

RESULTS COMPARISON

CDS-SectionDesigner / Cubs-Fagus

ANALYSIS 1 – Prestressed Concrete

CUBUS-FAGUS

Analyse des contraintes sous effort

Sollicitations

No	AP	P	Flexion et effort normal			Effort tranchant et torsion			Remarques
			N [kN]	M _y [kNm]	M _z [kNm]	V _y [kN]	V _z [kN]	T [kNm]	
1	!ELU		0	1000.0	0				-

Paramètres d'analyse "!ELU" Norme: Eurocode EN

Contraintes et dilatations extrêmes

Nom	Classe	y _q [m]	z _q [m]	ε [‰]	σ _d [N/mm ²]	γ [-]
C1	C40/50	2.2	1.7	-0.12	-2.619	1.76
C1	C40/50	-1.3	-1.7	-0.09	-1.901	1.76
P2	B500B	0.6	1.8	-0.11	-22.463	1.15
P5	B500B	-0.8	-0.666	-0.09	-18.659	1.15
PP1	S1500/1670	2.	0.8	4.89	952.852	1.15
PP3	S1500/1670	-1.1	-0.2	4.91	956.61	1.15

Contraintes calculées dans la section homogène (matériau linéaire)

Nom	Pondération	y _q [m]	z _q [m]	σ _{elas} [N/mm ²]
C1	1.	2.2	1.7	-2.689
C1	1.	-1.3	-1.7	-1.946

État au dernier pas d'itération

Efforts intérieurs			Élongation et courbures			Rigidités		
N [kN]	M _y [kNm]	M _z [kNm]	ε _x [‰]	χ _y [km ⁻¹]	χ _z [km ⁻¹]	N/ε _x [kN]	M _y /χ _y [kNm ²]	M _z /χ _z [kNm ²]
-4.8	996.1	1.1	-0.10	0.0	0.0	47579.09	194459175.	241034.42

Forces de précontrainte P(t=0) au début du chargement

N _p [kN]	M _{yp} [kNm]	M _{zp} [kNm]
-30615.0	1172.9	2039.3

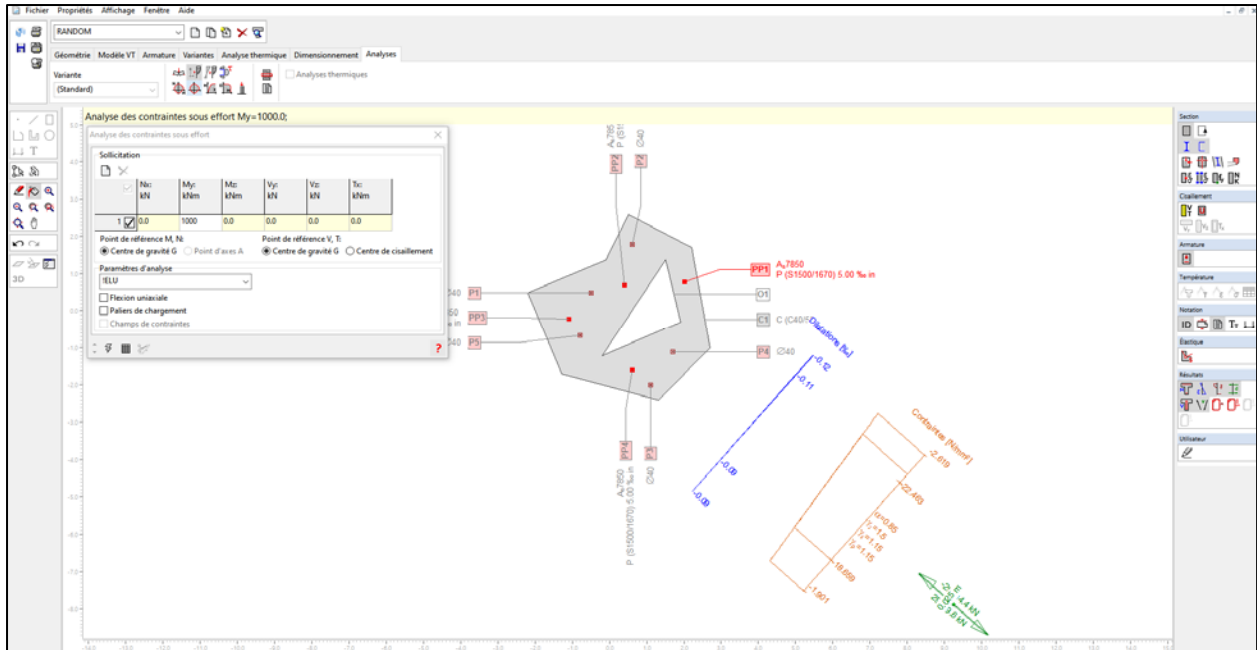
Efforts internes comme un couple de forces :

	Efforts intérieurs de traction et compression			Moments		z	Valeurs géométriques		
	Sct princip. [kN]	Armature [kN]	Somme [kN]	M	Unité [kNm]		Unité [m]	x, d	Unité [m]
Compr. F _c =	-29867.7	-126.6	-29994.4	M _c =	-2873.7	z _c =	0.096	x _c =	0.
Tract. F _s =	0.	29989.6	29989.6	M _s =	2129.7	z _s =	-0.071	d =	4.867
N =			-4.8	M =	-744.	z =	0.025	x/d =	1.

