

WSP Africa, Structures

Rapid Structural Prototyping

Established as a specialised internal unit of WSP Africa, Structures, the RSP team aims to rapidly develop functional, practical, and efficient solutions for various types of building projects.

Capability Summary

In a challenging property market where project feasibility is easily hindered by a single factor, successful projects can be delivered by those who adapt to change and capitalize on new developments in emerging technologies.

By defining the constraints and requirements at an early stage and deriving an accurate BIM model fast, the project will benefit from a previously unseen level of information detail. Robust construction budgets, tested constructability, and timelines can offer a competitive advantage to the bidder.

At WSP, we constantly push the boundaries to meet the expectations of our clients. Our expertise allows architects to realize their aesthetic visions, while our clients meet their commercial and operational goals.

We have a long history of innovation, as well as a reputation for imaginative thinking coupled with practical and proven solutions.

RSP combines years of experience in the industrial and commercial building sector with the latest technology to apply the idea of rapid prototyping of optimal structural schemes, and thereby improve construction economy and aid project viability.

These solutions are especially valuable where cost-effective structural schemes and well-planned construction methods can determine overall feasibility, such as industrial or high-rise buildings.

RSP's speed of implementation allows for parametric studies on different shapes and solutions, an exercise that was previously unachievable due to bid time-constraints.

WSP RSP aims to offer any bidder or project developer a strategic advantage in the earliest phases of a project.

SERVICES

From prototyping to project completion, RSP ensures that the original vision is fully realised.

The notion of improved integration resides near the core of our overall vision. As a forward-thinking department of applied sciences, RSP aspires to bring together the relevant stakeholders and escape the isolated boxes from which the industry so often operates.

We believe this coordination between client, end-user, consultant, and contractor enables our team to transform visionary ideas to breath-taking realities. To promote this vision, our internal focus will always be placed on both the science and the application thereof.

With our research & development team at the centre of the structural department, we maintain an office environment conducive to collaboration and innovation. This way we ensure that the RSP way of thinking is not limited to only a selection of individuals. Instead, this philosophy follows our vision of growing this approach to become a global mind-set.

Once a prototype is approved for construction, RSP will hand over the structural concept to the production team by means of a workshop and set of 2D and 3D documentation. Throughout the production stage, consultation sessions and documentation reviews ensure that the original vision is fully realised.

Stakeholder Requirements >>> Rapid Structural Prototyping >>> Construction Documentation

