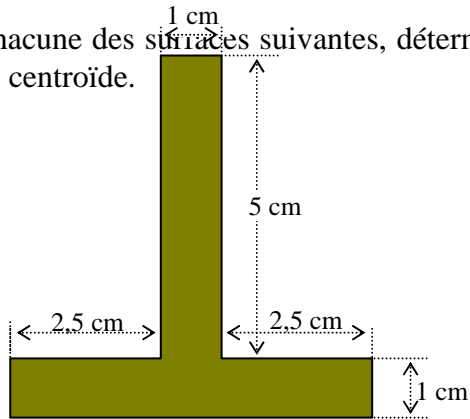


203-001 D6

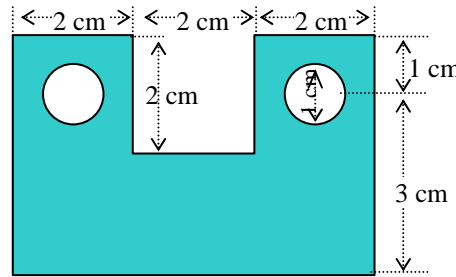
NOM : .....

À compléter avant : .....

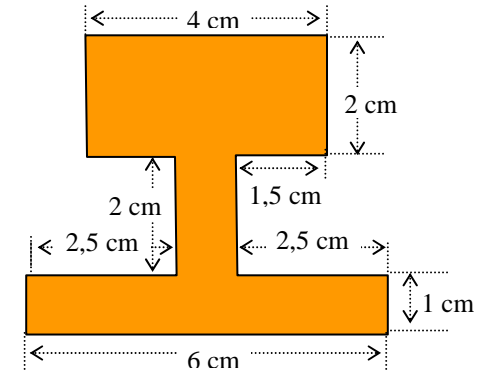
Pour chacune des surfaces suivantes, déterminer le module de section ainsi que le rayon de giration par rapport à un axe horizontal passant par son centroïde.



