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Support Technology and Vibration Control Systems
Hessenstrasse 11 D 65719 Hofheim-Wallau
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Profile calculation

(Version 10.06 16/12/2010)

Project : Solar Park Enel 5 MW

Position : Solar Park Enel 5 MW

Company : Hydroplan

Responsible : Stelios Kalathakis
Phone :
Facsimile :
E-Mail :

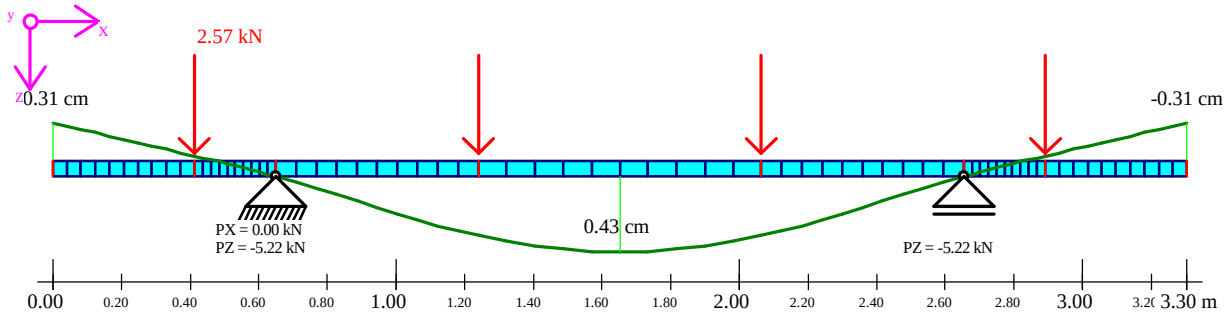
Profile type : MPC Profile 40/80

Profile length : 3.304 [m] (Number of nodes : 71)

Section values :

Cross section :		5.820	[cm^2]			
Weight :		4.680	[kg/m]			
Youngs modulus :		210000.000	[N/mm²]			
Shear modulus :		81000.000	[N/mm²]			
Shear section :	Az =	4.620	[cm^2]	Ay =	1.110	[cm^2]
Resistance moment :	Wy =	10.182	[cm^3]	Wz =	9.092	[cm^3]
Inertia moments :	Iy =	40.727	[cm^4]	Iz =	18.184	[cm^4]

System : Vertical loads with own weight



Input data :

```
*****************************************************************************
***   Suspension conditions :  2                                          ***
*****************************************************************************
        Position no.    PX PY PZ   MX MY MZ   MG  Marked
  1      0.65000  21     1  1  1    0  0  0    0  1
  2      2.65400  51     0  1  1    0  0  0    0  1

*****************************************************************************
***   Point loads          :  4  Max. value :          2.57380 [kN]         ***
*****************************************************************************
        Position no.      Px [kN]      Py [kN]      Pz [kN]     My [kNm]     Mz [kNm]
  1      0.41300  11                               2.57380
  2      1.23900  31                               2.57380
  3      2.06500  41                               2.57380
  4      2.89100  61                               2.57380

*****************************************************************************
***   Distributed loads     :  0  Max. value :      0.00000 [kN/m]           ***
*****************************************************************************
  from position  no.  to position no.   Qzl [kN/m]   Qzr [kN/m]   Qyl [kN/m]   Qyr [kN/m]
        0.00000   1      3.30400  71      0.04590      0.04590  (Own weight)
```

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Output data :

```
*****************************************************************************
***   Element forces : Extreme values                                     ***
*****************************************************************************
                            N [kN]            Q [kN]           M [kNm]
      min. values :       -0.00000 (  1)    -2.61979 ( 51)    -0.61969 ( 21)
      max. values :       -0.00000 (  1)     2.61979 ( 21)     0.91932 ( 36)

*****************************************************************************
***   Bearing loads : (*) Bearing force , (K) Point load                  ***
*****************************************************************************
       Position no.          PX [kN]           PZ [kN]          MY [kNm]
        0.65000  21                (*)      -5.22342 (*)               ( )
        2.65400  51                ( )      -5.22342 (*)               ( )

*****************************************************************************
***   Anchor extraction forces :  +F : Tension , -F : Stress              ***
*****************************************************************************
       Position no.          F1 [kN]           F2 [kN]           e  [cm]

*****************************************************************************
***   Stress     : extreme values                                         ***
*****************************************************************************
                      SigmaN [N/mm²]      TauQ [N/mm²]     SigmaM [N/mm²]
      min. values :       -0.00000 (  1)    -8.50580 ( 51)    -60.86093 ( 51)
      max. values :       -0.00000 (  1)     8.50580 ( 21)     90.28891 ( 36)

      Hint :  TauQ=1.5*Q/A_bridge (shearing force take over only by bridge)
```

