IPHA Technical Seminar,
Leuven. September 2003

INTERNATIONAL PRESTRESSED HOLLOWCORE ASSOCIATION

Camber

Replies from Members to a Questionnaire on Camber

with suggestions for

Subjects for Future Research

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Camber

Action on finding a difference between theoretical and actual camber:

Difference (no action)	3 Members
Difference (acted)	2 Members
No Difference (acted)	3 Members

Camber

Time of measuring camber:

Immediately after lifting	3
Up to 24 hrs after lifting	1
During storage	14
Just before despatch	7

Camber

Limits on theoretical camber:

span/250	1 Member
span/300	4 Members
span/333	1 Member
span/400	2 Members
span/500	1 Member
No specific limit	8 members

Camber

Limits on theoretical camber:

40mm	2 Members
50mm	1 Member
60mm	1 Member
No specific limit	11 Members

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References for camber limits:

Company policy	9 Members
National Standard	7 Members
Eurocode or ISO	2 Members

Camber

Is camber important to Customers?

All of our customers	1 Member
Most of our customers	11 Members
A few of our customers	7 Members
None of our customers	0

Camber

Do your customers complain about excessive camber?

Often	1 Member
Sometimes	17 Members
Never	1 Member

Camber

When customers complain, are the units actually excessively cambered?

Often	4 Members
Sometimes	8 Members
Rarely	7 Members
Never	1 Member

Camber

Do you make units with low camber for particular customers?

Yes	5 Members
No	11 Members

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Precautions against camber development during storage:

Position of supports	17
Time limit	5
More than two supports	1
Weather protection	3
Other	4

Camber

Do you adjust camber on site?

Always	1 Member
Often	5 Members
Sometimes	4 Members
Rarely	6 Members
Never	1 Member

Camber

Do you give advice to erectors?

Yes 13 No 5

Do you have written instructions?

Yes 8 No 11

Camber

Methods of adjusting camber:

	Used	Not used
Replace unit	15	4
Prop low unit	13	5
Load high unit	12	7
Mechanical devices	15	3
Shim at supports	12	7


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Site works – in situ concrete

	often or sometimes	rarely	never
Grout joints	13	3	3
Gaps at cols	10	6	3
Reinforcement	10	4	5
Conc open core	9	4	5
Struct. topping	4	6	8

Vibration in hollowcore floors

Enquiries about vibration from:

	Often	Sometimes	Rarely	Never
People (walking or running)	1	11	5	2
Machinery (rotating or vibrating)	2	6	8	3

Vibration in hollowcore floors

Answers that satisfy:

	Always	Often	Sometimes	Rarely	Never
The customer	2	6	7	2	1
Ourselves	1	5	7	5	1

Vibration in hollowcore floors

Minimum acceptable natural frequency:

Car Park	4		3	5		>8	5.5 to 6	3	3	3 to 4	3
Factory	4			6			5	5	5	3	3
Other	4	5	8.4	6	15	>7.4	5	3	3	4	5

Vibration in hollowcore floors

Sources of guidance:

National Standards	9
International Standards	5
Specialist industry guidance	7
Company literature/software	6
Calculations from first principles	9
Empirical, based on measurements	5

Suggestions for future research

'Academic' studies

- Dynamic response
- Torsion
- Load distribution
- Structural toppings (Using old and new materials)
- Seismic design (High rise without structural topping)
- Improving fire resistance of hollowcore roofs
- Shear-Torsion and Torsion-Bending interactions
- Shear capacity of slabs with filled cores
- FEM software for hollowcore

Suggestions for future research

Design guidance

- Design to EC2
- Load distribution with respect to holes, notches and straps
- Fire resistance
- New solutions for flexible support cases

Suggestions for future research

Factory practice

Making holes in wet concrete

Suggestions for future research

Site practice

- Handling & installation
- Erection using lifting anchors (not clamps)
- Drainage from extruded hollowcore
- Lifting equipment
- Practical solutions for avoiding cracks in polished (mainly non-structural) toppings for industrial floors with hollowcore

Suggestions for future research

Other topic

Special applications of hollowcore in various countries

Suggestions for future meetings

Topics

It is noted that for the 2nd time 20cm hollowcore slabs collapsed in a fire whilst precast columns and beams resisted

Marketing and promotion of hollowcore slabs

Calculations for spalling or horizontal cracks

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