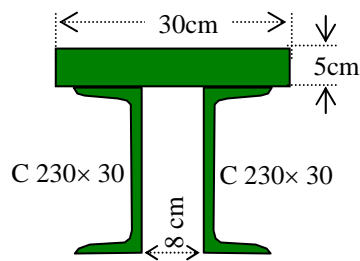
Surface 6A



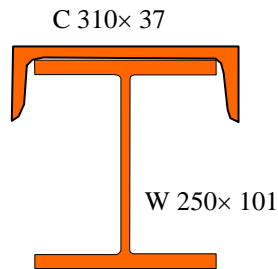
Surface 6B



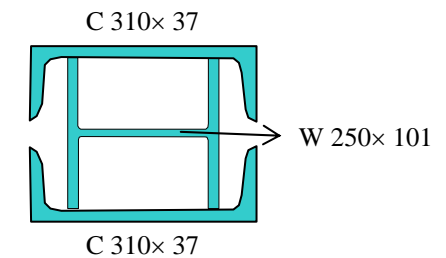
Surface 6C



Surface 6D

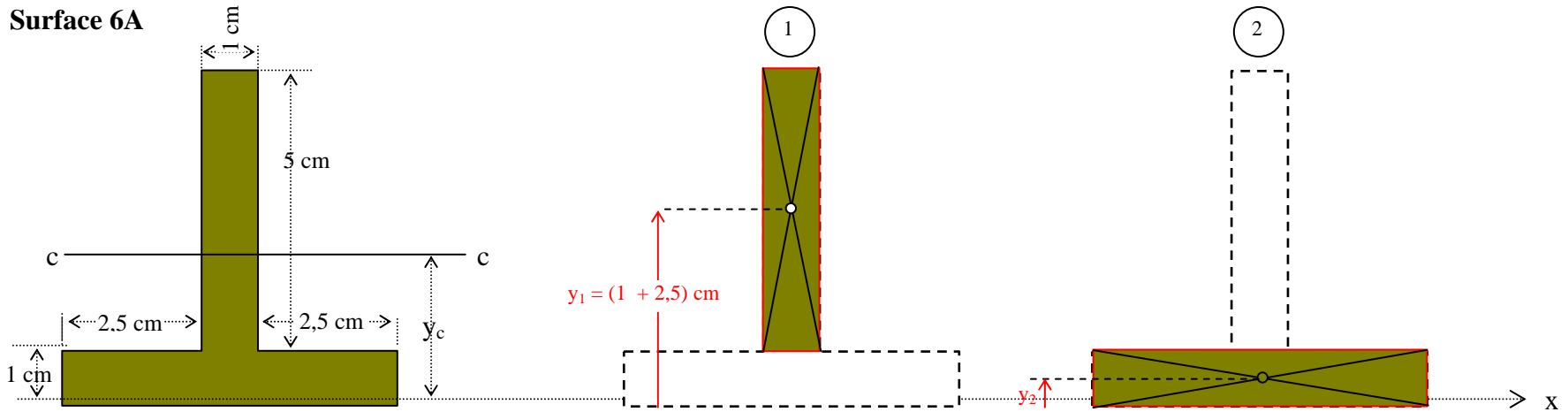


Surface 6E



Surface 6F

Surface 6A



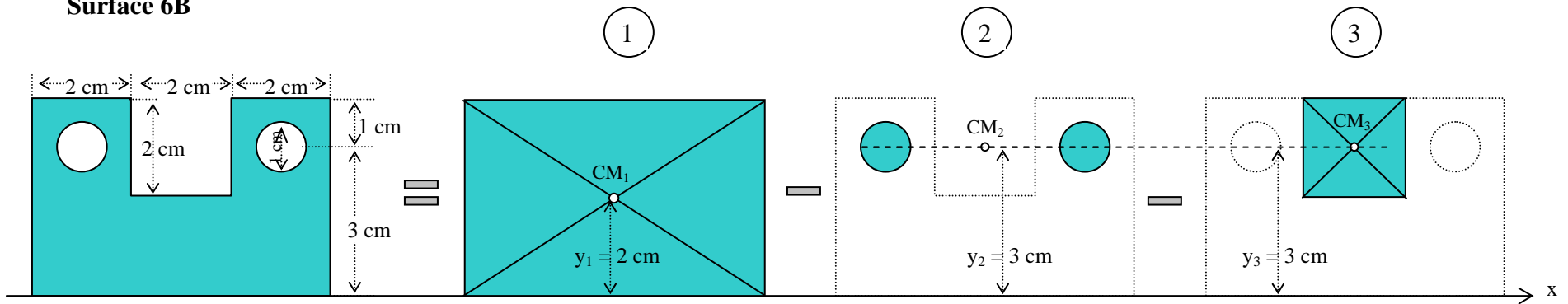
Surface	$A_n$	$y_n$	$y_n A_n/A$	$d_n$	$I_{n/n}$	+	$A_n d_n^2$	=	$I_{n/c}$
	( $cm^2$ )	( $cm$ )	( $cm$ )	( $cm$ )	( $cm^4$ )		( $cm^4$ )		( $cm^4$ )
1	$5 \times 1 =$ 5	$1 + 2,5 =$ 3,5	$3,5 \times 5 \div 11 =$ 1,59091	$3,5 - 1,8636$ $= 1,63636$	$5^3 \times 1 \div 12$ $= 10,4167$	+	$5 \times 1,63636^2$ $= 13,3884$		$= 23,8051$
2	$6 \times 1 =$ 6	0,5	$0,5 \times 6 \div 11 =$ 0,27273	$1,8636 - 0,5$ $= 1,3636$	$1^3 \times 6 \div 12$ $= 0,5$	+	$6 \times 1,3636^2$ $= 11,1564$		$= 11,657$
$A = 11$		$y_c =$	$= 1,8636 \text{ cm}$	$I_{total/c} =$					$= 35,462 \text{ cm}^4$

