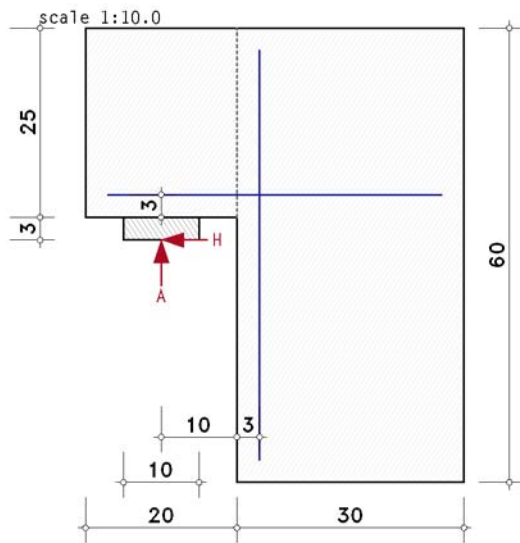


POS. 62: BEAM BRACKET (BEARING BRACKET)

dimensioning a bearing bracket EC 2 (1.11), NA: Deutschland

1. input protocol



cross section (beam bracket)

beam: $b = 30.0$ cm, $h = 60.0$ cm, center distance (design calculation): $e_1 = 3.0$ cm

bracket: $l_k = 20.0$ cm, $h_k = 25.0$ cm, center distance (design calculation): $d_{1k} = 3.0$ cm

bearing plate: $l_p = 10.0$ cm

material properties

concrete: C30/37, reinforcement: B500A

material safety factors

design situation: basic combination

design resistance: concrete $\gamma_c = 1.50$, reinforcement $\gamma_s = 1.15$

parameters

Load application for $\Delta a = 10.0$ cm, $\Delta h = 3.0$ cm

design method acc. to EC 2-1-1, 6.5

bearing bracket, load application with variant 1

bearing contact pressure: dry bearing joint

design calculation values (ULS)

lc 1: $A_{Ed} = 125.0$ kN/m, $H_{Ed} = 25.0$ kN/m

1.1. durability and concrete cover

vertical: minimum strength class, concrete cover

due to reinforcement corrosion XC1 $\Rightarrow$ C16/20, $C_{nom} = 20$ mm, $C_{nom,l} = 20$ mm $\Rightarrow C_{nom} = 20$ mm $\leq c_v = 20$ mm **ok**

minimum concrete quality C16/20 with $f_{ck} = 16.0$ N/mm² < exst $f_{ck} = 30.0$ N/mm² **ok**

horizontal: minimum strength class, concrete cover

due to reinforcement corrosion XC1 $\Rightarrow$ C16/20, $C_{nom} = 20$ mm, $C_{nom,l} = 20$ mm $\Rightarrow C_{nom} = 20$ mm $\leq c_v = 20$ mm **ok**

minimum concrete quality C16/20 with $f_{ck} = 16.0$ N/mm² < exst $f_{ck} = 30.0$ N/mm² **ok**

2. note

general reinforcement rules are not taken into account.

3. design calculation

3.1. lc 1

design calculation values: $A = A_v = 125.00$ kN/m ($\Delta a = 10.0$ cm), $H = A_h = 25.00$ kN/m ($\Delta h = 3.0$ cm)

bearing contact pressure (dry bearing joint): $\sigma_p = 1.25$ N/mm² < $\sigma_{Rd,max} = 6.80$ N/mm² **ok**

tensile reinforcement horizontal: $Z_{A+H} = 111.69$ kN $\Rightarrow$ req $A_{s,h} = 2.57$ cm²

vertical: $Z_v = 206.11$ kN $\Rightarrow$ req $A_{s,v} = 4.74$ cm²

verification of compression strut: $x = 0.73$ cm < perm $x = 0.4 \cdot d = 7.6$ cm **ok**

total: $A_{s,h} = 2.57$ cm²/m, $A_{s,v} = 4.74$ cm²/m ($\Sigma A_{st} = 7.31$ cm²/m)