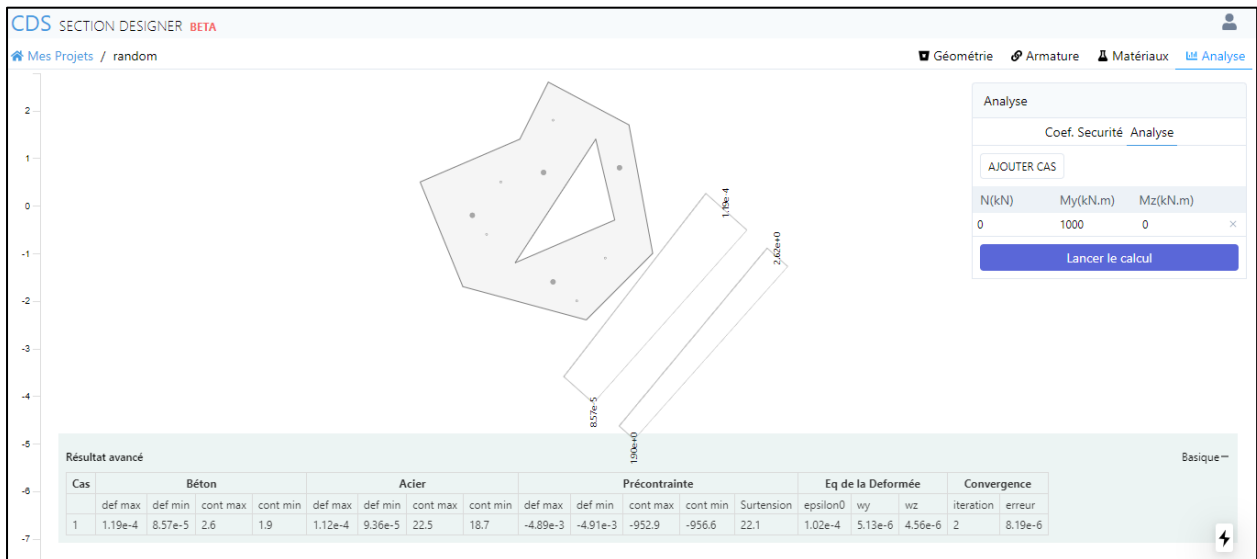
Calcul des fissures

Points de résultat

TECHINCAL NOTE – RANDOM CONCRETE SECTION



CDS-SectionDesigner



Results comparison

	CDS-SectionDesigner	Fagus	Error (%)
Deformation at COG (e^{-3})	-0.1	-0.1	0.0
Curvature about Y (e^{-3})	0.0	0.0	0.0
Curvature about Z (e^{-3})	0.0	0.0	0.0
Stress - Concrete (MPa)	-2.6	-2.6	0.0
Stress - Steel Min (MPa)	-22.5	-22.5	0.2
Stress - Steel Max (MPa)	-18.7	-18.6	0.5
Stress - PT Min (MPa)	952.9	952.8	0.0
Stress - PT Max (MPa)	956.6	956.6	0.0

ANALYSIS 2 – Prestressed Concrete

CUBUS-FAGUS

Analyse des contraintes sous effort

Sollicitations

No	AP	P	Flexion et effort normal			Effort tranchant et torsion			Remarques
			N [kN]	M _y [kNm]	M _z [kNm]	V _y [kN]	V _z [kN]	T [kNm]	
1	IELU		0	1000.0	-50000.0				-

Paramètres d'analyse "IELU" Norme: Eurocode EN

Contraintes et dilatations extrêmes

Nom	Classe	y _q [m]	z _q [m]	ε [‰]	σ _d [N/mm ²]	γ [-]
C1	C40/50	-2.2	0.5	-0.72	-13.313	1.76
C1	C40/50	2.7	-1.	0.76	0.	1.76
P5	B500B	-0.8	-0.666	-0.25	-49.743	1.15
P4	B500B	1.7	-1.1	0.48	96.944	1.15
PP3	S1500/1670	-1.1	-0.2	4.64	904.461	1.15
PP1	S1500/1670	2.	0.8	5.45	1063.66	1.15

Contraintes calculées dans la section homogène (matériau linéaire)

Nom	Pondération	y _q [m]	z _q [m]	σ _{elas} [N/mm ²]
C1	1.	-2.2	0.5	-9.167
C1	1.	2.7	-1.	3.823

État au dernier pas d'itération

Efforts intérieurs			Élongation et courbures			Rigidités		
N [kN]	M _y [kNm]	M _z [kNm]	ε _x [‰]	χ _y [km ⁻¹]	χ _z [km ⁻¹]	N/ε _x [kN]	M _y /χ _y [kNm ²]	M _z /χ _z [kNm ²]
11.9	997.7	-49983.	0.06	0.1	-0.3	198699.23	16496400.3	176701107.

Forces de précontrainte P(t=0) au début du chargement

N _p [kN]	M _{yp} [kNm]	M _{zp} [kNm]
-30615.0	1172.9	2039.3

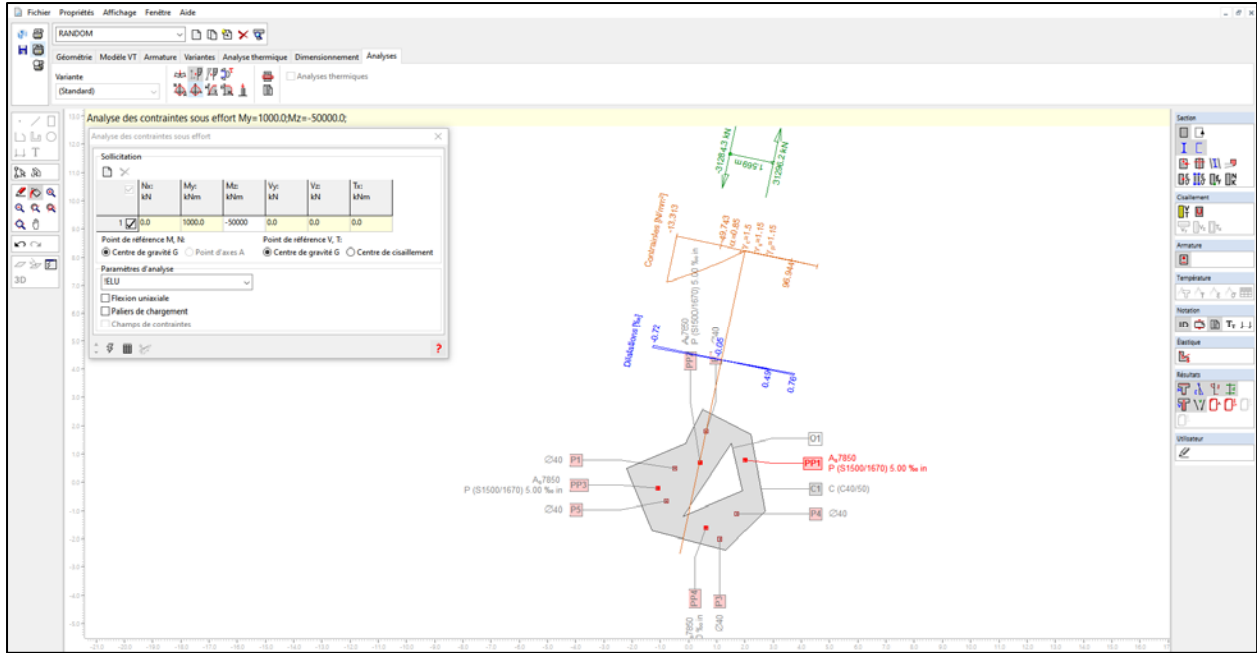
Efforts internes comme un couple de forces :

