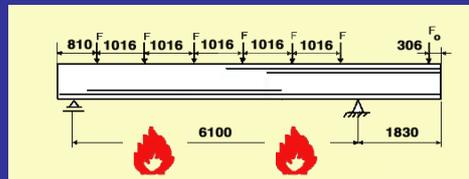




Experimental investigation by B.ELLINGWOOD & T.D.LIN

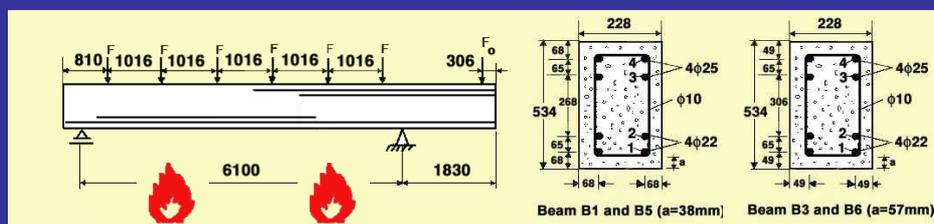
In 1987 six reinforced concrete beams were cast at the **Construction Technology Laboratories of the Portland Cement Association**. All beams were designed according to ACI Standard 318. Beams were fabricated using normal-weight carbonate concrete and Grade 60 deformed reinforcing bars. Only four of them are analyzed in this example.

Specimens were tested to simulate the end span of a continuous beam. This was accomplished by maintaining the cantilever end of the beam at a constant elevation during the course of the fire test by changing the cantilever load as required. The loads applied to the simply supported span were held constant during the test.



Experimental investigation by B.ELLINGWOOD & T.D.LIN

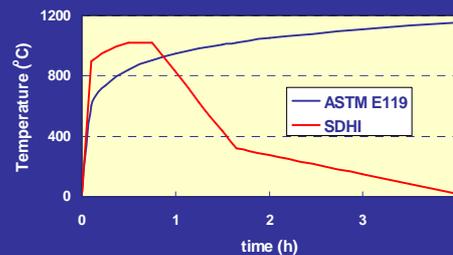
Reinforcement details and cross sectional geometry of the beams



FIRE EXPOSURE OF THE BEAMS

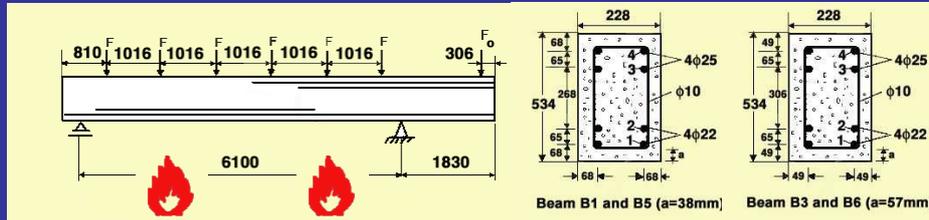
Beams B1 and B3: **ASTM E 119**

Beams B5 and B6: **SDHI**





Experimental investigation by B.ELLINGWOOD & T.D.LIN



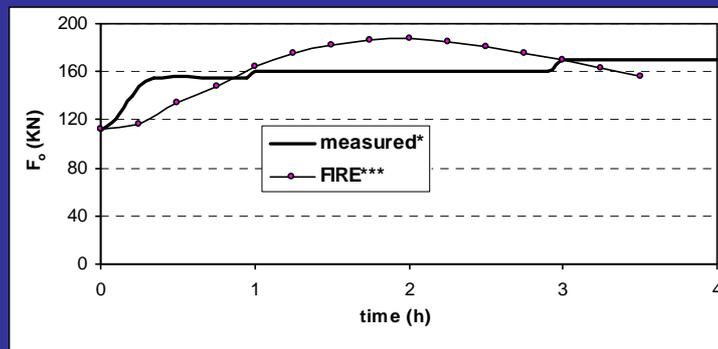
Beam	$f_c(20^\circ C)$	$f_y(20^\circ C)$	F_0 (KN)	Fire model
B1	27.8	410	114.6	ASTM
B3	29.5	440	111.2	ASTM
B5	33.5	410	114.6	SDHI
B6	34.5	440	111.2	SDHI

