. This required our architect, Jacobus Scott, to come up with innovative solutions. One of these problems was that we wanted a multi-use gathering area, which required an ultra-long span roof design. There was just no other cost-effective option but to make use of the MiTek Ultra-Span system."

COMPLETE SOLUTIONS

With more than 60 years of experience in product design, testing and manufacturing, Simpson Strong-Tie provides comprehensive structural solutions for cold-formed steel construction.

From steel-to-steel connections to full-scale lateral solutions, Simpson Strong-Tie remains committed to developing new technology that helps to advance the light steel frame building industry.

The company's success is underpinned by a commitment to helping its customers build safer and stronger structures, economically. As such, Simpson Strong-Tie provides complete construction solutions with a broad range of innovative products including connectors, mechanical anchors, chemical anchors, fasteners and the Quik Drive® auto-feed screw driving system.

Critical to the longevity of a building is ensuring safe and strong connections. Simpson Strong-Tie has a long history in developing innovative products to assist in creating a continuous load path. This type of construction method ties the structure together from the roof down to the foundation, and equips the building to resist the strong forces that can be caused by high winds and earthquakes.

Simpson Strong-Tie South Africa stocks a range of specifically designed connectors for light steel frame construction. The range includes tension ties and hold-downs, truss connectors, multi-purpose ties and tensioners. The S/DTT2Z tension tie is just one of Simpson Strong-Tie's hold-down connectors that are suitable for lighter-duty hold-down

ABOVE: ***Installation example S/DTT2Z.***

HIGH-END HOUSING LEANS TOWARD GREEN LIVING DESIGN

Alternative building technology lends itself to green living design with a host of qualities under the banner of innovative, sustainable and complete building solutions.

It was the building method of choice for one home owner who had to rebuild four holiday homes for his family after a fire gutted a number of homes on the Vaal River in September 2015.

He opted for the efficiencies of dry construction, utilising light steel framing, KalsiClad 12 mm fibre cement cladding and Siniat gypsum board.

Alternative building technology from Marley Building Systems works on a multi-layer concept comprising fibre cement, plasterboard, light steel frame and insulation. On a scale of good, better, best, this lean construction method achieves five star ratings in:

- Mechanical impact performance;
- Mechanical fixing performance;
- Acoustic performance; and
- Fire resistance.

Alternative building technology meets SANS 517 and SANS10400 legislation from a green building perspective, achieving optimal energy efficiency from the thermal insulation built into the structure. Other performance values for high end specifications can reach 11,72 cm in wall thickness, 54 db in acoustic performance, and a 30-minute structural fire rating.

It is superior to traditional building methods which can sometimes inhibit the design options available to architects. The home owner in the Vaal found alternative building technology extremely versatile for his design purposes.

He used a mix of mediums, including hot rolled steel for beams, light steel frame for curtain walling and partitions that extend outside, and plenty of glass. Paint and plaster techniques on the Kalsi fibre cement cladding also helped to create a strong aesthetic appeal.

Sustainability and innovation are two sides of the same coin for Marley Building Systems as the company pushes forward to exceed industry standards through continually seeking new ways to manufacture products as efficiently as possible. Etex, the Belgian industrial group, global leader in building materials and holding company of Marley Building Systems, commits one percent of the group's annual sales turnover to research and development.

For this reason, Marley Building Systems can offer the market dry construction solutions that are 100% recyclable or recoverable.

The Marley Building Systems design team works alongside engineers on alternative building technology projects to ensure an optimised design.

On this home, Marley Building Systems also worked closely with the contractor on the project, De Wet Nel Construction – an experienced manufacturer of steel structures. (Since this is a project in progress, readers can stay up to date with the development on the Marley Building Systems page on Facebook.)

"We are geared towards the future of dry construction solutions as South Africa and the rest of the Continent transitions from traditional, cumbersome construction to more lightweight, economical and environmentally friendly technology," says Amanda Nortje, product manager for fibre cement at Marley Building Systems.

"Our unique and competitive offer capitalises on the building trends of the future."

PICTURED LEFT: ***AT-HP® Blue fast-cure anchoring adhesive.***

applications. Easy to install, the S/DTT2Z provides a high-strength, post-pour, concrete-to-steel connection.

