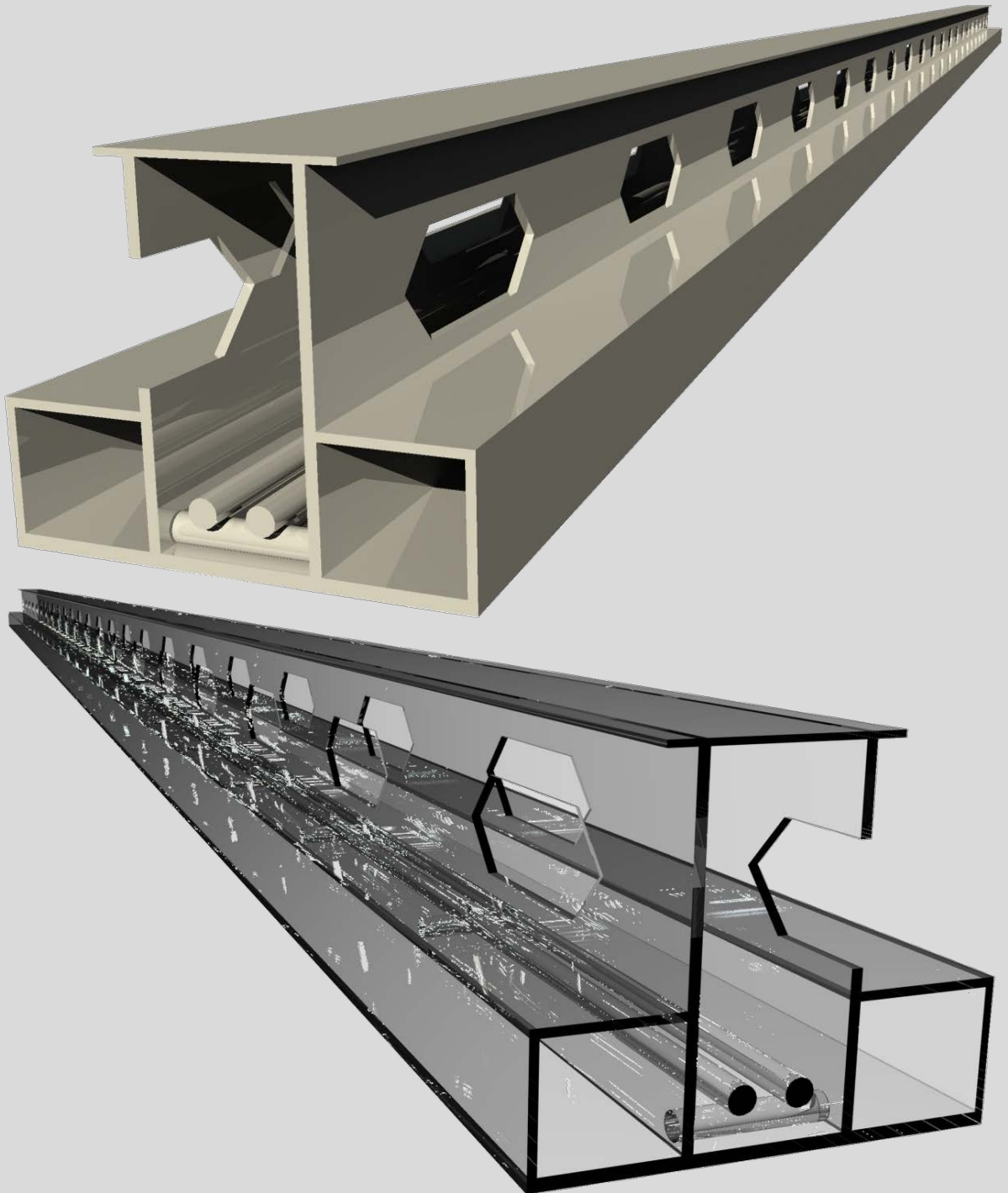


PI SECTION™



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PI SECTION™

PI SECTION™ is a customisable composite beam system that can support large span slabs and decks such as conventional cast-in-place solid slabs, hollow core precast slabs (HCS), partial precast slabs, deep decks, etc to form a rigid floor-plate system in buildings. PI SECTION™ offers a revolutionary new approach to design and construction of floor systems in steel-composite buildings for various applications. This compatibility with multiple slab systems ensures that decision makers have a variety of choices both in sourcing and in contractual approach.

Traditional reinforced concrete beam-column systems are considered to be very labour intensive and slow to build and have now been relegated to mostly smaller buildings. While the heavier flat-slab systems with drops are an improvement, they still remain labour and formwork intensive, slow, unsustainable and fraught with quality & safety issues. They are also unable to provide moment frame actions and require a separate lateral load carrying system.



