CONSTRUCTION
FOR A NEW AGE OF BUILDINGS

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INTRODUCTION

In today's burgeoning construction industry, what we build and how we build it is constantly evolving. Changing typologies and new density-driven demand surrounding the delivery of projects mean that buildings are not only taller, larger, and more high-tech than ever, but are also delivered in accordance with stricter deadlines and tighter turnarounds: in 2015, a Chinese construction company erected a 57-storey skyscraper in just 19 working days.[1] In addition to design performance, speed and efficiency have emerged as paramount concerns within contemporary construction.

Yet neither speed nor efficiency is possible without the right construction materials. The industry is moving away from traditional materials and instead pursuing new technologies and materials that are better suited to today's construction climate. Crucially, construction materials must now meet three key demands: the ability to build at heights, modularity, and design flexibility. In this white paper, we explore the intricacies of each of these design demands, and discuss how they might be most efficiently met.

BUILDING AT HEIGHTS

Formerly a typology reserved for commercial and corporate buildings, high rises are now dominating the construction industry across all sectors from residential to education. Multistorey apartment complexes in particular have seen rapid growth, with Business Insider Australia reporting that in 2016, construction of a record high of 152,449 multistorey apartment blocks was underway across the nation – more than double the 63,414 detached dwellings under construction during the same year.[2] This trend toward high rise apartments is not unique to Australia: in 2016, 436 residential towers were at some stage of development in London,[3] while the second half of 2017 alone saw 54 high rises under construction in Chicago.[4]

Against this backdrop, the ideal construction material is one that is suitable for building at heights. Speed and ease of construction when working at heights is often contingent on materials allowing for quick and easy set up, installation, and minimal clean up and waste production. According to a 2011 joint report by the Federal Department of Sustainability, Environment, Water, Population and Communities and the Queensland Department of Environment and Research Management, 19 million tonnes of construction and demolition waste was generated in Australia in 2008 alone. Of this, 45% was not adequately recovered or recycled.[5] The challenge in collecting and properly disposing of construction waste is exacerbated at heights, as it is particularly difficult to transport receptacles for gathering and securing waste up multiple storeys and back down to ground level.

Materials used at heights must also be easy to store and transport up to each floor. The less bulky the material the better, with modular components or materials that can be separated into smaller units preferable for easier storage and transportation using cranes or forklifts.

Consideration must also be given to the fact that all materials have ancillary requirements that also need to be transported and stored as construction progresses. Most cladding materials will require mortar, fixings, sealants, or similar components, though amounts of these vary between different materials. In the context of large scale, high-rise structures where high quantities of construction material are required, the difference in additional components and materials may add up to significant variation in cost and labour requirements.

MODULARITY

When a Chinese construction company built a 57-storey 'Mini Sky City' in just 19 days, they relied heavily on modular design to achieve a staggering construction rate of three floors per day.[6] The level of standardisation inherent in modularity is its strength, allowing components to simply fit together without the need to cut them down to size onsite or determine new methods of fixing. Modular systems use consistent fixings, sizes, and components throughout, streamlining the construction process and paring down construction times significantly.

Beyond this, modular construction materials meet all the requirements for compatibility with building at heights: they are easy to install with standardised, minimal tools, and in most cases are safe and easy to handle. These characteristics are particularly crucial when building at heights, especially in the case of façade construction. Façade materials on high-rise buildings must have the ability to span large stretches of façade without buckling or deforming with age or exposure toweather conditions. This is of particular importance at present, as climates around the world increasingly move toward both lower temperatures in winter and scorching new highs in summer.

Smaller, modular materials such as tiles, bricks, or cladding panels are in this regard ideal, as regular joints prevent cracks or warping. Modular systems such as tiles also allow for easy replacement and maintenance, with damaged or broken components easily isolated and removed, leaving the rest of the façade intact.

Modularity also provides a high degree of scalability, which is invaluable in today's diverse construction industry. Because they allow for the purchase of virtually the exact quantity of materials required, modular systems are highly cost-effective and can be applied to projects of all sizes with ease. Further, standard component sizes and fixings reduce material wastage to the bare minimum.

