PCI Plant Quality Talk
Quality Enhancement Committee

PCI Precast/Prestressed Concrete Institute

SERIES 3, ISSUE 10 – CAMBER IN PRESTRESSED PRECAST CONCRETE COMPONENTS

Camber is the upward deflection created by an eccentric stressed strand pattern located below the precast component's center of gravity. Estimated camber is calculated typically at two time periods: initially (after stripping) and at 28 days. The design loads, length of span, and component cross section factor into the amount of prestressing force required, which affects the amount of camber.

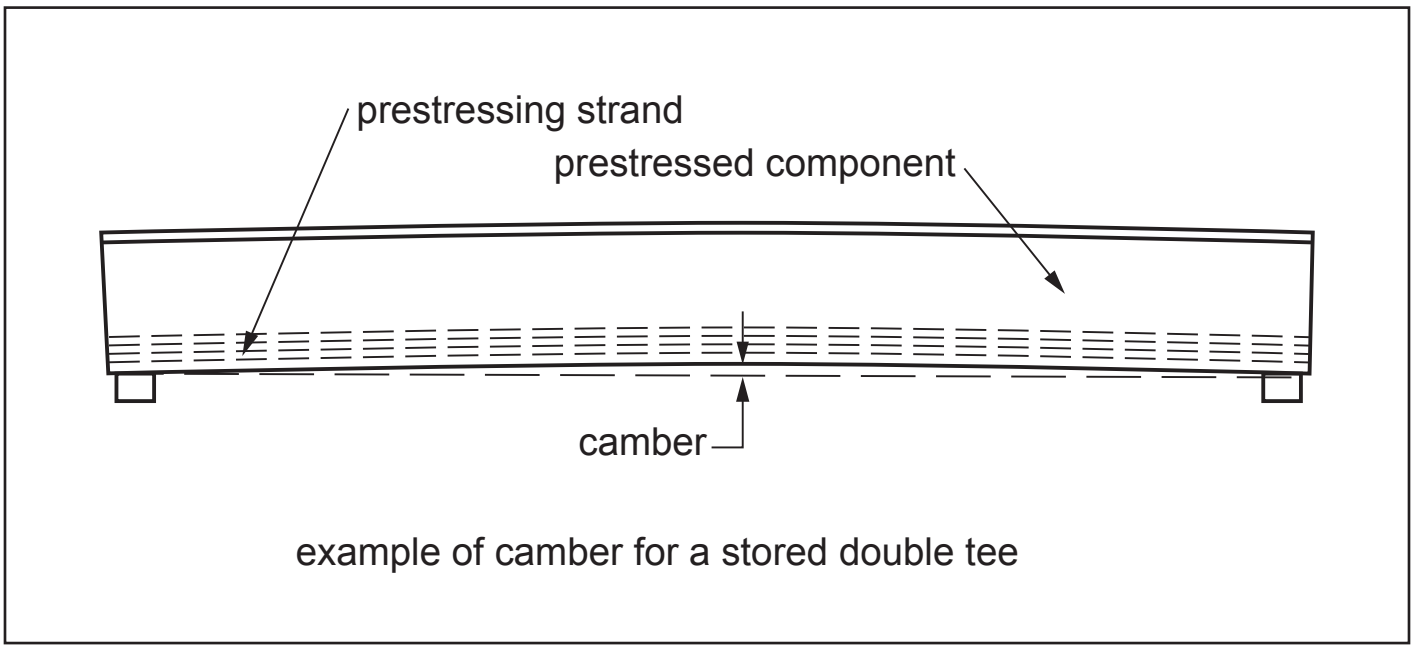
Measuring and recording camber is important because it can alert precast concrete plants to variations in production and storage procedures. Confirming cambers to the initial and 28-day design values helps verify product quality and consistency between pours.

Initial camber can vary between components of the same design due to:

- Varying release strengths
- Varying dunnage locations
- Varying time of obtaining camber measurement
- Inconsistent concrete unit weight
- Component temperature (effects of differential cooling after stripping)
- Varying durations before strand release

28-day cambers can vary between components of the same design due to:

- Varying 28-day strengths
- Varying dunnage locations
- Location in stack due to sunshine exposure
- Location in stack due to moisture exposure



example of camber for a stored double tee

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What should QC look for in the yard?

- QC should ensure that components are stored at dunnage locations shown on the drawings for each component. Dunnage should be level and not twist components.
- Component storage should be reviewed periodically after initial placement to ensure settlement has not occurred and dunnage is sound.

Best practices for camber measurement:

- The component drawings should indicate the designed initial stripping camber and 28-day camber.
- Measure and record the camber after the product is stripped and stored at proper dunnage locations. The same length of time after stripping should be used when comparing stripping cambers from pour to pour. Time and temperature can affect initial camber measurements.
- Cambers should be measured at the same time of day
- Measure and record the 28-day camber (a different age may be specified in the contract documents). When components are stacked, the top component camber can vary from those below due to absorbed moisture on the top surface or the expansion effect of sunshine.

Camber is inherent in most unsymmetrical prestressed components.

- Camber is the vertical deflection due to prestress forces in the strand being concentrated lower in the component height or thickness.

Additional items that can affect camber:

- Methods used to measure camber as well as differences in how individuals approach measurement can contribute to variances.
- Components stored for long periods of time (in excess of 28 days) can continue to gain camber.
- Product weight variation from component elements that cause change in product weight and/or concrete volume (e.g., blockouts, shortened flanges, recesses, pour stops, etc.)

Confidence of alignment of components when installed can be confirmed in the plant by performing proper camber checks. Contact the responsible engineer when cambers are out of accepted tolerance from the design values or between components of same design and length.

When camber control procedures must be utilized for plant-stored product, they should be determined by the responsible engineer. Adjusting dunnage locations or adding weight to components to control high cambers can mitigate out of tolerance cambers.

Note: Please complete this form and return to the Quality Control Manager. All crew members should be observant and report to their foreman anything out of the ordinary on a project. See something, say something.

NOTES	ATTENDEE SIGNATURES
_____ DATE _____ PRESENTER	_____ _____ _____ _____ _____ _____