The traditional steel-composite floor system comprises main beams spanning columns, secondary beams spanning these main beams, and steel decks spanning the secondary beams. The depth of these beams occupy valuable head room needed for services. The process of erection and welding of shear studs at site, make this floor system slow, labour intensive, unsafe and imprecise.

The revolutionary PI SECTION™ floor-plate system addresses these issues and provides a cost effective and powerful solution to structural engineers, architects and other decision makers in the modern design and construction industry.

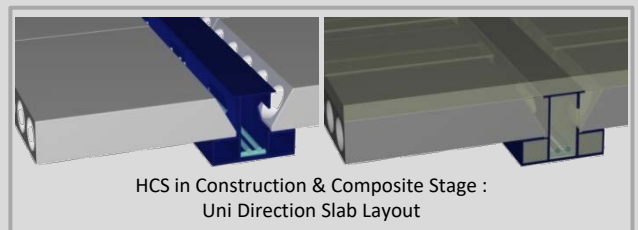
Features & Advantages

Robust Steel-Composite Behaviour

PI SECTION™ beams are typically designed to support off-site or cast-in-place slabs and decks along with wet concrete and construction live loads, as a pure steel section. In the final stage, when the concrete screed, infill and encasement has hardened, the total composite section can resist all perceivable ultimate combinations of loading effectively. The composite behaviour is enhanced without the need for shear studs at site.

Longer Spans – Lower Depths

The unique feature of PI SECTION™ beams is that it can span the very large column free spaces encountered in modern multi-storey industrial buildings and commercial building towers with very low structural depths. This offers excellent head room to accommodate suspended services and still provide higher ceiling heights.



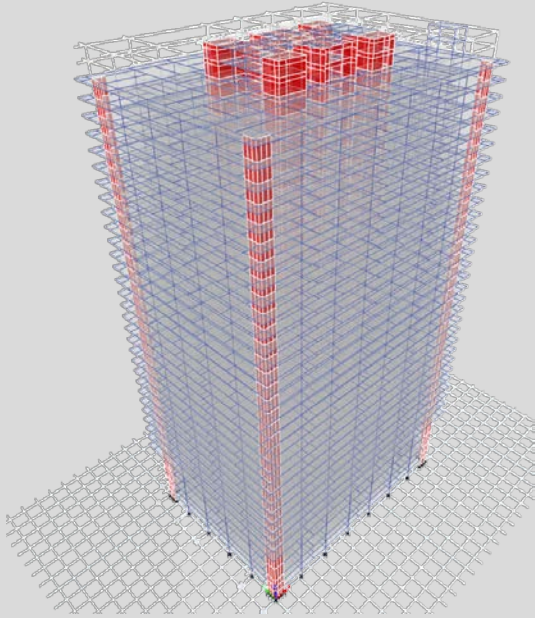
Assured Fire Resistance

The special feature of the PI SECTION™ floor-plate system is its ability to withstand fire limit states and provide the necessary fire ratings without any additional and expensive fire protection



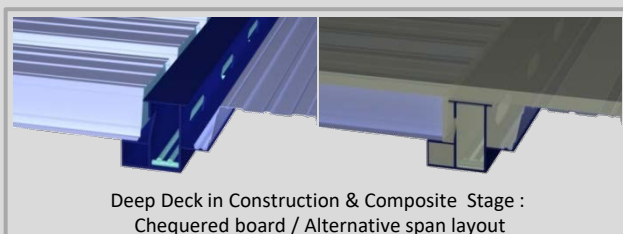
Superior Gravity Resistance

PI SECTION™ beams can be simply supported on columns or structural walls or can be framed into them to provide moment connections. In the absence of a separate lateral load resisting system such as shear walls, PI SECTION™ beam-column frames can step in as the primary lateral load carrying system. Typically, low-rise buildings are designed in this manner.



Improved Speed, Safety & Quality

PI SECTION™ floor-plate systems eliminate the need for secondary beams and offer a clean slab soffit with an order of magnitude improvement in speed of site construction. Due to the reduced operations and the simple but robust seating arrangements of the slab system directly on the main beams, quality and safety of site work is assured.



Enhanced Human Comfort

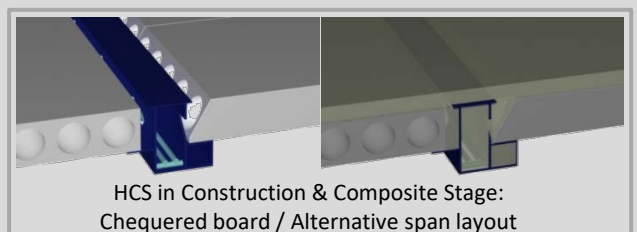
In analytical studies, it has been found that the inherent integrity and higher stiffness of the PI SECTION™ floor plate system contributes to minimizing uncomfortable floor vibrations better than conventional steel-composite deck systems.