Efforts intérieurs de traction et compression			Moments			Valeurs géométriques			
Sct princip. [kN]	Armature [kN]	Somme [kN]	M	Unité [kNm]	z	Unité [m]	x, d	Unité [m]	
Compr. F _c =	-31162.5	-121.8	-31284.3	M _c =	-45149.8	z _c =	1.443	x _c =	2.473
Tract. F _s =	0.	31296.2	31296.2	M _s =	-3937.3	z _s =	0.126	d =	2.805
N =			11.9	M =	-49087.1	z =	1.569	x/d =	0.88

Calcul des fissures

Points de résultat

TECHINCAL NOTE – RANDOM CONCRETE SECTION



CDS-SectionDesigner



Results comparison

	CDS-SectionDesigner	Fagus	Error (%)
Deformation at COG (e^{-3})	0.06	0.06	0.0
Curvature about Y (e^{-3})	0.1	0.1	0.0
Curvature about Z (e^{-3})	-0.3	-0.3	0.0
Stress - Concrete (MPa)	-13.3	-13.3	0.0
Stress - Steel Min (MPa)	-50.5	-49.7	1.6
Stress - Steel Max (MPa)	96.8	96.9	-0.1
Stress - PT Min (MPa)	904.5	904.4	0.0
Stress - PT Max (MPa)	1063.5	1063.7	0.0

ANALYSIS 3 – Prestressed Concrete

CUBUS-FAGUS

Analyse des contraintes sous effort

Sollicitations

No	AP	P	Flexion et effort normal			Effort tranchant et torsion			Remarques
			N [kN]	M _y [kNm]	M _z [kNm]	V _y [kN]	V _z [kN]	T [kNm]	
1	IELU		0	50000.0	-10000.0				-

Paramètres d'analyse "IELU" Norme: Eurocode EN

Contraintes et dilatations extrêmes

Nom	Classe	y _q [m]	z _q [m]	ε [‰]	σ _d [N/mm ²]	γ [-]
C1	C40/50	0.5	2.6	-0.97	-16.608	1.76
C1	C40/50	1.3	-2.4	1.49	0.	1.76
P2	B500B	0.6	1.8	-0.58	-115.488	1.15
P3	B500B	1.1	-2.	1.27	254.473	1.15
PP2	S1500/1670	0.4	0.7	4.9	955.092	1.15
PP4	S1500/1670	0.6	-1.6	6.	1169.928	1.15

Contraintes calculées dans la section homogène (matériau linéaire)

Nom	Pondération	y _q [m]	z _q [m]	σ _{elas} [N/mm ²]
C1	1.	0.5	2.6	-9.889
C1	1.	1.3	-2.4	4.653

État au dernier pas d'itération

Efforts intérieurs			Élongation et courbures			Rigidités		
N [kN]	M _y [kNm]	M _z [kNm]	ε _x [‰]	χ _y [km ⁻¹]	χ _z [km ⁻¹]	N/ε _x [kN]	M _y /χ _y [kNm ²]	M _z /χ _z [kNm ²]
12.4	49981.7	-9995.8	0.28	0.5	-0.2	44911.94	107755559.	57315878.7

Forces de précontrainte P(t=0) au début du chargement

N _p [kN]	M _{yp} [kNm]	M _{zp} [kNm]
-30615.0	1172.9	2039.3

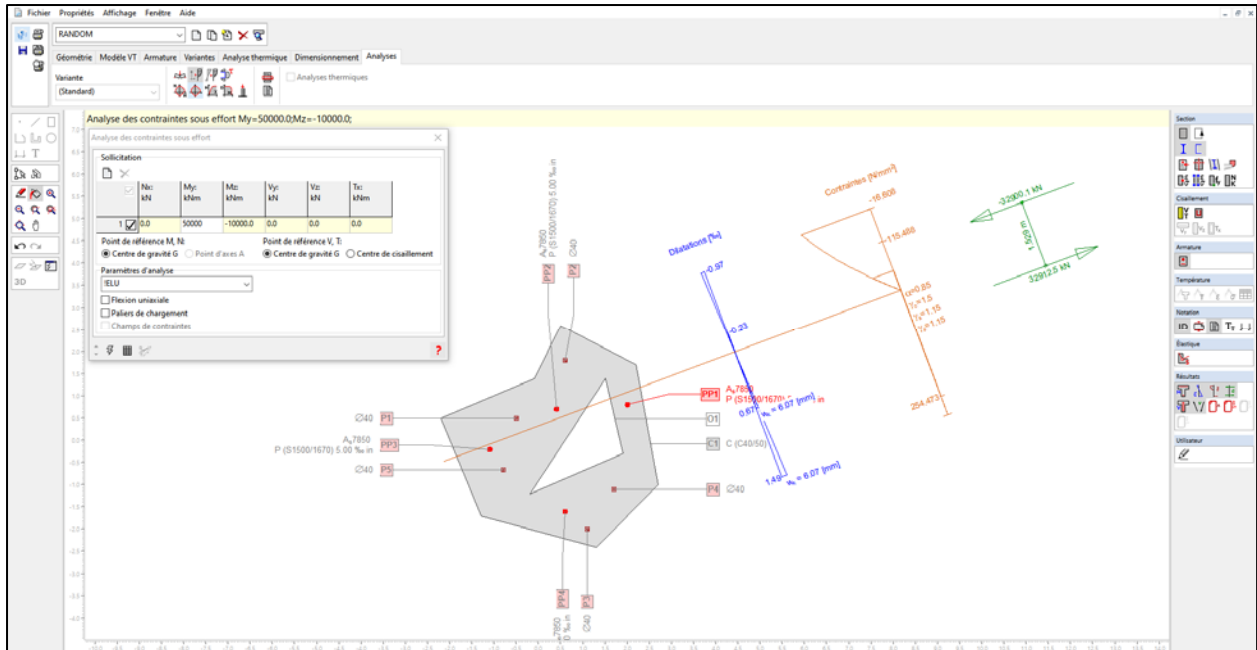
Efforts internes comme un couple de forces :