Simpson Strong-Tie's range extends beyond light frame steel construction connectors to a range of chemical anchors including the new AT-HP Blue high-performance all-weather anchoring adhesive. AT-HP Blue has just been released in South Africa and utilises colour change technology. The anchoring adhesive changes colour from blue to grey when cured to give a visual indication that the chemical anchor has cured. This innovation makes it easier for the installer onsite to know when the chemical anchor is ready to load.

In line with a history of innovation, Simpson Strong-Tie continues to develop its range of collated fasteners for use with the Quik Drive auto-feed screw driving system. One of the more popular Simpson Strong-Tie fasteners is the range of CBSDG screws which are used for timber-to-steel applications. This robust fastener features a winged design, perfect for steel joist applications up to 3 mm thick. This clever fastener saves time onsite through its collated design, minimising wastage, all from an ergonomic standing position.

NO PROJECT TOO BIG OR SMALL

Award-winning light steel frame builders and shopfitting specialists, Shospec, has been successfully providing the residential, industrial and building industries in KwaZulu-Natal with top quality services for over 25 years.

Experts in offering turnkey solutions to clients, there is no project too big or small – from multi-million-rand government contracts to small personal home extensions, Shospec prides itself on creating and constructing modern and functional projects and accommodating all elements of a client's brief.

Neil Woolridge Motors

The Neil Woolridge Motorsport workshop in Pietermaritzburg suffered a major setback in 2016 when a large section of its workshop burned down. The owner then decided to add a second floor to the building as a renovation option, and the quickest way possible was to use Light Steel Frame Building (LSFB).

Shospec constructed a 272 m^2 1st floor light steel frame extension to the workshop, which took only four months to complete. One of the special attributes in this project is the fact that the floor needed to be designed to take extra loads of 3,5 to 5 KN due to manufacturing of racing car chassis and the jig for this.

New office park development

The office park development in Pietermaritzburg is one of the bigger projects Shospec are currently involved in. Shospec, D Construction & SMS Design architects are a joint consortium, known as the Townhill Office Park Joint Venture (TOP JV), providing a service to deliver a full turnkey development for the Department of Health consisting of three Light Steel Frame office blocks.

These include furniture, fittings, and parking lots for an office park with a floor area of around 3 600 m^2 on the 12 500 m^2 site.

The light steel framing for this project amounts to roughly 60 tons in total and a contract valued at around R70-million, this large-scale development is due to keep Shospec busy for the next 12 months.

House Bredin

An 80-year old house set in an established Durban suburb was transformed into a double-story masterpiece, showcasing how Light Steel Framing (LSF) can be used to enhance an existing structure in a short space of time and with minimal noise, mess and disruption.

Although one of Shospec's smaller projects, the first-floor extension, totaling 168 m^2, took only three months to complete. Whilst light on the old foundations, the LSF structure was strong enough to support a natural stone floor.

The LSF frame also allowed for the use of extraordinary large windows to flood the space with light, open up the view to sky and sea and permit a free flow of air to counter Durban's humidity. And, in an area where wood borer is a problem, the resistance of LSF to degenerative effects such as borer, termites and wood rot was an added bonus.

Not only did using LSF allow us to meet our client's brief, it also proved to be an intelligent solution to the many challenges that extensions of this nature present without compromising on style and functionality.

Steel Frame Developments (SFD) is a light gauge steel manufacturing company, based in Durban, who are proud suppliers to Shospec. SFD manufactures engineered steel framed buildings for residential and light commercial construction and purpose made flooring, walling and roofing systems direct to the building industry.

SFD & Shospec have consistently been at the cutting edge of the industry whilst raking up awards and accolades.

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SOUTHERN AFRICAN
LIGHT STEEL FRAME BUILDING ASSOCIATION

Mission

The mission of SASFA is to develop and grow the Southern African and export markets for light steel frame building.

Vision

SASFA will strive to make the following come true:

- Light steel frame building is established as a high quality, energy efficient, cost effective and preferred method of building in South Africa, for low rise residential and non-residential buildings.
- Light steel frames constitute a significant export industry

The backbone of award-winning façades

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