Scheme Development

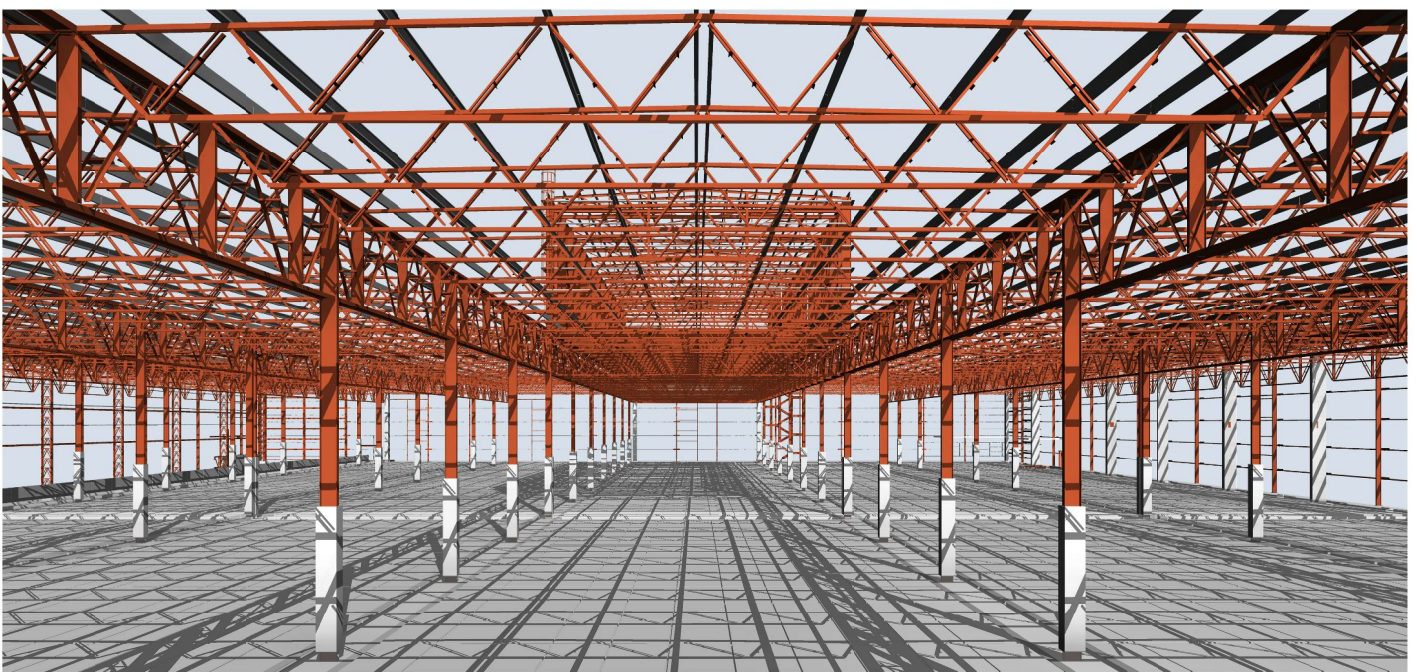
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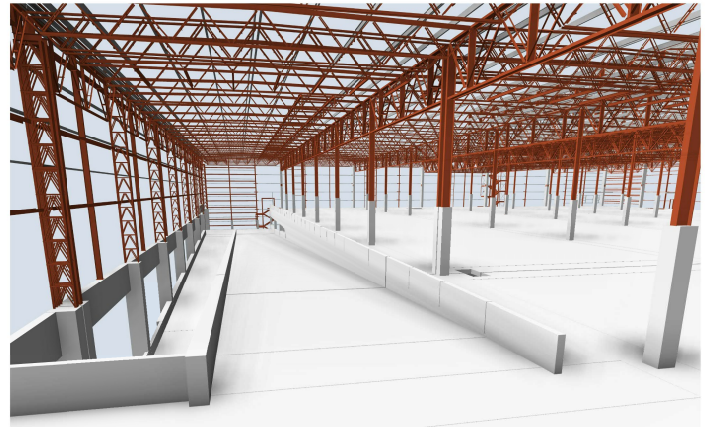
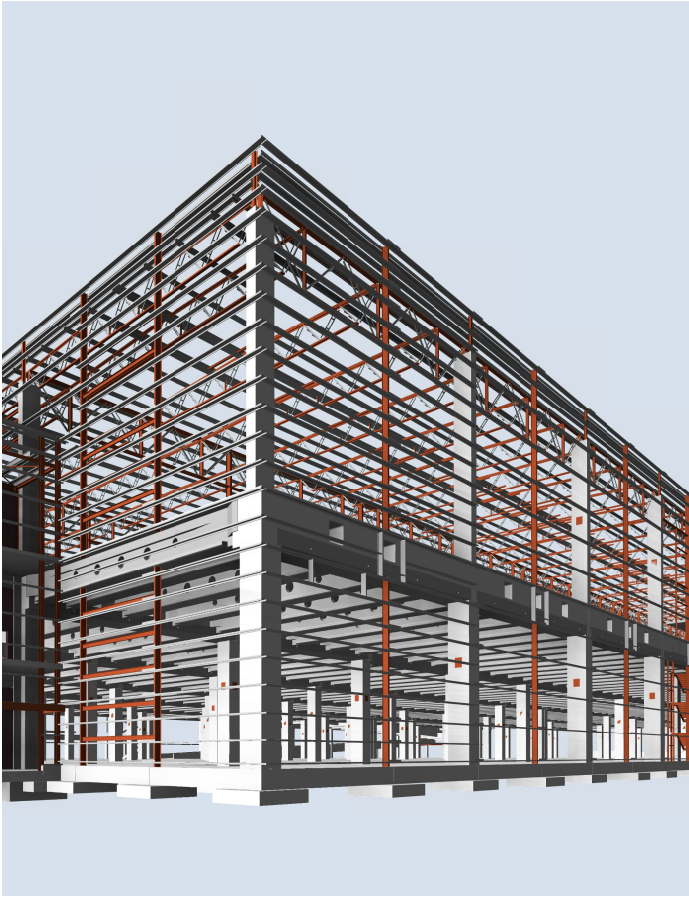
- technical research (materials, systems, components)
- interdisciplinary collaboration
- information-driven design with project-specific solutions
- parametric design optimisation
- LOD300 model development

