Hollowcore is the most versatile of all Oldcastle Precast concrete products

**Speed of construction for hollowcore plank is unprecedented.** No other flooring system can match the installation rate per day.

**Versatility.** You can design plank to work with steel, masonry, CIP, metal stud or precast building components.

**Clear spans.** Column free interior space provides design freedom and lets you maximize the use of your space now and in the future.

**Durability.** Hollowcore plank is resistant to nature from termites or hurricanes to high winds and seismic events.

**Fire safety.** Concrete does not burn and can never be turned off or malfunction. Hollowcore plank has a minimum 1.5 hour fire rating. A structural topping can increase that up to a 4-hour rating.

**Efficiency.** Run the numbers and estimate your next project in Oldcastle Precast hollowcore plank. Savings in cost and time will keep your project on time and under budget.

See our web site for additional topics on hollowcore plank: installation, toppings, openings, finished floors, specifying and more.

**Locations:**
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Camber is inherent in all prestressed precast products. It is the upward deflection created by the prestressed forces in the strands located below the center of gravity. This is required to resist design loads and in the hollowcore plank it compresses the bottom more than the top. Span length, plank thickness and design load requirements will determine the amount of prestressing force needed in the plank, from which the engineer can calculate an estimated camber. The benefit of camber in prestressed precast concrete products is that it allows for longer spans, shallower depth sections and higher load carrying capabilities than conventional building materials. Camber should not be specified as a design parameter.

**Differential Camber**

Differential camber refers to varying amounts of camber between adjacent hollowcore planks. Camber differences occur because no two planks have the same exact strength gain, creep and exposure to the elements in storage. Planks in the yard exposed to direct sunlight will experience more camber growth than plank in the shade. Adjacent planks with different span lengths will differ in camber as will those with different prestressing strand patterns.

**Theoretical Camber**

Theoretical camber is the calculated upward deflection based on relevant design parameters. It is time dependent due to the curing of concrete and can vary significantly from actual camber on site. The optimal storage time for plank in the yard is 2 to 3 weeks. Extensive job schedule delays and increased storage time can lead to camber growth. This is especially true in the early summer where warmer temperatures and low humidity accelerates the curing process.

**Important Considerations about Camber**

- **S**pecify realistic design loads to avoid overly conservative load requirements.
- **L**imit plank span to depth ratio to 45. Increase plank thickness if necessary.
- **I**ncrease 2-inch topping overlays if maximum plank camber exceeds 3/4 inch. Plan finished floor elevations accordingly.
- **M**inimize differential plank camber prior to grouting keyways by one of more of these methods: use temporary shoring to jack up low planks; use sandwich plates and bolts at mid span to draw planks vertically together; shim shorter and low planks at bearing points; flash patch (feather) joints between adjacent planks; apply self-leveling coatings (gypcrete) or use structural topping.
- **A**dvise subcontractors installing door frames to account for plank camber and topping if any.

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Engineer your Openings for a Successful Plank Project

A wide variety of opening sizes and configurations can be accommodated using an Oldcastle Precast hollowcore floor system. They range from "large" openings (>10-inches) to small core drills.

Most common large openings include: HVAC, plumbing and electrical chases, hatch access at roof, trash chutes and skylights.

Small core drill openings include single plumbing risers, electrical lines, radiant heat tubing risers and roof drains.

The general contractor and other trades are responsible for design coordination and field layout of all openings. Oldcastle will show openings larger than 10-inches square on shop drawings if supplied early. Additional openings not shown on returned approved shop drawings must have written approval from Oldcastle’s engineer.

General contractors and other trades must field locate all openings prior to cutting them. Oldcastle can cut large openings if included in the scope of work.

Common Practice: Openings

Whether you know it or not, floors are the key element when it comes to architectural freedom and design: their load bearing capacity has a direct influence on the need for partition walls and other structural elements of a building. Hollowcore slabs are prestressed floor elements with voids. The excellent load-bearing capacity and structural efficiency allows you to build large areas with fewer partition walls. Ultimately, this means greater freedom in design and architecture during and after construction as well as savings in material costs.