DESIGN FLEXIBILITY

In an age where urban skylines around the world are hyper-saturated with skyscrapers, it is more important than ever that buildings are designed to be unique and stand out from one another. Yet high rises run a real risk of looking alike: urban design publication CityLab has written of the tendency of today's skyscrapers toward "supertall, superskinny"[7] forms, while Australia has been criticised for a "homogenised architecture that has the same response to the north, south, east and west".[8] As a consequence, there is a pressing demand on construction materials to grant designers the freedom to explore different finishes and allow them to fully realise their creative vision. Construction materials should provide designers with the flexibility to play with colour, texture, and pattern, particularly in terms of façade design. They should be versatile and capable of adapting to a range of styles, aesthetics, and project types with ease: the ideal cladding material is one that is as well suited to a commercial high rise as it is to a walk-up apartment block, two-storey school building, or sprawling university campus.

Designers should also be mindful of the compatibility of construction – particularly cladding materials – with other design elements such as fenestration or service openings. Materials that can be specified or easily cut down to size and conformity with openings in the building envelope are ideal, and it is important to consider how transitions will be managed. For example, clay bricks used above a door or window opening will require a lintel, whereas tiles or panel systems in the same installation context will not.

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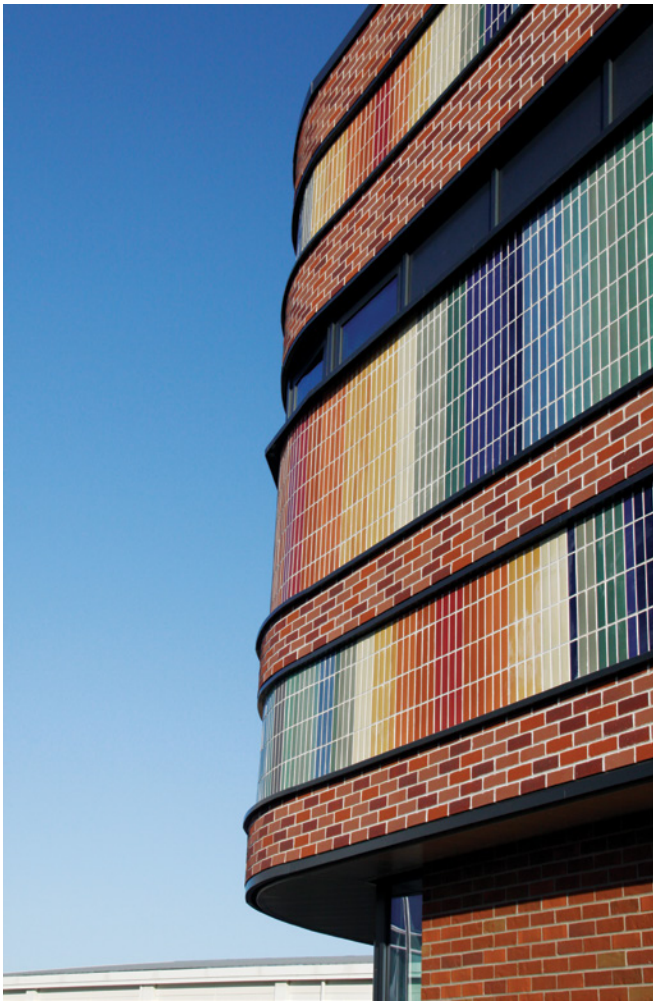
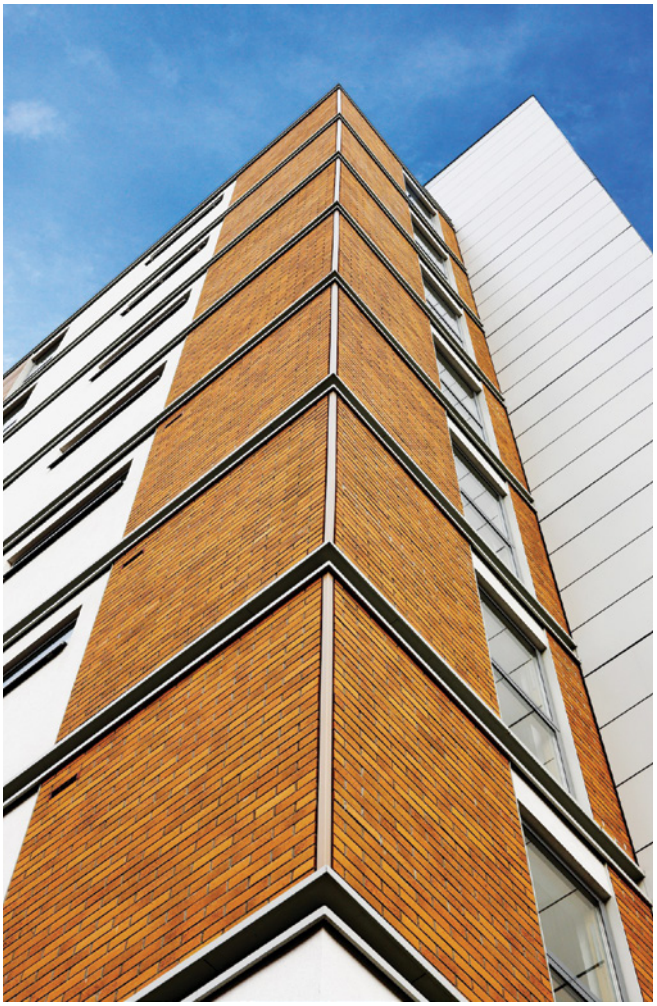
Established in 1958 with the merger of the companies of Maxwell Porter and David Galbraith with Hanson Consolidated Industries, PGH Bricks is one of Australia's largest manufacturers of brick products. Thanks to years of experience at the forefront of the brick industry, PGH Bricks offers designers and specifiers outstanding design flexibility and service excellence with a diverse selection of bricks that meet the demands of contemporary construction.