Detailed Design & Construction

WSP, Structures, Cape Town:

- BIM-integrated workflows for detailed analysis and documentation
- interdisciplinary 3D coordination
- model refinement to LOD400
- clear construction documentation, incl. 3D visualisations
- involvement with manufacturing and construction





A selection of projects

01. Mercedes-Benz Body Shop *East London*

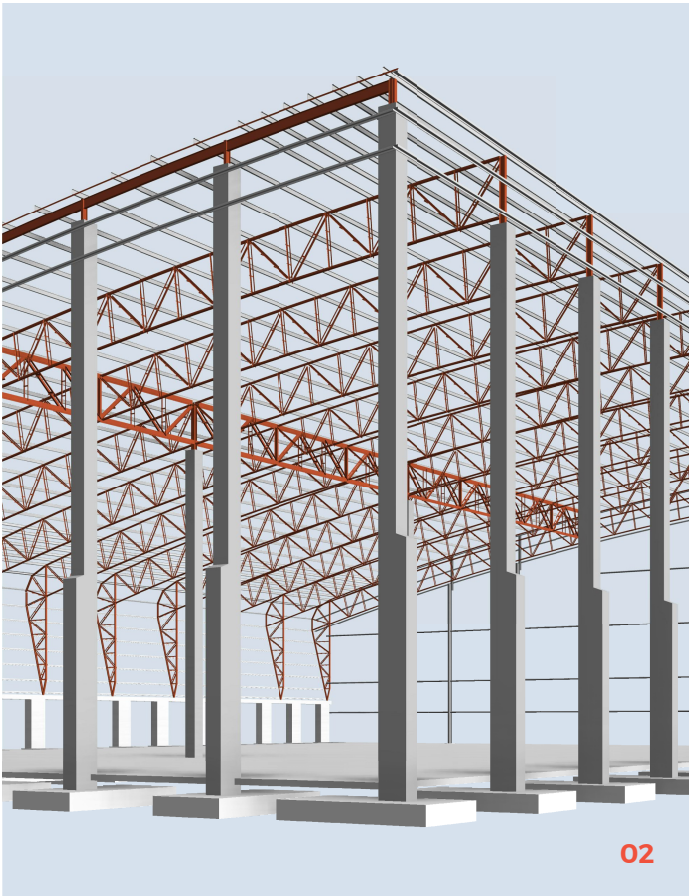
Over the course of the turnkey tender period, the RSP team developed a highly detailed bid design with the purpose of producing an accurate budget and timeline for the construction of this entire facility.

The detailed 4D structural BIM model was used to visualise the bid programme and associated constructability aspects, during which a major programming flaw was identified and corrected.

As part of Daimler's R 10 billion investment in its East London plant, the new body shop's most significant structural feature is its suspended high-load industrial floor. At ten metres above the ground floor, the concrete floor structure can withstand a load of 4000kg per square meter, in addition to its self-weight.

Our winning solution relied on precast construction for the main concrete structure, which minimised risk during the construction phase and enabled quality controlled off-site fabrication for the majority of the structure.