	Efforts intérieurs de traction et compression			Moments		Valeurs géométriques			
	Sct princip. [kN]	Armature [kN]	Somme [kN]	M	Unité [kNm]	z	Unité [m]	x, d	Unité [m]
Compr. F _c =	-32713.2	-186.9	-32900.1	M _c =	-47444.5	z _c =	1.442	x _c =	1.949
Tract. F _s =	0.	32912.5	32912.5	M _s =	-2857.5	z _s =	0.087	d =	2.594
N =			12.4	M =	-50302.	z =	1.529	x/d =	0.75

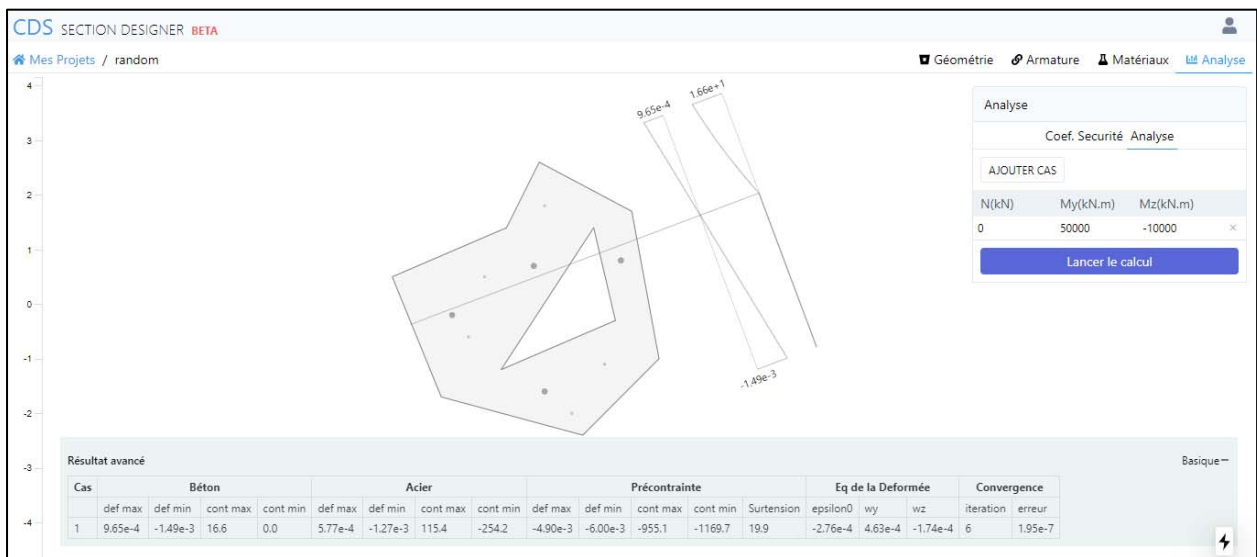
Calcul des fissures

Points de résultat

TECHINCAL NOTE – RANDOM CONCRETE SECTION



CDS-SectionDesigner



Results comparison

	CDS-SectionDesigner	Fagus	Error (%)
Deformation at COG (e^{-3})	0.28	0.28	0.0
Curvature about Y (e^{-3})	0.5	0.5	0.0
Curvature about Z (e^{-3})	-0.2	-0.2	0.0
Stress - Concrete (MPa)	-16.6	-16.6	0.0
Stress - Steel Min (MPa)	-115.4	-115.5	-0.1
Stress - Steel Max (MPa)	254.2	254.5	-0.1
Stress - PT Min (MPa)	955.1	955.0	0.0
Stress - PT Max (MPa)	1169.7	1170.0	0.0

ANALYSIS 4 – Prestressed Concrete

CUBUS-FAGUS

Analyse des contraintes sous effort

Sollicitations

No	AP	P	Flexion et effort normal			Effort tranchant et torsion			Remarques
			N [kN]	M _y [kNm]	M _z [kNm]	V _y [kN]	V _z [kN]	T [kNm]	
1	!ELU		0	-60000.0	-10000.0				-

Paramètres d'analyse "ELU" Norme: Eurocode EN

Contraintes et dilatations extrêmes

Nom	Classe	y _q [m]	z _q [m]	ε [‰]	σ _d [N/mm ²]	γ [-]
C1	C40/50	1.3	-2.4	-1.	-16.979	1.76
C1	C40/50	0.5	2.6	2.54	0.	1.76
P3	B500B	1.1	-2.	-0.73	-146.357	1.15
P2	B500B	0.6	1.8	1.97	394.612	1.15
PP4	S1500/1670	0.6	-1.6	4.5	876.974	1.15
PP1	S1500/1670	2.	0.8	6.42	1251.704	1.15

Contraintes calculées dans la section homogène (matériau linéaire)

Nom	Pondération	y _q [m]	z _q [m]	σ _{elias} [N/mm ²]
C1	1.	1.3	-2.4	-9.363
C1	1.	0.5	2.6	6.372

État au dernier pas d'itération

Efforts intérieurs			Élongation et courbures			Rigidités		
N [kN]	M _y [kNm]	M _z [kNm]	ε _x [‰]	χ _y [km ⁻¹]	χ _z [km ⁻¹]	N/ε _x [kN]	M _y /χ _y [kNm ²]	M _z /χ _z [kNm ²]
11.4	-59981.4	-9999.4	0.56	-0.7	-0.1	20468.21	82373485.7	80408140.6

