**PRESS RELEASE**

85 m arched truss system pioneered in Addis Ababa

***1 October 2015:*** *South African structural engineering expertise and ingenuity has been showcased at a project to construct a new maintenance hangar for Ethiopian Airlines at Bole International Airport in Addis Ababa, Ethiopia that can accommodate a single Boeing 767, a 777, or two Boeing 737s.*

The main design objectives were low steel tonnage, fabrication simplicity and erection safety, without incurring the cost of temporary works staging. Hatch Goba commenced with the design component of the project in January 2013, with project completion in December 2014.

“Hatch Goba provided a unique design solution that addressed these challenges by means of a unique 85 m arched truss system,” explains **Pierre Olivier**, managing director: AEM, Hatch Goba.

The arched trusses comprised 11.8-m-long segments fabricated from lightweight square hollow sections, forming boxed trusses. The arch effect, combined with the use of these hollow steel sections, resulted in significant material savings. The total structural steel tonnage, inclusive of purlins, amounted to 240 tonnes, or 39 kg/m2.

The span involved meant that the arched trusses required aerial connection at the crown. This was achieved by means of temporary support on a mobile support tower. The door pocket towers were designed in such a way that they could function as temporary support towers during truss erection.

One truss was erected at a time, with the support tower then moved on wheels to the next truss. Once all the trusses had been erected, the mobile tower was then incorporated in to the permanent works.

“The design of the boxed trusses was a complex process that required careful consideration of erection safety and stability,” **Tim Dubber**, principal technologist: structures at Hatch Goba in the Eastern Cape, comments. The springing of each truss consisted of a double pin support, thereby providing sufficient lateral stability to individual trusses, even without lateral bracing.

The design and detailing of the bolted and welded connections using square hollow sections meant that special attention had to be paid to the higher design and fabrication complexities of the connection type.

Another design and detailing challenge was posed by the wind load transfer from the door pockets to the arch, given the load magnitude, arch geometry and bracing stiffness required. An innovative lateral bracing system was introduced that involved the use of tensioned cables and struts. The pre-tensioned cables effectively formed a net of diagonal ties throughout the roof at top chord level.

The purlin system comprised specialised MetSec 12.5 m span sleeved z-purlins, provided by Safintra South Africa. The arch foundations consisted of reinforced concrete pad footings with deep shear keys to resist the arch thrust. The Black Cotton soil type found on the construction site was replaced with selectable material up to a depth of 2.5 m in order to counter the potential heave.

All structural steel for the hangar was sourced from Italy and imported via the Port of Djibouti, from where it was road-freighted to Ethiopia. Efficient ordering of the structural steel was achieved by means of Strucad 3D structural steel detailing software, which outputs comprehensive material ordering schedules.

Hatch Goba was appointed as the structural and civil engineer on the project by client Elmi Orlindo Construction for Ethiopian Airlines. It provided full structural and civil design services, including foundation, hangar floor and apron design.

The innovative and tailor-made arched truss design from Hatch Goba allowed this Ethiopian-based contractor to clinch this prestigious project. “The hangar was erected successfully, and represents a quality structure that the Ethiopian construction industry can take great pride in,” Olivier highlights.

“Hatch Goba provided an appropriate cost-effective and local solution that maintained the quality of the end product, while acknowledging some constraints of constructing in an Ethiopian environment,” Dubber concludes.

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**About Hatch Goba**   
Hatch Goba supplies process and business consulting, information technology, engineering, procurement and project and construction management and operational services to the mining, metallurgical, energy and infrastructure industries.

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