Loads:
 $F=44.48$ KN, F_0 is changeable
 End deflection is constant:
 Beams B1 and B5: $y=0.8$ mm
 Beams B3 and B6: $y=1.3$ mm



Experimental investigation by B.ELLINGWOOD & T.D.LIN

Variation of F_0 for beam B1

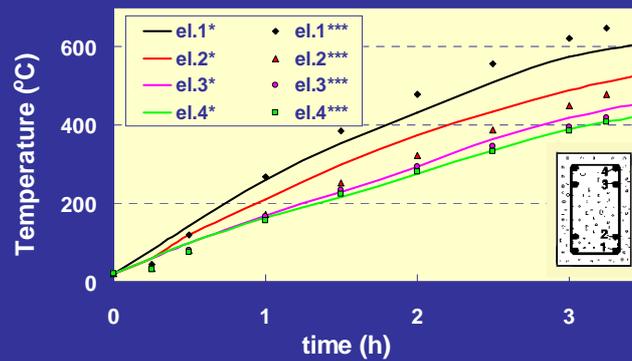




Experimental investigation by B. ELLINGWOOD & T.D. LIN

Comparison of reinforcement temperatures

Beam B1 (ASTM E119)



* Measured

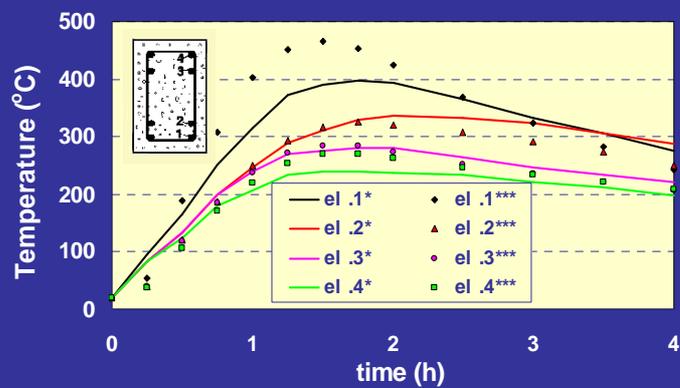
*** Predicted by program FIRE



Experimental investigation by B. ELLINGWOOD & T.D. LIN

Comparison of reinforcement temperatures

Beam B5 (SDHI)



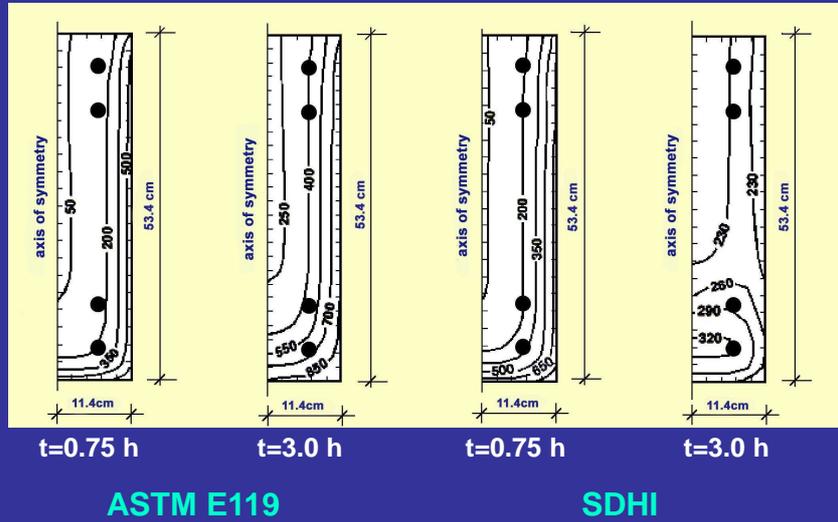
* Measured

*** Predicted by program FIRE



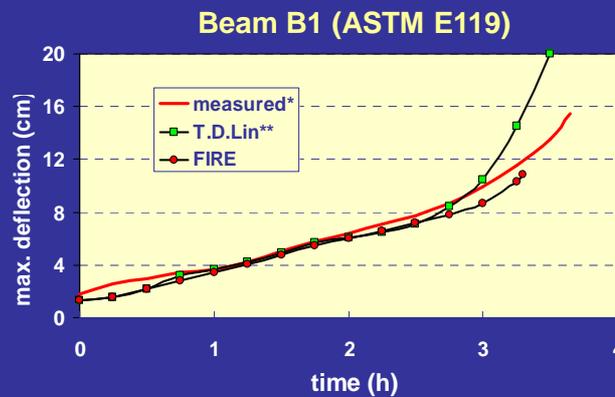
Experimental investigation by B.ELLINGWOOD & T.D.LIN