Forces de précontrainte P(t=0) au début du chargement

N _p [kN]	M _{yp} [kNm]	M _{zp} [kNm]
-30615.0	1172.9	2039.3

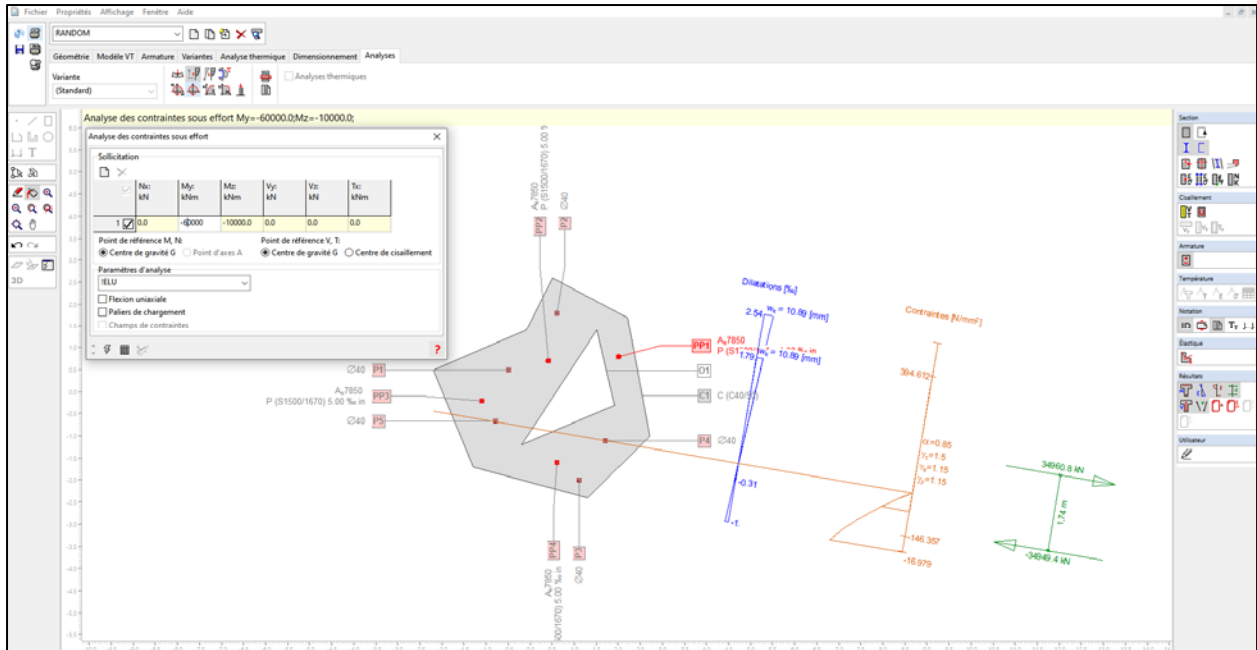
Efforts internes comme un couple de forces :

	Efforts intérieurs de traction et compression			Moments		z	Valeurs géométriques		
	Sct princip. [kN]	Armature [kN]	Somme [kN]	M	Unité [kNm]		Unité [m]	x, d	Unité [m]
Compr. F _c =	-34765.1	-184.3	-34949.4	M _c =	-53371.5	z _c =	1.527	x _c =	1.351
Tract. F _s =	0.	34960.8	34960.8	M _s =	-7437.2	z _s =	0.213	d =	2.317
N =			11.4	M =	-60808.7	z =	1.74	x/d =	0.58

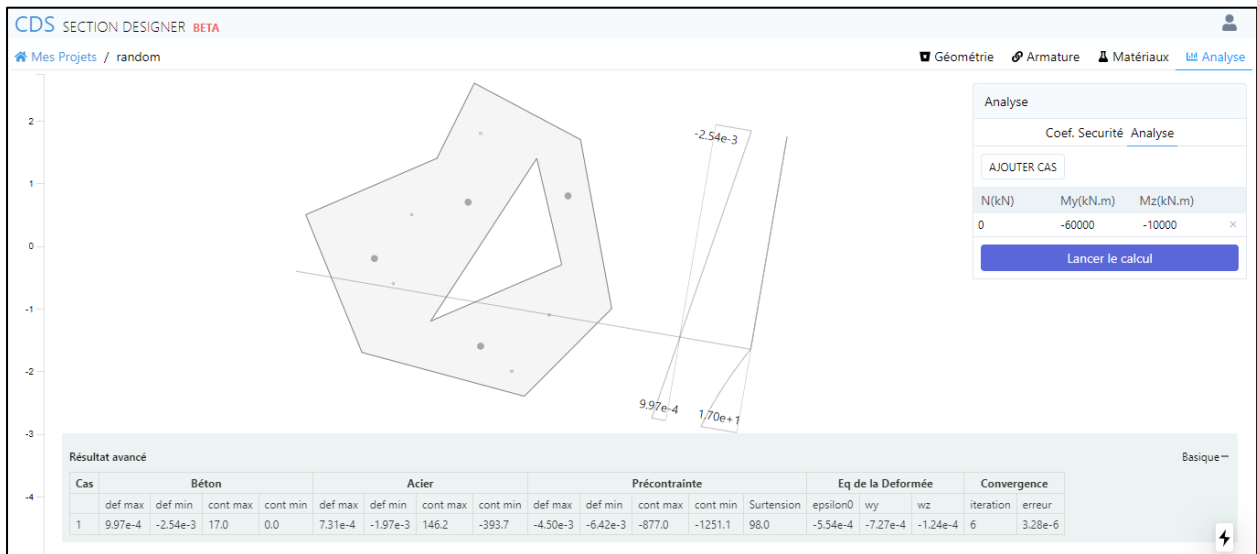
Calcul des fissures

Points de résultat

TECHINCAL NOTE – RANDOM CONCRETE SECTION



CDS-SectionDesigner



Results comparison

	CDS-SectionDesigner	Fagus	Error (%)
Deformation at COG (e^{-3})	0.55	0.56	-1.8
Curvature about Y (e^{-3})	-0.7	-0.7	0.0
Curvature about Z (e^{-3})	-0.1	-0.1	0.0
Stress - Concrete (MPa)	-17.0	-17.0	0.0
Stress - Steel Min (MPa)	-146.2	-146.3	-0.1
Stress - Steel Max (MPa)	393.7	394.6	-0.2
Stress - PT Min (MPa)	877.0	877.0	0.0
Stress - PT Max (MPa)	1251.1	1251.7	0.0