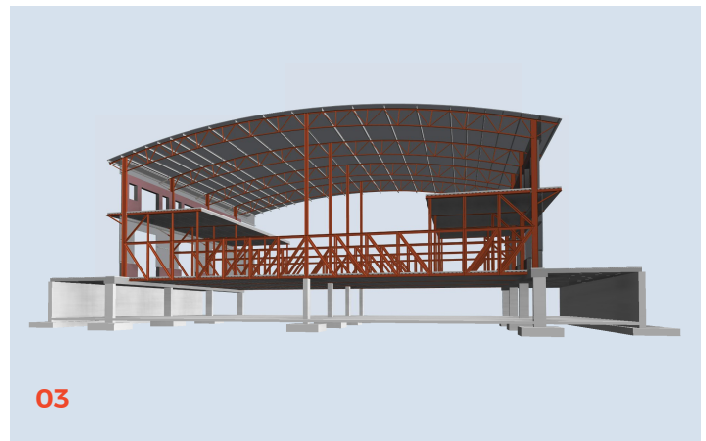
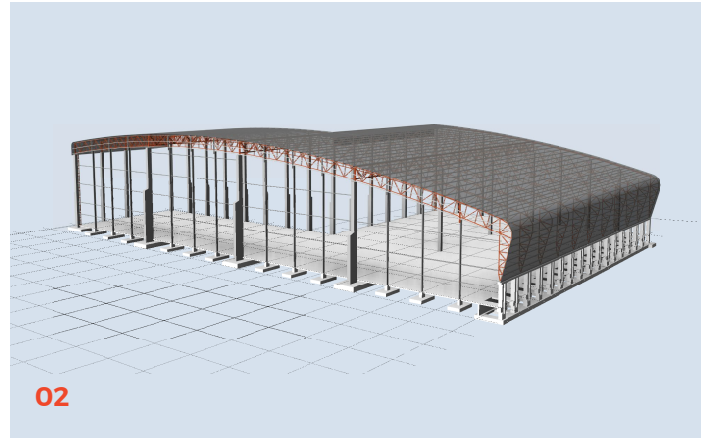
During the implementation stage of the project, the structural model was refined to LOD400 for integration into the client's global BIM factory platform.



02. Retail Distribution Centre *Polokwane*

Based on a symmetrical high-level steel structure that maximises internal racking space before tapering down to the loading area of this distribution centre, the streamlined shape of this structure reduces aerodynamic drag while also dealing with rainwater run-off efficiently.

In a matter of days our team developed, refined, and delivered the structural scheme, costing drawings, and steel schedules to the client for project feasibility reviews.

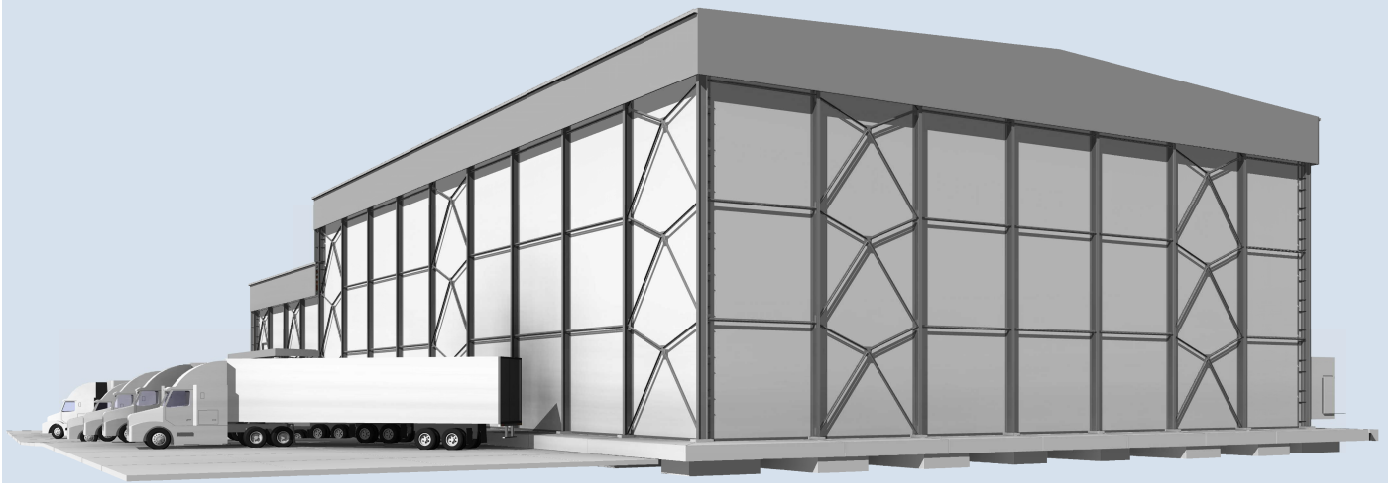


03. Capricorn Industrial Park *Cape Town*

The concept for this multi-tenant, light industrial building was developed during a collaborative online workshop with the project architect in order to define the building system and review a promising site for the project.