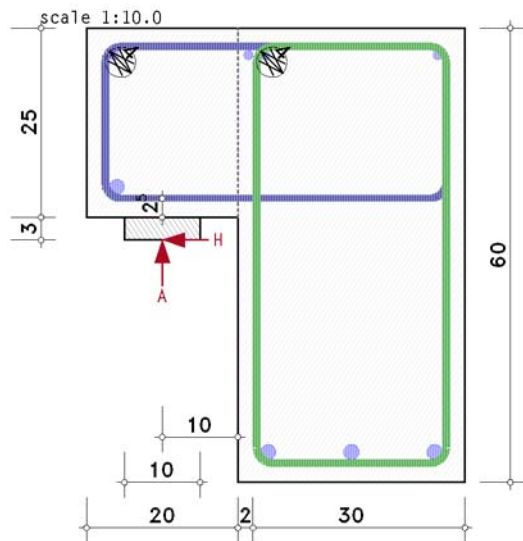
notifications to calculation

beam bracket: $z_k > 0.85 d$, is set to $0.85 d$

4. final result

maximum reinforcement: $A_{s,h} = 2.57 \text{ cm}^2/\text{m}$, $A_{s,v} = 4.74 \text{ cm}^2/\text{m}$

5. selected reinforcement



concrete cover $c_{v,v} = 2.0 \text{ cm} > c_{nom,v} = 2.00 \text{ cm}$ **ok**

concrete cover $c_{v,h} = 2.0 \text{ cm} > c_{nom,h} = 2.00 \text{ cm}$ **ok**

beam reinforcement above $2\text{Ø}12$, exst $A_{so} = 2.26 \text{ cm}^2$

beam reinforcement bottom $3\text{Ø}20$, exst $A_{su} = 9.42 \text{ cm}^2$

bracket reinforcement above $2\text{Ø}12$, exst $A_{sk,o} = 2.26 \text{ cm}^2$

bracket reinforcement bottom $1\text{Ø}20$, exst $A_{sk,u} = 3.14 \text{ cm}^2$

main reinforcement $\text{Ø}10/30.0 \text{ cm}$ (stirrup, 2-shear), $D_{min} = 4.0 \text{ cm}$, exst $A_{s,h} = 5.24 \text{ cm}^2/\text{m} > \text{req } A_{s,h} = 2.57 \text{ cm}^2/\text{m}$ **ok**

vertical reinforcement $\text{Ø}10/30.0 \text{ cm}$ (stirrup, 2-shear), $D_{min} = 4.0 \text{ cm}$, exst $A_{s,v} = 5.24 \text{ cm}^2/\text{m} > \text{req } A_{s,v} = 4.74 \text{ cm}^2/\text{m}$ **ok**

center distance exst $d_{1k} = 2.50 \text{ cm} < \text{clc } d_{1k} = 3.0 \text{ cm}$ **ok**

center distance exst $e_1 = 2.00 \text{ cm} < \text{clc } e_1 = 3.0 \text{ cm}$ **ok**

design resistance ensured

6. regulations

EN 1990, Eurocode 0: Grundlagen der Tragwerksplanung;

Deutsche Fassung EN 1990:2002 + A1:2005 + A1:2005/AC:2010, Ausgabe Dezember 2010

EN 1990/NA, Nationaler Anhang zur EN 1990, Ausgabe Dezember 2010

EN 1992-1-1, Eurocode 2: Bemessung und Konstruktion von Stahlbeton- und Spannbetonbauteilen -

Teil 1-1: Allgemeine Bemessungsregeln und Regeln für den Hochbau;

Deutsche Fassung EN 1992-1-1:2004 + AC:2010, Ausgabe Januar 2011

EN 1992-1-1/NA, Nationaler Anhang zur EN 1992-1-1, Ausgabe April 2013

Frank Fingerloos, Gerhard Stenzel: Konstruktion und Bemessung von Details nach DIN 1045,

Betonkalender 2007 T.2, Verlag Ernst & Sohn, 2007