# Temperature calculation in steel and composite beams

Proposal 1 - Item 4.2.5 of EN 1993-1-2

Proposal 2 - Item 4.3.4.2.2 (11) of EN 1994-1-2

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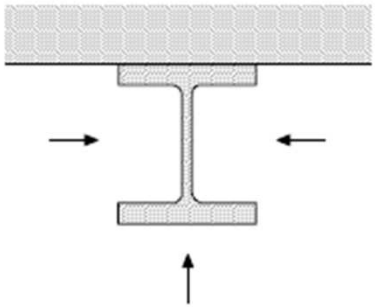
# Proposal 1 - Item 4.2.5 of EN 1993-1-2

- For structural steel elements the calculation of temperature increase in an unprotected member exposed to fire is based on the assumption of uniform temperature filed in the element. The formula for temperature increase is therefore based on a single section factor of the structural member (4.2.5 of EN 1993-1-2).
- For certain elements (e.g. large beams with tall webs supporting concrete floors) this assumption does not seem to be realistic.
- This approach is also not consistent with calculation methods for composite floor presented in EN 1994-1-2
- For beams / columns with 4-side exposure the assumption of uniform temperature seems to be realistic

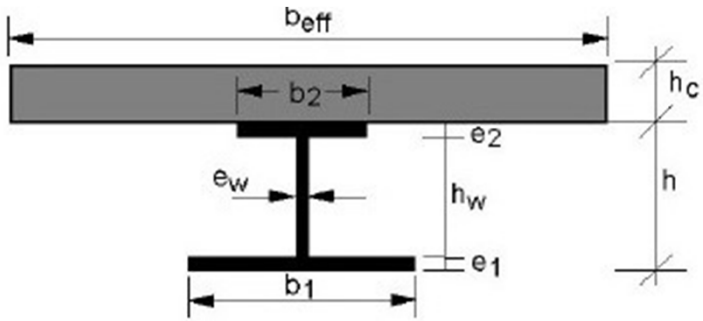
# Proposal 1 - Item 4.2.5 of EN 1993-1-2