See our web site for additional topics on hollowcore plank: camber, toppings, finished floor systems, specifying, installation and more.

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Get to know more about Openings in Hollowcore Plank

The best place to locate large openings is near the bearing point. This location has the least design impact to the floor system. Large openings near the bearing may require solid concrete areas that are done either in the plant prior to shipping or in the field after installation. Large openings near the mid-span of the plank will require more prestressing and will impact camber.

Small core drilled openings can be placed anywhere provided they are located in the hollow void of the plank and are small enough that they do not cut any prestressing strand. Any core drilled openings that cut through the strand must be accounted for in the design of the plank and carefully monitored in the field. Any core drilled opening that cuts prestressing strand that was not accounted for in design needs the immediate review of Oldcastle’s engineer. For multiple cores concentrated in one area, it is recommended that these are aligned and bunched together in order to reduce the amount of coring perpendicular to the spans.

Important Considerations for Openings

Keep openings away from areas where the plank supports wall and point loads.

Headers are only intended to assist the construction process, and should not be misconstrued as the primary support component of the opening.

Minimize the length of the opening transverse to the plank span. A longer narrower opening is almost always better than a shorter wider one. Minimize the amount of corner overcut. Excessive overcutting may cut more strand than is feasible. In some cases this may required coring of the corners at a large opening to ensure that there is no over cut potential.

Locating Openings

Openings are a critical component to the design and layout of hollowcore plank. It is extremely important to give Oldcastle Precast all required opening sizes and locations as early as possible in the design process. It is also recommended that the locations of penetrations are properly coordinated early enough so that the precast can be properly designed. However, it is possible that some openings may need to be moved or re-sized for structural reasons. Penetrations can affect the following design aspects: thickness; amount of prestressing; fire ratings; camber; composite topping; solid cores; redistribution of loading; steel headers; and layout of plank.

Penetrations can affect fire rating; camber; prestressing strand; steel headers; solid cores; topping; thickness; redistribution of loading and plank layout.

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Topping can contribute to your hollowcore project

Toppings are sometimes used as part of a total hollowcore plank system. They can be used for Cosmetic (non-structural) purposes or for Structural reasons that contribute to the design capacity of the floor system.

Structural Topping thicknesses vary with a minimum of 2” to 2 1/2” depending on your code requirements. Structural topping must be bonded to the planks, continuous from support to support uninterrupted by walls or expansion joints.

The intent of using a structural topping is that it works with the plank as a composite system. This adds stiffness and strength for gravity loads and can act as a diaphragm if properly reinforced. The integrity of the hollowcore may be compromised if walls are placed directly on top of the plank and not on top of the topping.

Vibration can also be minimized and fire ratings improved with the use of a structural topping.

Common Practice: Topping

Whether you know it or not, floors are the key element when it comes to architectural freedom and design: their load bearing capacity has a direct influence on the need for partition walls and other structural elements of a building. Hollowcore slabs are prestressed floor elements with voids. The excellent load-bearing capacity and structural efficiency allows you to build large areas with fewer partition walls. Ultimately, this means greater freedom in design and architecture during and after construction as well as savings in material costs.

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Underlayment

Underlayment can be a cost-effective way in which to prepare the hollowcore plank for pad and carpet. Typically, the material is troweled on top, using a thin layer of latex or epoxy modified sand and cement mix. Skim coat underlayment can minimize the differential camber between precast units but is not intended to level the floor.

Important Considerations on Toppings

Topping and its effect on plank design

Get to know more about Toppings

Toppings are frequently used in conjunction with hollow-core plank floor systems. You can select either a structural or non-structural topping depending on your design.

A skim coat underlayment can minimize the differential camber between precast planks

Non-structural toppings are considered fill toppings (lightweight, concrete and gypsum based materials) that are separated from the top of the hollowcore by a bond-breaker, waterproofing membrane, and vapor or moisture barrier. The intended use of non-structural toppings are to compensate for camber and differentials (level floors), create slope and pitch, increase fire rating and provide a wearing surface. By considering the topping as non-composite we must include this material as added dead load to the design of the plank. This does not add to the overall load capacity of the plank.