**C = 4,1364 cm**

**S = 8,573 cm<sup>3</sup>**

**r = 1,796 cm**

**Surface 6B**



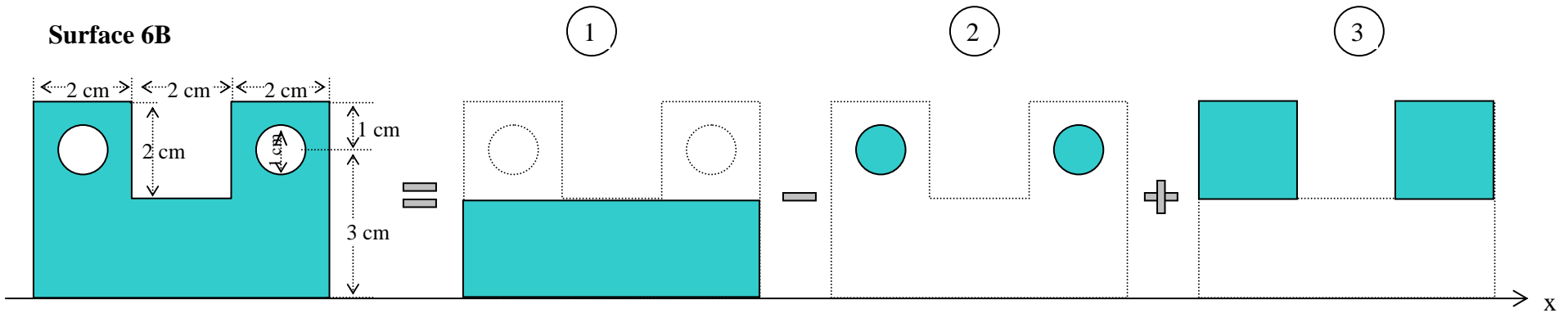
Surface	$A_n$	$y_n$	$y_n A_n/A$	$d_n$	$I_{n/n}$	+	$A_n d_n^2$	=	$I_{n/c}$
	( $cm^2$ )	( $cm$ )	( $cm$ )	( $cm$ )	( $cm^4$ )		( $cm^4$ )		( $cm^4$ )
1	$6 \times 4 =$ <b>24</b>	<b>2</b>	<b>2,6046</b>	$2 - 1,6977$ <b>0,3023</b>	$4^3 \times 6 \div 12$ <b>= 32</b>	+	<b>2,19297</b>		<b>= 34,193</b>
2	$- 2 \times (\pi \times 1^2 \div 4) =$ $- \pi \div 2$	<b>3</b>	<b>0,25570</b>	<b>1,3023</b>	$2 \times (\pi \times 1^4 \div 64)$ <b>= 0,09817</b>	+	<b>2,66397</b>		<b>= - 2,7621</b>
3	$- 2 \times 2 =$ <b>- 4</b>	<b>3</b>	<b>0,65114</b>	<b>1,3023</b>	$2^3 \times 2 \div 12$ <b>= 1,3333</b>	+	<b>6,78374</b>		<b>= - 8,1171</b>
<b><math>A = 18,4292</math></b>		<b><math>y_c = 1,6977</math></b>		<b><math>I_{total/c} = 34,193 - 2,762 - 8,117 = 23,314 \text{ cm}^4</math></b>					