EN 1993-1-2

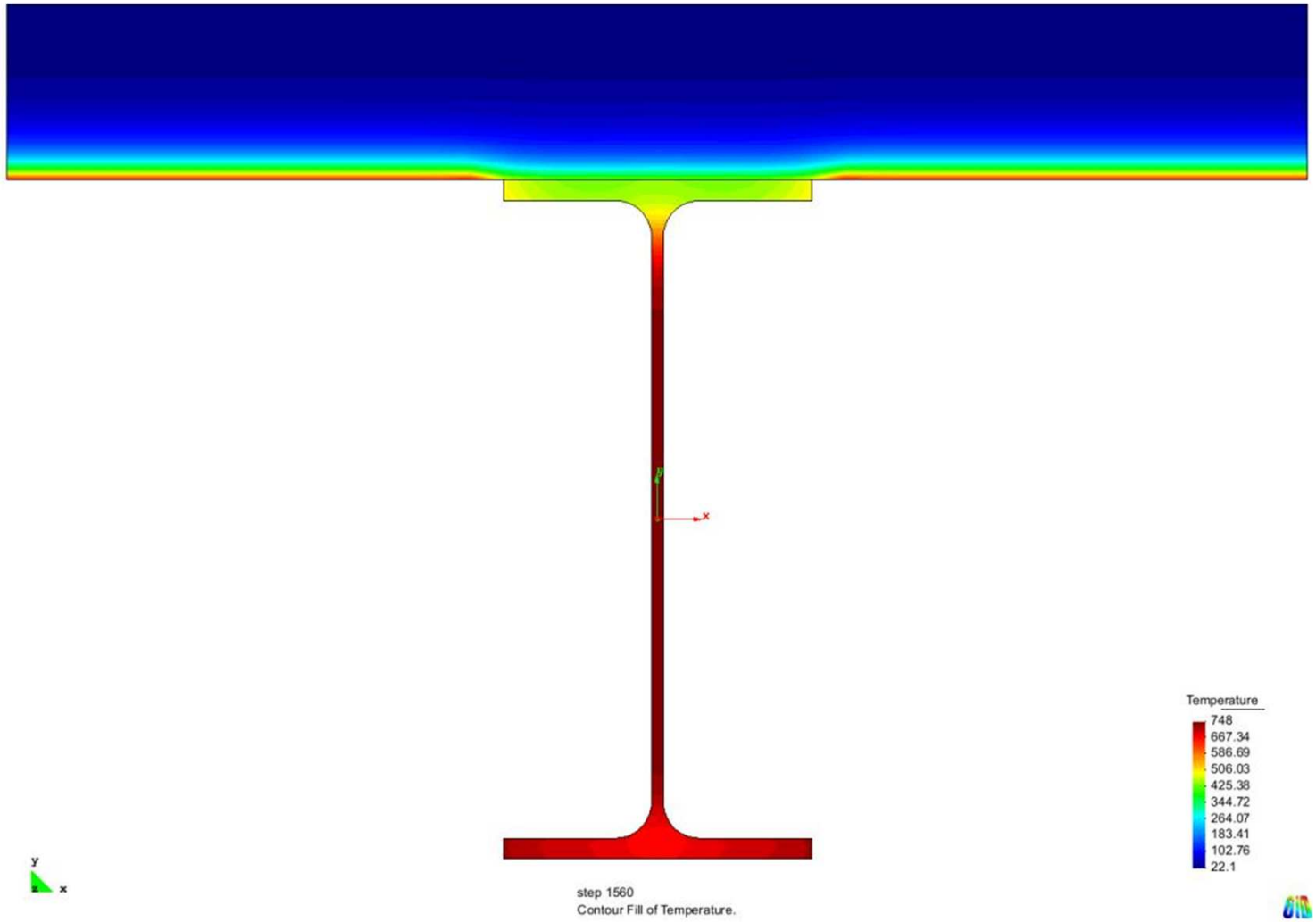
$$\frac{A_m}{V} = \frac{\text{surface exposed to fire}}{\text{cross- section area}}$$



EN 1994-1-2



# Proposal 1 - Item 4.2.5 of EN 1993-1-2



# Proposal 1 - Item 4.2.5 of EN 1993-1-2

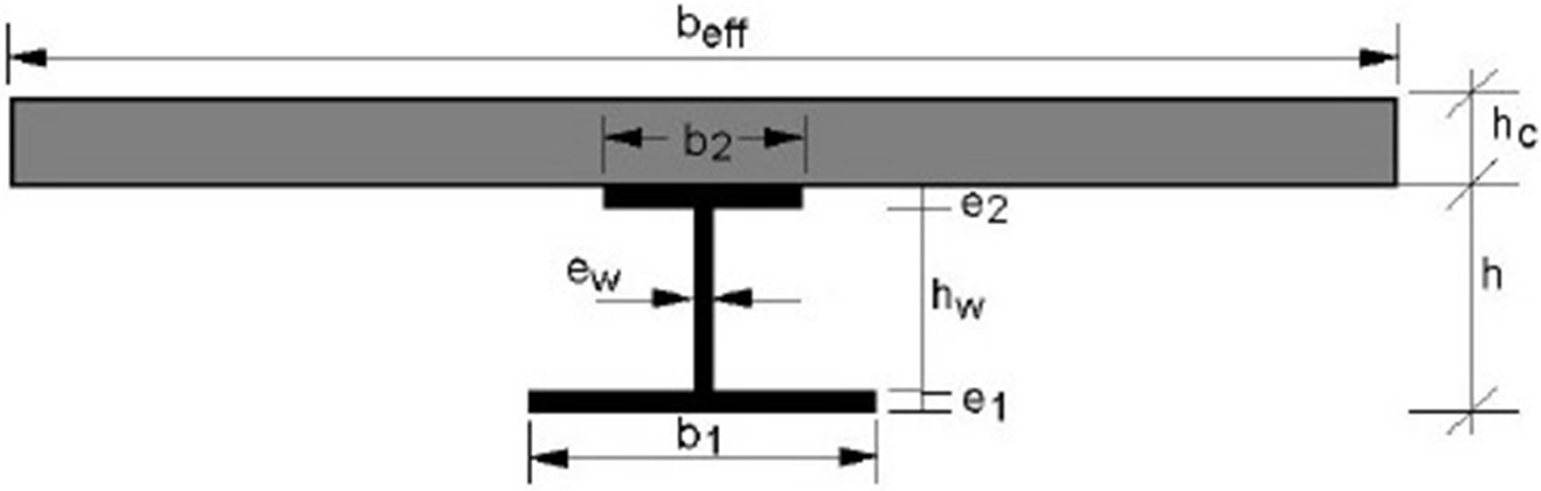
Suggestion:

- Provide criteria when it is appropriate to assume uniform temperature distribution in a steel beam, and when it is more appropriate to split the member notionally into different parts, each having uniform temperature – in the same way it is done for composite beams

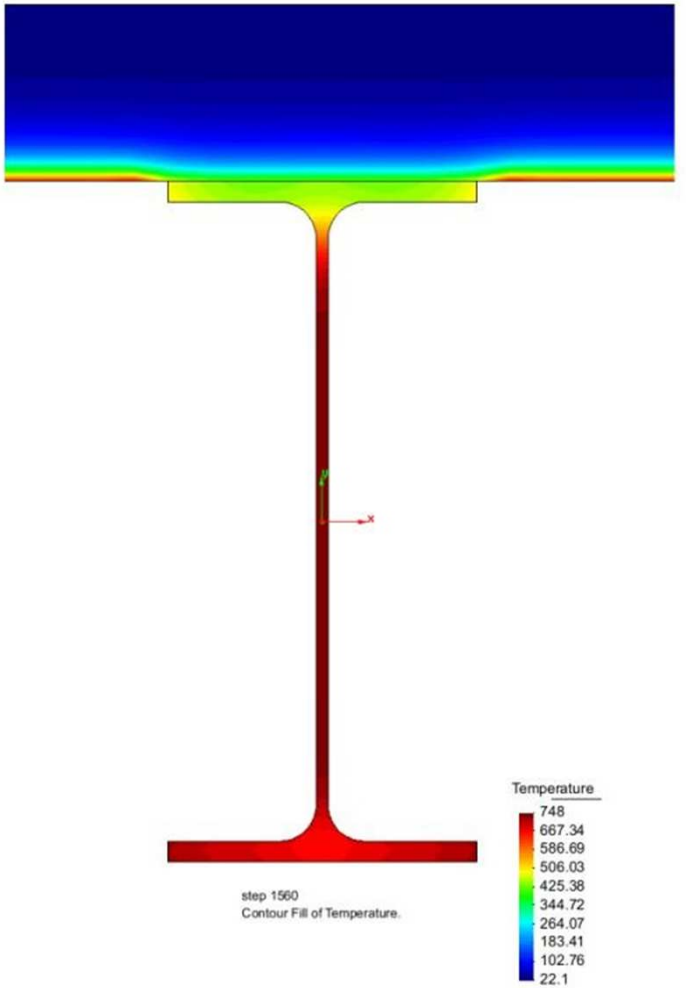
# Proposal 2 - Item 4.3.4.2.2 (10) of EN 1994-1-2

„If the beam depth h does not exceed 500 mm, the temperature of the web may be taken as equal to that of the lower flange"