CORIUM

Distributed exclusively in Australia by PGH Bricks, CORIUM combines within a single product the three crucial performance characteristics of suitability for construction at heights, modularity, and design flexibility. Around the world, CORIUM's unique, patented brick tile system has a proven track record in quick, simple, unique high-rise construction and is emerging as a favoured material for buildings of all types.

Specifically designed for fast, cost-effective installation, CORIUM combines the durability and warmth of a conventional brick façade with the high performance and efficient installation of contemporary construction technology. To achieve this, genuine brick tiles are attached to profiled or galvanised steel sections in a unique lightweight system that has a low nominal weight of 68kg/m2. Ideal for building at heights, CORIUM components are safe and easy to handle and have none of the mess or complicated installation requirements associated with brick: instead, tiles are simply 'clipped' on and finished with a mortar with minimal need for specialist tools or skills. This clip system has the dual effect of providing a continuous, high strength façade while also allowing for adjustment of tile positioning during insulation.

As a modular system, CORIUM significantly streamlines the construction process, particularly when compared with traditional brickwork and masonry. Universal fixings allow for entire facades to be completed at once and with ease, while standardised tile sizes mean that the correct amount of material can be specified for every project with minimal wastage.

CORIUM's modular nature also means that tiles can be isolated and easily removed and replaced should repair or maintenance be required. Effortlessly combining durability with style, CORIUM offers virtually unlimited design flexibility. The brick tiles are available in a diverse range of finishes that includes glazed or standard colours, and can be paired with a breadth of standard and bespoke mortar options. CORIUM's clean, contemporary aesthetic is ideal for renovations and new builds alike, making it a popular choice for commercial towers, high rise apartments, and institutional buildings around the world.

Unlike traditional brick facades, in which the bricks support one another, CORIUM façades are self-supporting and allow patterns to be run both horizontally and vertically. CORIUM brick tiles can be arranged in stacked bond, 45 degree, herringbone, soffit, and soldier coursing all using the same rail system, marking a radical reduction of the intensive structural requirements of traditional brick and unprecedented level of design freedom. This high level of flexibility is matched by durability, with CORIUM facades bearing a 60-year design life in most applications as certified by the Building Research Establishment (BRE).

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