Time redistribution of isotherms in the cross section of beams



Experimental investigation by B.ELLINGWOOD & T.D.LIN

Comparison of measured maximum deflections and predicted by different computer programs



* Measured

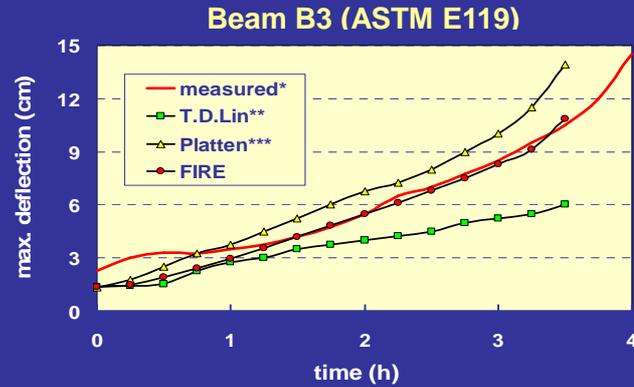
** Predicted by FIRES-RC (B.Ellingwood & T.D.Lin)

*** Predicted by FPPRCM-S (Z.Huang & A.Platten)



Experimental investigation by B.ELLINGWOOD & T.D.LIN

Comparison of measured maximum deflections and predicted by different computer programs



* Measured

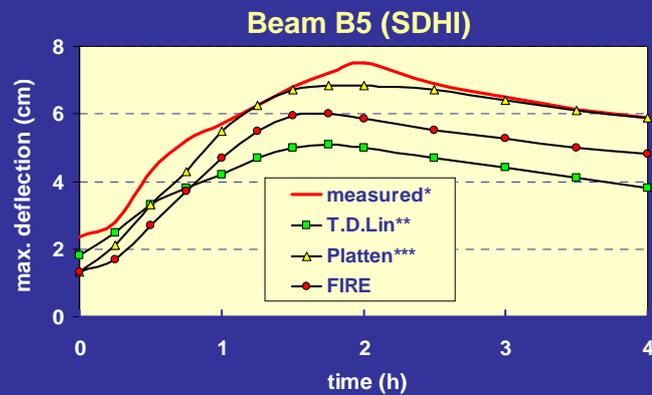
** Predicted by FIRES-RC (B.Ellingwood & T.D.Lin)

*** Predicted by FPPRCM-S (Z.Huang & A.Platten)



Experimental investigation by B.ELLINGWOOD & T.D.LIN

Comparison of measured maximum deflections and predicted by different computer programs



* Measured

** Predicted by FIRES-RC (B.Ellingwood & T.D.Lin)

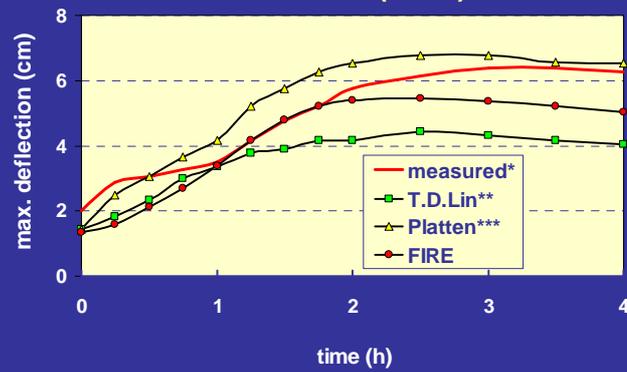
*** Predicted by FPPRCM-S (Z.Huang & A.Platten)



Experimental investigation by B.ELLINGWOOD & T.D.LIN

Comparison of measured maximum deflections and predicted by different computer programs

Beam B6 (SDHI)



* Measured

** Predicted by FIRES-RC (B.Ellingwood & T.D.Lin)

*** Predicted by FPPRCM-S (Z.Huang & A.Platten)