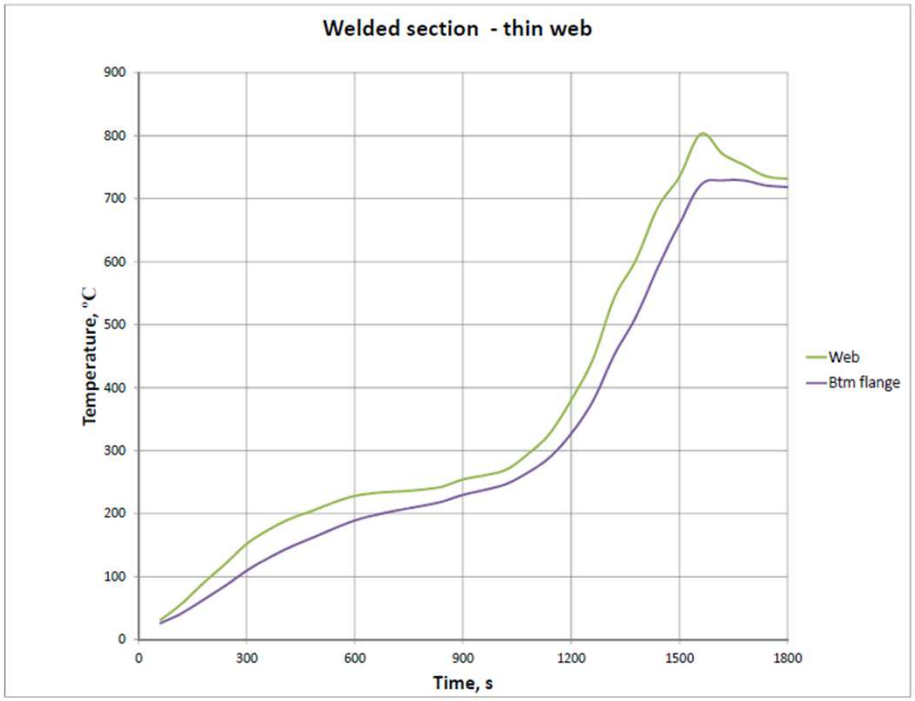
No limit is set for the ratio of section factors for the web / flange or the minimum thickness of the flange.

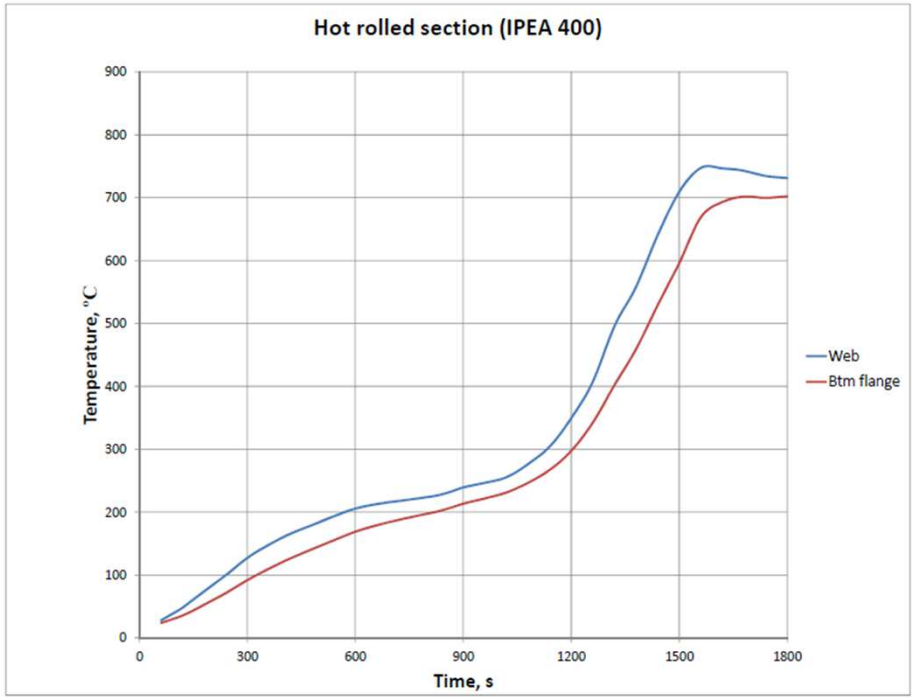


# Proposal 2 - Item 4.3.4.2.2 (10) of EN 1994-1-2

# Proposal 2 - Item 4.3.4.2.2 (10) of EN 1994-1-2



# Proposal 2 - Item 4.3.4.2.2 (10) of EN 1994-1-2

Suggestion:

- Provide additional criteria for the limiting ratio of the web thickness to lower flange thickness (or section factor) beyond which the temperature of the web needs to be calculated and not taken as equal to that of the bottom flange