Better Earthquake & Wind Resistance

Taller buildings are generally provided with a separate lateral load resisting system such as structural 'shear' walls, braced frames, etc. PI SECTION™ beams can be used in moment connected beam-column frames that can be used to tweak and control the torsional oscillations and other dynamic behaviour of the overall structure and ensure compliance with codes.

Further, PI SECTION™ beams are totally embedded into the overall floor system after the casting of screed, infill and encasement concrete and provide an effective shell-like behaviour. This integral composite behaviour can ensure excellent diaphragm action to transfer the horizontal inertial forces of the various masses to the lateral load resisting system in the shortest path.

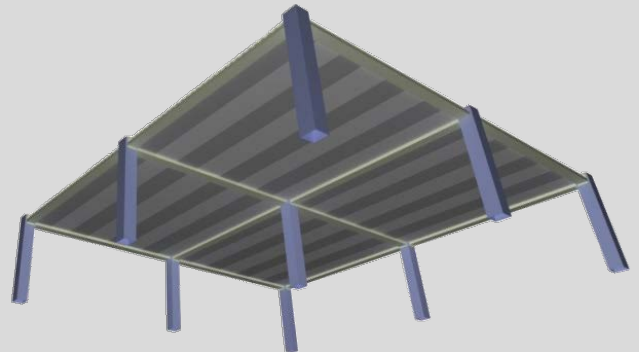
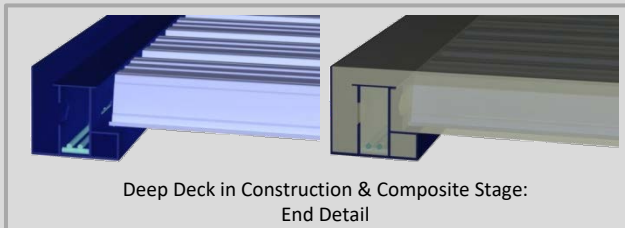


Reduced Foundation Costs

The self-weight of floor systems are compared by their equivalent concrete thickness after flattening all the structural elements and converting the densities. Conventional steel-composite system with secondary beams are the lightest but have many disadvantages. PI SECTION™ floor plate systems are lighter and stronger than RCC beam-column system or flat-slab system, and the overall building foundation is significantly more economical.

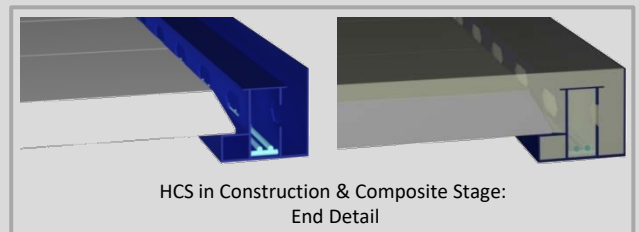
Floor Plate Configuration & Layout

Floor plates can have multiple configurations depending on various factors such as the architectural layout of the floor, column and wall positions, the anticipated behaviour of the building, etc. Large span slab systems made off-site such as precast slabs or deep deck profiles show one-way behaviour and span across and load two parallel main , while cast-in-place, formwork based solid slab systems have two-way behaviour and load all the peripheral beams. Using off-site slab systems one can arrange them either in an unidirectional layout or in a checker board layout.



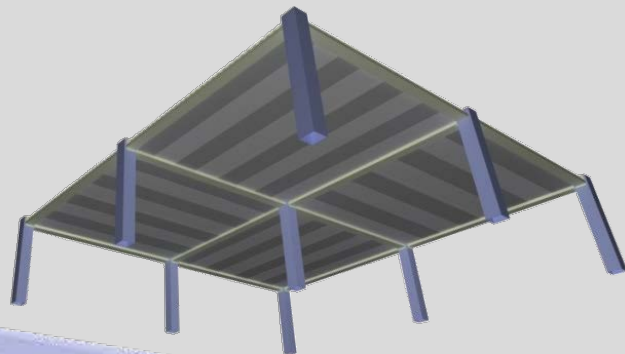
Unidirectional Layout

The slab elements are arranged in one direction and load the main beams perpendicular to them. The main beams in the other direction are redundant for gravitational loads but participate in diaphragm actions. In order to ensure that the edge slab elements do not have localized shear issues, any backing provided to prevent slurry leakages along these edges is kept flexible. The primary main beam has rigid seating while the redundant main beams have a rectangular profile with flexible seating.



Checker Board Layout

It allows for large spans while negating the need for excessive load-bearing elements. Alternate bays have different arrangement of the off-site elements so that all main beams are loaded gravitationally and inertially. In this case, the profile has rigid seating on one side and flexible seating on the other side.



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