**$C = 4 - 1,6977 = 2,3023 \text{ cm}$**

**$S = 10,126 \text{ cm}^3$**

**$r = 1,125 \text{ cm}$**

**Surface 6B**



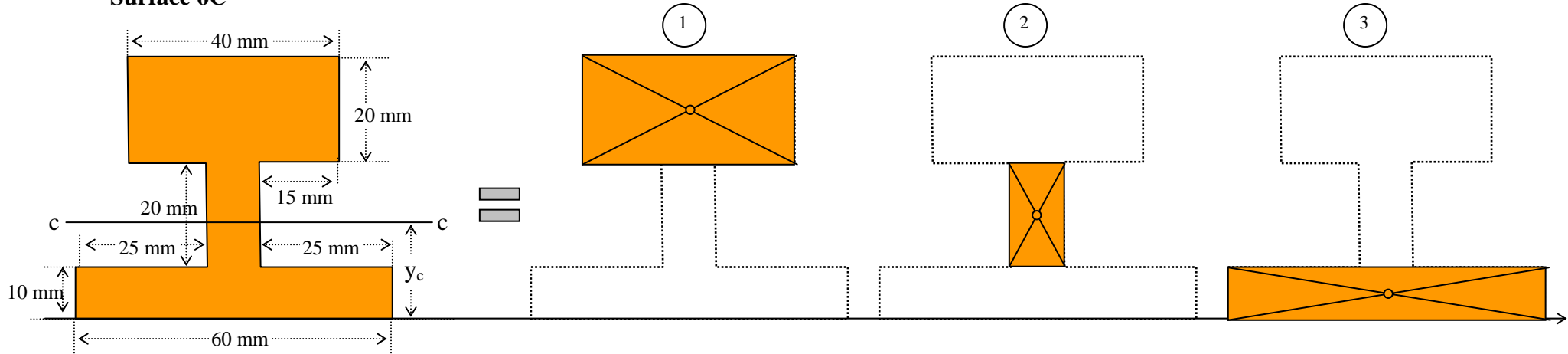
Surface	$A_n$ ( $cm^2$ )	$y_n$ ( $cm$ )	$y_n A_n/A$ ( $cm$ )	$d_n$ ( $cm$ )	$I_{n/n}$ ( $cm^4$ )	+	$A_n d_n^2$ ( $cm^4$ )	= $I_{n/c}$ ( $cm^4$ )
1	12	1	0,65114	0,69772	4	+	5,8417	= 9,8417
2	-1,5708	3	-0,25570	1,3023	-0,09817	+	-2,66397	= -2,7621
3	8	3	1,30228	1,3023	2,6667	+	13,56748	= 16,2342
$A = 18,4292$		$y_c = 1,6977$		$I_{total/c} = \dots\dots\dots = 23,314 \text{ cm}^4$				

**$C = 4 - 1,6977 = 2,3023 \text{ cm}$**

**$S = 10,126 \text{ cm}^3$**

**$r = 1,125 \text{ cm}$**

Surface 6C



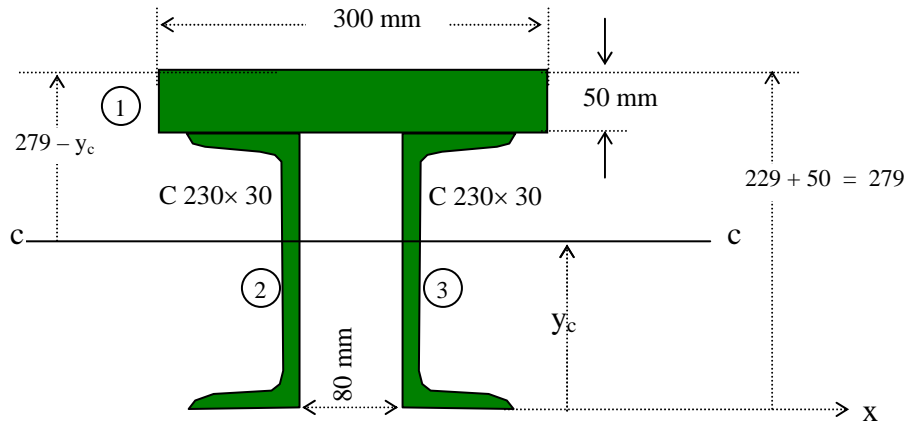
Surfa ce	$A_n$	$y_n$	$y_n A_n/A$	$d_n$	$I_{n/n}$	+	$A_n d_n^2$	=	$I_{n/c}$
	(mm <sup>2</sup> )	(mm)	(mm)	(mm)	(mm <sup>4</sup> )		(mm <sup>4</sup> )		(mm <sup>4</sup> )
1	800	40	20	15,625	26666,7	+	195312,5	=	221 979,2
2	200	20	2,5	4,375	6666,7	+	3828,1	=	10 494,8
3	600	5	1,875	19,375	5000	+	225234,4	=	230 234,4
$A = 1600$		$y_c = 24,375 \text{ mm}$		$I_{total/c} =$				$= 462,71 \times 10^3 \text{ mm}^4$	