ANALYSIS 5 – Prestressed Concrete

CUBUS-FAGUS

Analyse des contraintes sous effort

Sollicitations

No	AP	P	Flexion et effort normal			Effort tranchant et torsion			Remarques
			N [kN]	M _y [kNm]	M _z [kNm]	V _y [kN]	V _z [kN]	T [kNm]	
1	!ELU		-20000.0	90000.0	30000.0				-

Paramètres d'analyse "ELU" Norme: Eurocode EN

Contraintes et dilatations extrêmes

Nom	Classe	y _q [m]	z _q [m]	ε [‰]	σ _d [N/mm ²]	γ [-]
C1	C40/50	0.5	2.6	-1.68	-22.099	1.76
C1	C40/50	1.3	-2.4	1.99	0.	1.76
P2	B500B	0.6	1.8	-1.09	-218.537	1.15
P3	B500B	1.1	-2.	1.71	342.093	1.15
PP1	S1500/1670	2.	0.8	4.5	877.07	1.15
PP4	S1500/1670	0.6	-1.6	6.47	1261.125	1.15

Contraintes calculées dans la section homogène (matériau linéaire)

Nom	Pondération	y _q [m]	z _q [m]	σ _{elas} [N/mm ²]
C1	1.	0.5	2.6	-17.184
C1	1.	1.3	-2.4	6.072

État au dernier pas d'itération

Efforts intérieurs			Élongation et courbures			Rigidités		
N [kN]	M _y [kNm]	M _z [kNm]	ε _x [‰]	χ _y [km ⁻¹]	χ _z [km ⁻¹]	N/ε _x [kN]	M _y /χ _y [kNm ²]	M _z /χ _z [kNm ²]
-19980.8	89966.5	29991.6	0.37	0.8	0.1	53979071.4	119487140.	258452897.

Forces de précontrainte P(t=0) au début du chargement

N _p [kN]	M _{yp} [kNm]	M _{zp} [kNm]
-30615.0	1172.9	2039.3

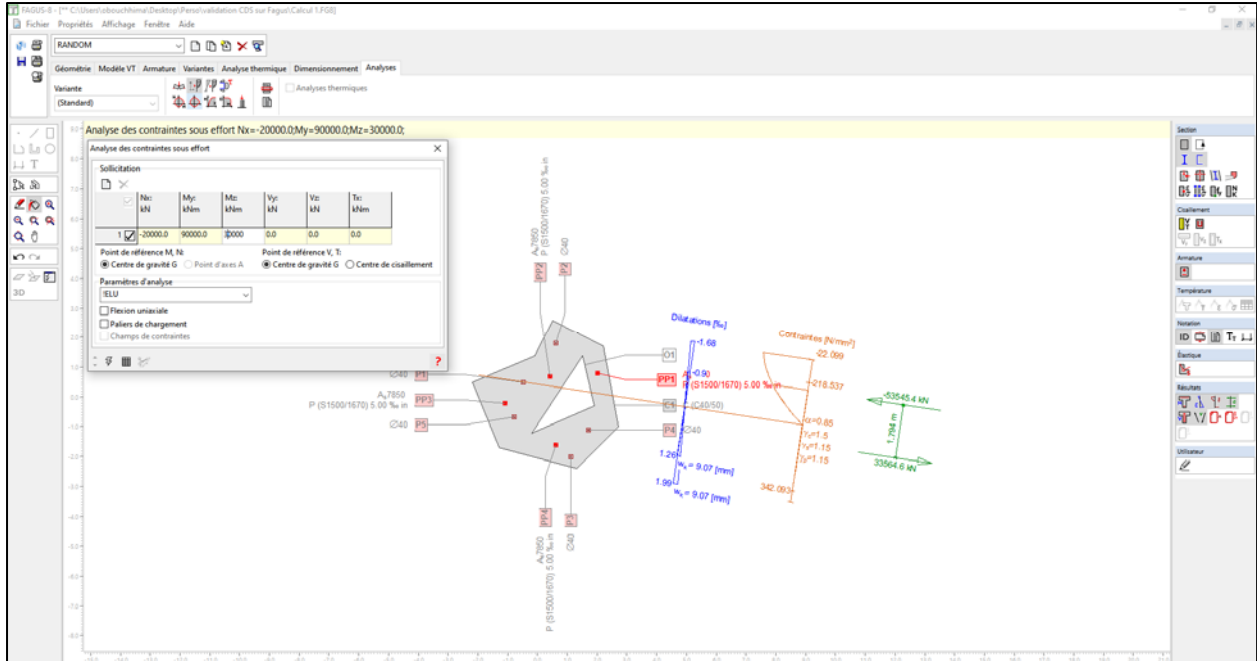
Efforts internes comme un couple de forces :

	Efforts intérieurs de traction et compression			Moments			Valeurs géométriques		
	Sct princip. [kN]	Armature [kN]	Somme [kN]	M	Unité [kNm]	z	Unité [m]	x, d	Unité [m]
Compr. F _c =	-53270.8	-274.5	-53545.4	M _c =	-89138.4	z _c =	1.665	x _c =	2.21
Tract. F _s =	0.	33564.6	33564.6	M _s =	-4347.3	z _s =	0.13	d =	2.825
N =			-19980.8	M =	-93485.7	z =	1.794	x/d =	0.78