There is no such thing as a carpet ready floor system. Without a separation from the top of the planks to the topping material, the system will try to work compositely.

Thickness of the topping should be measured at the high point of camber in the plank. Allowances for additional concrete must be included at bearing ends of the plank where camber is minimal.

Oldcastle Precast does not specify or design the topping system. The use of reinforcement for shrinkage control is recommended. Selection of mesh or fiber reinforcement is at the discretion of the engineer of record.

Control joints should be cut promptly after initial set of the concrete and located over a hollowcore plank joint.

Thickness considerations should be reviewed for application using a tile floor system (i.e. ceramic). It is not recommended that tiles be placed directly on the precast slabs without a floating base.

A typical 28 day structural topping mix design is 3,000 psi. Water cement ratios must be controlled in order to minimize shrinkage cracking in the topping concrete. Admixtures should be minimized in order to reduce shrinkage.

Surfaces of the hollowcore plank must be clean and thoroughly damp, with no standing water in order for the topping to bond properly.

Keyways in hollowcore plank must be grouted and cured before topping is applied. Topping cannot be used to fill the keyways and will compromise the keyway’s ability to function.

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Hollowcore plank is used on a wide variety of building types and supports an equally wide variety of final applied floor finishes. When used with a structural concrete topping (typically 2 inches or more) follow the manufacturer’s recommendations for installation.

This guide addresses applications where the starting substrate is the untopped hollow core plank.

All floor systems require some form of plank preparation prior to application. If a level floor substrate is required then the project designers should consider the use of either a thin self-leveling overlay system or a fully composite concrete topping.

Leveling systems remove the irregularities of the segmental construction and relieve some of the plank camber. Fully composite toppings will relieve both joint and camber issues and have the added benefit of increasing the system’s strength.

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Carpet systems are the easiest to use with untopped plank floors, but a proper leveling material at the joints should be used in order to reduce differences in joint elevations. Regardless of how the carpet is installed, directly adhered or set with tack strips, a pad of sufficient thickness and density will minimize the irregularities in the untopped plank system. For systems utilizing thinner padding it is best to provide a leveling material either in spot locations or throughout the carpeted area. For directly adhered systems, the installers should test the compatibility of the adhesives with the concrete. With tack strip systems the installer should be aware of the higher strength concretes associated with hollowcore planking. Hardened nails and/or power actuated fasteners may be needed for the installation of these elements.

Ceramic Tile
This brittle floor system requires the most attention when preparing the plank. Tile suppliers do not recommend applying tiles directly to the plank system whether it be topped or untopped. A slip sheet or debonding board should be used between the tile and slabs for both thin set and full depth mortar beds. A leveling course may not be needed with an adequate thickness of the tile setting bed.

Vinyl Floors
Most vinyl floors are fully adhered to the substrate. They require relatively level floors and should not be applied directly to the untopped planks. In areas limited in size, such as bathrooms and kitchens, a leveling course may be needed. For systems utilizing thinner padding it is best to provide a leveling material either in spot locations or throughout the carpeted area. For directly adhered systems, the installers should test the compatibility of the adhesives with the concrete. With tack strip systems the installer should be aware of the higher strength concretes associated with hollowcore planking. Hardened nails and/or power actuated fasteners may be needed for the installation of these elements.

Hardwood Flooring
Wood floors are typically set as floating or sleeper systems. For sleeper systems set upon a grillage of wood nailers, there is little preparation required. The installer should check the entire floor area for elevation prior to setting the first nailer. The plank camber will create a curvature in the floor and the nailers will require shims to set the system level. Like carpet tack strips, the high strength concrete in the plank will require the use of hardened nails or power actuated fasteners if they are attached to the floor. Floating floor systems can be applied directly to the untopped system. However, leveling materials are recommended so that the finished system does not reflect the plank irregularities. These irregularities can cause uneven wear in the flooring and damage at the interlocking joints where pressure points occur. Wood floor systems anchored directly to the plank system are not recommended due to the difficulty in installing the anchors through the finished wood directly into the concrete. Follow the recommendations of the supplier of the specified material for your type of flooring so that all warranties are met.

Get to know more about Finished floor systems and how they work with hollowcore plank.