**C = 5,625 mm**

**S = 18,06 × 10<sup>3</sup> mm<sup>4</sup>**

**r = 17,01 mm**

**Surface 6D**



Profilé C 230x30 :

Hauteur = .....229..... mm;

Aire = .....3800..... mm<sup>2</sup>;

Largeur de l'aile = .....67..... mm;

Épaisseur moyenne de l'aile = ...10,5... mm;

Épaisseur de l'âme = .....11,4..... mm;

$I_x = .....25,5 \times 10^6 ..... mm^4$  ;

$I_y = .....1,01 \times 10^6 ..... mm^4$  ;

$x_c = .....14,8..... mm$

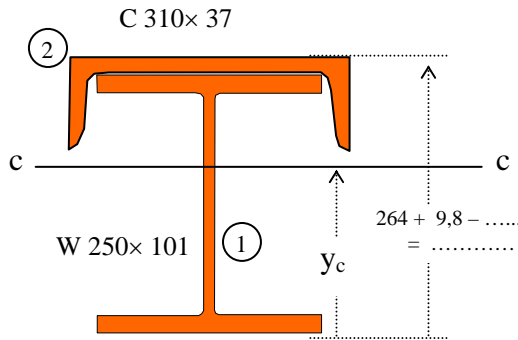
Surfa ce	$A_n$	$y_n$	$y_n A_n/A$	$d_n$	$I_{n/n}$	+	$A_n d_n^2$	= $I_{n/c}$
	(mm <sup>2</sup> )	(mm)	(mm)					
1	15 000	$229 + 25 = 254$	168,584	$254 - 207,089 = 46,911$	$50^3 \times 300 / 12 = 3,125 \times 10^6$	+	$33,010 \times 10^6$	= $36,135 \times 10^6$
2	3800	$229 / 2 = 114,5$	19,252	$207,08 - 114,5 = 92,589$	$25,5 \times 10^6$	+	$32,576 \times 10^6$	= $57,976 \times 10^6$
3	3800	$229 / 2 = 114,5$	19,252	$207,08 - 114,5 = 92,589$	$25,4 \times 10^6$	+	$32,576 \times 10^6$	= $57,976 \times 10^6$
$A = 22\ 600\ mm^2$ $y_c = 207,089\ mm$				$I_{total/c} = 152,287 \times 10^6\ mm^4$				

**C = 207,089 mm**

**S = 735,4 × 10<sup>3</sup> mm<sup>3</sup>**

**r = 82,09 mm**

**Surface 6E**



Profilé C 310×37 :

Hauteur = .....305..... mm;  
 Aire = .....4720..... mm<sup>2</sup>;  
 Largeur de la semelle = .....77..... mm;  
 Épaisseur moyenne de la semelle = 12,7... mm;  
 Épaisseur de l'âme = .....9,8..... mm;  
 $I_x = .....59,9 \times 10^6 ..... mm^4$  ;  
 $I_y = .....1,85 \times 10^6 ..... mm^4$  ;  
 $x_c = .....17,1 ..... mm$

Profilé W 250×101 :

Hauteur = ...264..... mm;  
 Aire = .....12 900... mm<sup>2</sup>;  
 Largeur de la semelle = ...257..... mm;  
 Épaisseur moyenne de la semelle = ...19,6... mm;  
 Épaisseur de l'âme = ...11,9..... mm;  
 $I_{xx} = .....164,0 \times 10^6 ..... mm^4$  ;  
 $I_{yy} = ... ..55,5 \times 10^6 ..... mm^4$  ;