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*****************************************************************************
***   Structural analysis of stress in accordance with EC3                ***
*****************************************************************************
      Partial safety coefficient :       gamma-M =    1.100
      Stretching limit :                fy,k =  235.000 [N/mm²]

      Load baring combinations according to EC1
        1.35 * Own weight  +  1.35 * G
        1.35 * Own weight  +  1.50 * 0.90 * Q
        - constant influences G
        - changeable influences Q

      Demands S,d
       SIGMA max = 1.35 * (  90.289 +   0.000) =  121.890 [N/mm²]  = Sigma_d
         TAU max = 1.35 * (       8.506      ) =   11.483 [N/mm²]  =   Tau_d

      Demanding R,d
        Limitation of direct stress=  235.000 /  1.10 =  213.636 [N/mm²]  = Sigma_R,d
        Limitation of shear stress=  213.636 / 1.732 =  123.343 [N/mm²]  =   Tau_R,d

      Verification of bending and direct stress :

            Sigma_d         121.890 [N/mm²]
           ------------ = ------------------ =    0.571 <= 1.000
            Sigma_R,d       213.636 [N/mm²]

      Shear stress verification :

            Tau_d            11.483 [N/mm²]
           ------------ = ------------------ =    0.093 <= 1.000
            Tau_R,d         123.343 [N/mm²]

      Comparable stresses do not need to be verified.

      Hint :
      If applicable, additional verifications of load bearing capacity and stability proofs need to be considered
      according to measures  of corresponding liturature or engineering standards !
```

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*****************************************************************************
***   Structural analysis in accordance with EC3                          ***
*****************************************************************************
      Partial safety coefficient :       gamma-M =    1.100
      Stretching limit :               fy,k =  235.000 [N/mm²]

      Load baring combinations according to EC1
        1.35 * Own weight  +  1.35 * G
        1.35 * Own weight  +  1.50 * 0.90 * Q
        - constant influences G
        - changeable influences Q

      Demands E,d
        M_E,d = 1.35 *    0.919 =    1.241 [kNm]
        N_E,d = 1.35 *    0.000 =    0.000 [kN]
        Q_E,d = 1.35 *    3.930 =    5.305 [kN]

      Demanding R,d
        M_R,d =  235.000[N/mm²] *   10.182[cm^3] *  0.00100000 /  1.10 =    2.175 [kNm]
        N_R,d =  235.000[N/mm²] *    5.820[cm^2] *  0.10000000 /  1.10 =  124.336 [kN]
        Q_R,d =  135.677[N/mm²] *    4.620[cm^2] *  0.10000000 /  1.10 =   56.984 [kN]

      Verification of strains of bending force and normal force :

           M_E,d    N_E,d       1.241 [kNm]       0.000 [kN]
          ------ + ------ = ---------------- + ---------------- =    0.571 <= 1.000
           M_R,d    N_R,d       2.175 [kNm]     124.336 [kN]

      Verification of lateral forces

           Q_E,d       5.305 [kN]
          ------ = ------------------ =    0.093 <= 1.000
           Q_R,d      56.984 [kN]

      Comparable stresses do not need to be verified.

      Hint :
      If applicable, additional verifications of load bearing capacity and stability proofs need to be considered
      according to measures  of corresponding liturature or engineering standards !

*****************************************************************************
***   Deflection : Extreme values                                         ***
*****************************************************************************
                              UX [cm]            UZ [cm]         PhiY [rad]
      max. values :         -0.00000 (  0)      0.43486 ( 36)      0.00632 ( 25)

*****************************************************************************
***   Check admissible deflection                                         ***
*****************************************************************************

      Standard field : 1
      - Field length                  :        0.65000 [m]
      - max. deflection               :        0.30547 [cm]
      - admissible deflection         :        0.65000 [cm]  (Cantilever L/100)

      Verification of admissible deflection :

           f_available        0.305 [cm]
          ------------ = ------------------ =    0.470 <= 1.000
           f_admissible       0.650 [cm]

      Remark for adequacy verification:
        Partial safety coefficient :       gamma-F =    1.000
        Partial safety coefficient :       gamma-M =    1.000
```