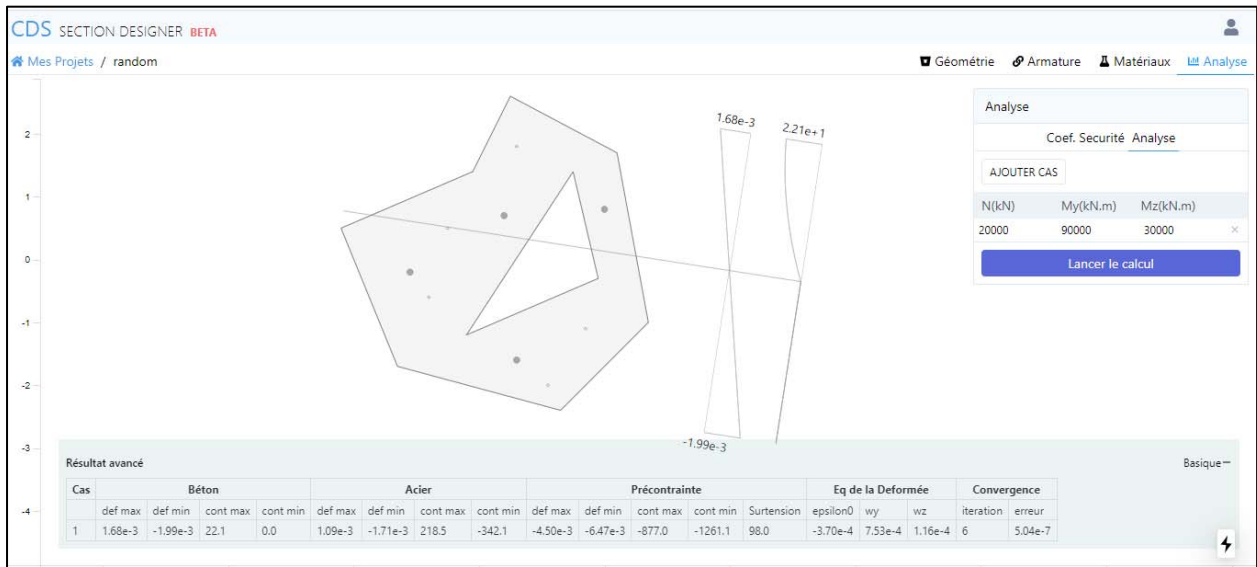
Calcul des fissures

Points de résultat

TECHINCAL NOTE – RANDOM CONCRETE SECTION



CDS-SectionDesigner



Results comparison

	CDS-SectionDesigner	Fagus	Error (%)
Deformation at COG (e^{-3})	0.37	0.37	0.0
Curvature about Y (e^{-3})	0.8	0.8	0.0
Curvature about Z (e^{-3})	0.1	0.1	0.0
Stress - Concrete (MPa)	-22.1	-22.0	0.5
Stress - Steel Min (MPa)	-218.5	-218.5	0.0
Stress - Steel Max (MPa)	342.1	342.0	0.0
Stress - PT Min (MPa)	877.0	877.0	0.0
Stress - PT Max (MPa)	1261.1	1261.1	0.0

ANALYSIS 6 – Prestressed Concrete

CUBUS-FAGUS

Analyse des contraintes sous effort

Sollicitations

No	AP	P	Flexion et effort normal			Effort tranchant et torsion			Remarques
			N [kN]	M _y [kNm]	M _z [kNm]	V _y [kN]	V _z [kN]	T [kNm]	
1	!ELU		10000.0	6000.0	6000.0				-

Paramètres d'analyse "ELU" Norme: Eurocode EN

Contraintes et dilatations extrêmes

Nom	Classe	y _q [m]	z _q [m]	ε [‰]	σ _d [N/mm ²]	γ [-]
C1	C40/50	2.2	1.7	-0.13	-2.863	1.76
C1	C40/50	-1.3	-1.7	-0.01	-0.244	1.76
P2	B500B	0.6	1.8	-0.1	-20.622	1.15
P5	B500B	-0.8	-0.666	-0.04	-7.392	1.15
PP1	S1500/1670	2.	0.8	4.89	953.141	1.15
PP3	S1500/1670	-1.1	-0.2	4.96	967.36	1.15

Contraintes calculées dans la section homogène (matériau linéaire)

Nom	Pondération	y _q [m]	z _q [m]	σ _{elas} [N/mm ²]
C1	1.	2.2	1.7	-2.949
C1	1.	-1.3	-1.7	-0.266

État au dernier pas d'itération

Efforts intérieurs			Élongation et courbures			Rigidités		
N [kN]	M _y [kNm]	M _z [kNm]	ε _x [‰]	χ _y [km ⁻¹]	χ _z [km ⁻¹]	N/ε _x [kN]	M _y /χ _y [kNm ²]	M _z /χ _z [kNm ²]
9991.3	5996.	5995.5	-0.07	0.0	0.0	146796257.	363483720.	329430772.

Forces de précontrainte P(t=0) au début du chargement

N _p [kN]	M _{yp} [kNm]	M _{zp} [kNm]
-30615.0	1172.9	2039.3

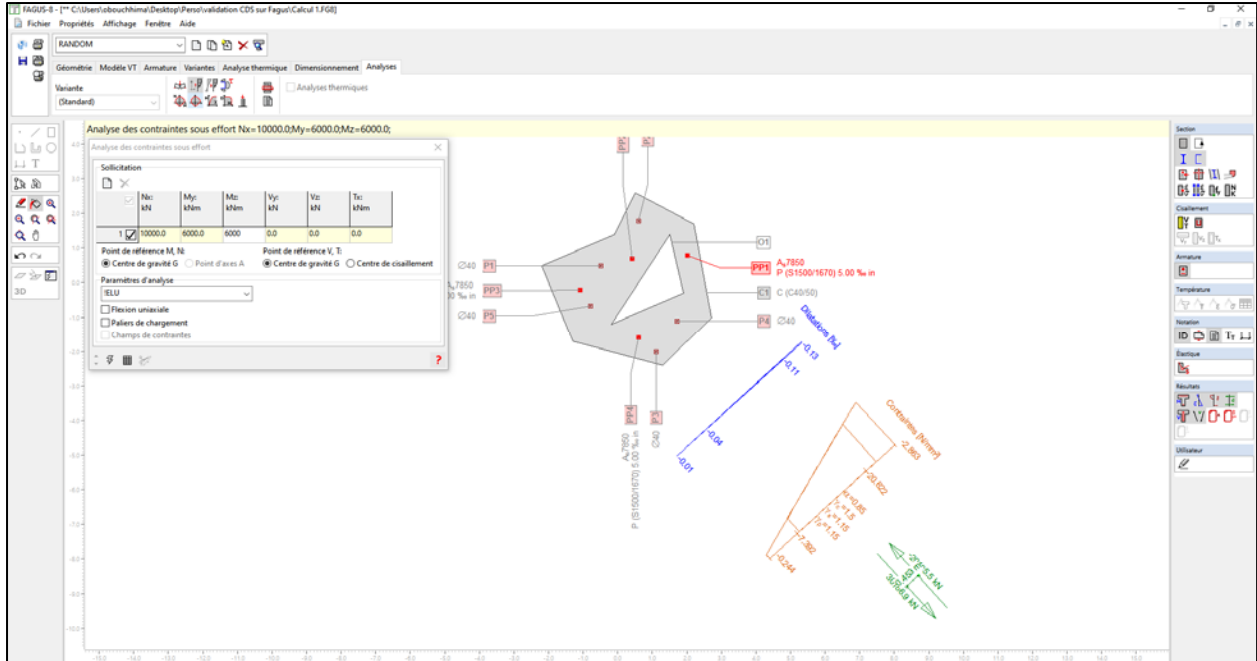
Efforts internes comme un couple de forces :