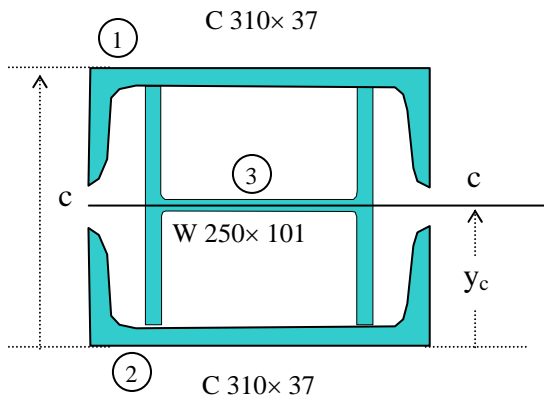
Surface	$A_n$	$y_n$	$y_n A_n/A$	$d_n$	$I_{n/n}$	+	$A_n d_n^2$	= $I_{n/c}$
	(mm <sup>2</sup> )	(mm)	(mm)	(mm)	(mm <sup>4</sup> )		(mm <sup>4</sup> )	(mm <sup>4</sup> )
1	12 900	$264 / 2 = 132$	96,640	$165,404 - 132 = 33,404$	$164,0 \times 10^6$	+	$14,3944 \times 10^6$	$= 178,394 \times 10^6$
2	4720	$264 + 9,8 - 17,1 = 256,7$	68,764	$256,7 - 165,404 = 91,296$	$1,85 \times 10^6$	+	$39,3407 \times 10^6$	$= 41,190 \times 10^6$
$A = 17 620$		$y_c = 165,404 \text{ mm}$		$I_{total/c} = 219,58 \times 10^6 \text{ mm}^4$				

**C = 165,404 mm**

**S = 1 327,6 × 10<sup>3</sup> mm<sup>3</sup>**

**r = 111,6 mm**

**Surface 6F**



**Profilé C 310×37 :**  
 Hauteur = .....305..... mm;  
 Aire = .....4 720... mm<sup>2</sup>;  
 Largeur de la semelle = .....77...mm;  
 Épaisseur moyenne de la semelle = 12,7 mm;  
 Épaisseur de l'âme = .....9,8.....mm;  
 $I_x = \dots 59,9 \times 10^6 \dots \text{mm}^4$  ;  
 $I_y = \dots 1,85 \times 10^6 \dots \text{mm}^4$  ;  
 $x_c = \dots 17,1 \dots \text{mm}$

**Profilé W 250×101 :**  
 Hauteur = ...264..... mm;  
 Aire = ...12900... mm<sup>2</sup>;  
 Largeur de la semelle = .....257.....mm;  
 Épaisseur moyenne de la semelle = ...19,6 mm;  
 Épaisseur de l'âme = ...11,9.....mm;  
 $I_x = \dots 164,0 \times 10^6 \dots \text{mm}^4$  ;  
 $I_y = \dots 55,5 \times 10^6 \dots \text{mm}^4$  ;

Surface	$A_n$ (mm <sup>2</sup> )	$y_n$ (mm)	$y_n A_n/A$ (mm)	$d_n$ (mm)	$I_{n/n}$ (mm <sup>4</sup> )	+	$A_n d_n^2$ (mm <sup>4</sup> )	= $I_{n/c}$ (mm <sup>4</sup> )
1	4 720	$2 \times 9,8 + 257 - 17,1$ = 259,5	54,827	$259,5 - 138,3$ = 121,2	$1,85 \times 10^6$	+	$69,334 \times 10^6$	= $71,184 \times 10^6$
2	4720	17,1	3,613	$138,3 - 17,1$ = 121,2	$1,85 \times 10^6$	+	$69,334 \times 10^6$	= $71,184 \times 10^6$
3	12 900	$9,8 + (257 / 2)$ = 138,3	79,86	0	$55,5 \times 10^6$	+	0	= $55,5 \times 10^6$
<b>A = 22 340</b> $y_c = 138,3 \text{ mm}$				<b><math>I_{total/c} = 197,87 \times 10^6 \text{ mm}^4</math></b>				

**C = 138,3 mm**

**S = 1431 × 10<sup>3</sup> mm<sup>3</sup>**

**r = 94,1 mm**