The client's requirement for a suspended industrial floor above basement parking necessitated a practical and efficient structural system to deal with the high floor loads and misaligned column grids.

In addition to addressing the operational requirements, this solution facilitates an accelerated construction programme where the fabrication of steelwork and precast concrete elements can run concurrently with the site establishment phase.



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04. Lusaka Cold Store

Zambia

As a result of highly efficient collaboration within the RSP team, the structural concept, detailed design, high-level tender drawings, and material schedules for this cold store were completed in less than two weeks.

During this process the tilt-up concrete column scheme was compared to and later replaced with a braced structural steel frame. The parametrically optimised vertical bracing system reduces wind-driven sway of the sensitive freezer portion and minimizes the vertical load in the slender steel columns.

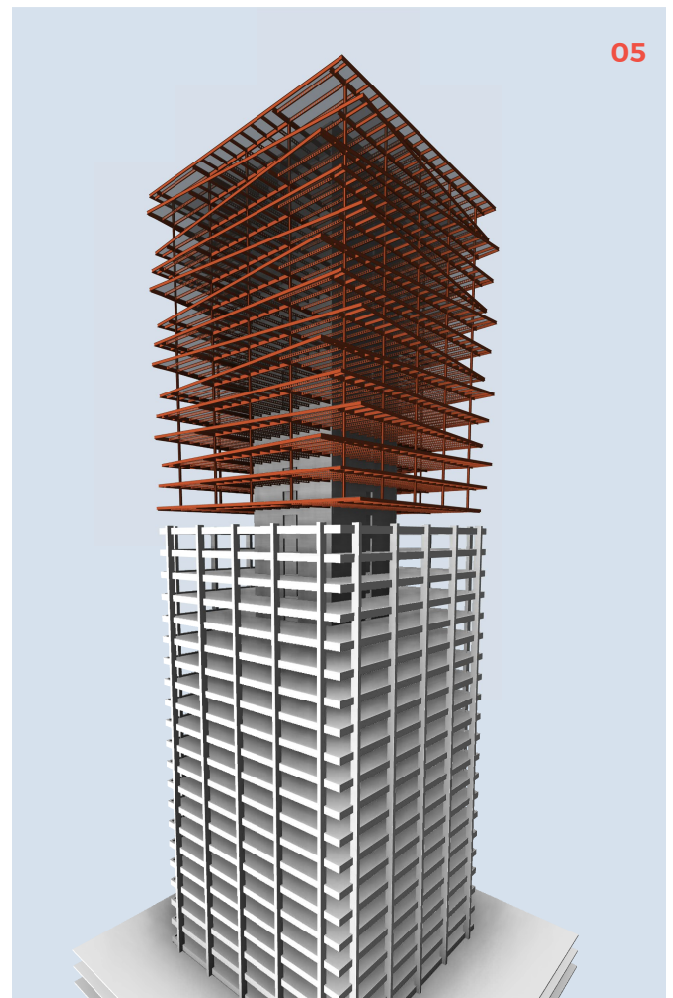
The entire building concept was developed to be mostly pre-fabricated in order to be constructable in areas where the required building materials may not necessarily be available.

05. High-rise Extension

Cape Town

After completing a structural due diligence on this fifty year old high-rise building, we discovered and further explored the opportunity to add fourteen new storeys to the existing twenty-three storey building.

By making use of an innovative structural system and advanced seismic engineering, we were able to present the opportunity of unlocking more than 20 000 m² of additional bulk in Cape Town's CBD while revitalising an iconic part of the skyline.



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