Efforts intérieurs de traction et compression			Moments		Valeurs géométriques				
Sct princip. [kN]	Armature [kN]	Somme [kN]	M	Unité [kNm]	z	Unité [m]	x, d	Unité [m]	
Compr. F _c =	-20113.4	-82.1	-20195.5	M _c =	-10525.1	z _c =	0.521	x _c =	0.
Tract. F _s =	0.	30186.9	30186.9	M _s =	2056.1	z _s =	-0.068	d =	4.877
N =			9991.3	M =	-8469.	z =	0.453	x/d =	1.

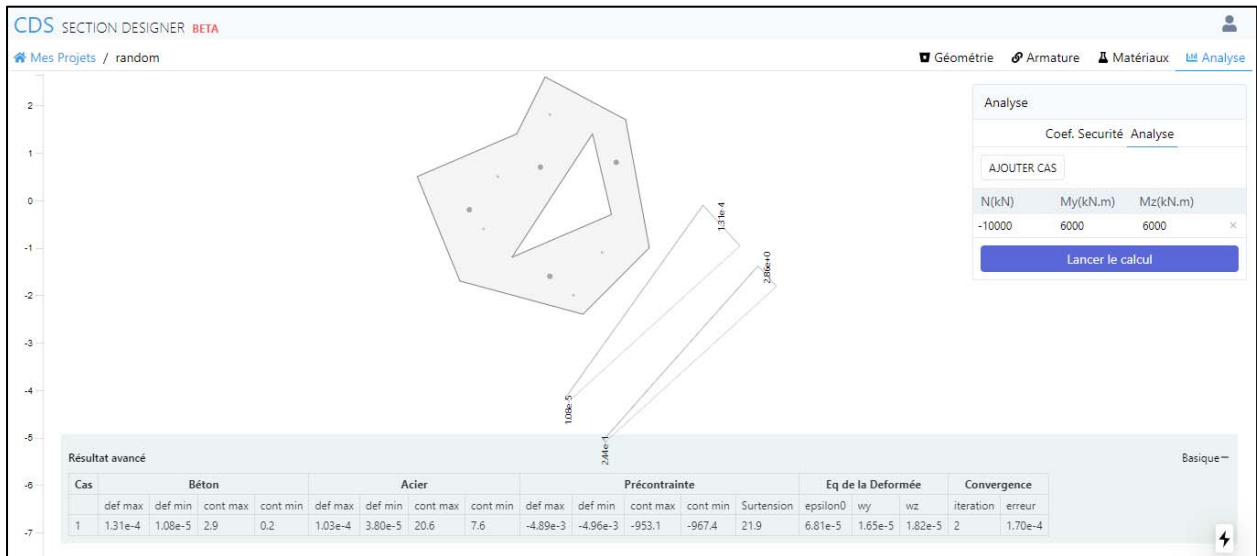
Calcul des fissures

Points de résultat

TECHINCAL NOTE – RANDOM CONCRETE SECTION



CDS-SectionDesigner



Results comparison

	CDS-SectionDesigner	Fagus	Error (%)
Deformation at COG (e^{-3})	-0.07	-0.07	0.0
Curvature about Y (e^{-3})	0.0	0.0	0.0
Curvature about Z (e^{-3})	0.0	0.0	0.0
Stress - Concrete (MPa)	-2.9	-2.9	1.3
Stress - Steel Min (MPa)	-20.6	-20.6	0.0
Stress - Steel Max (MPa)	-7.6	-7.4	2.7
Stress - PT Min (MPa)	953.1	953.1	0.0
Stress - PT Max (MPa)	967.4	967.4	0.0

ANALYSIS 7 – Prestressed Concrete

CUBUS-FAGUS

Analyse des contraintes sous effort

Sollicitations

No	AP	P	Flexion et effort normal			Effort tranchant et torsion			Remarques
			N [kN]	M _y [kNm]	M _z [kNm]	V _y [kN]	V _z [kN]	T [kNm]	
1	!ELU		10000.0	-6000.0	6000.0				-

Paramètres d'analyse "ELU" Norme: Eurocode EN

Contraintes et dilatations extrêmes

Nom	Classe	y _q [m]	z _q [m]	ε [‰]	σ _d [N/mm ²]	γ [-]
C1	C40/50	2.7	-1.	-0.13	-2.745	1.76
C1	C40/50	-2.2	0.5	-0.01	-0.188	1.76
P4	B500B	1.7	-1.1	-0.11	-21.289	1.15
P1	B500B	-0.5	0.5	-0.04	-8.41	1.15
PP4	S1500/1670	0.6	-1.6	4.91	957.24	1.15
PP3	S1500/1670	-1.1	-0.2	4.96	967.357	1.15

Contraintes calculées dans la section homogène (matériau linéaire)

Nom	Pondération	y _q [m]	z _q [m]	σ _{elas} [N/mm ²]
C1	1.	2.7	-1.	-2.821
C1	1.	-2.2	0.5	-0.214

État au dernier pas d'itération

Efforts intérieurs			Élongation et courbures			Rigidités		
N [kN]	M _y [kNm]	M _z [kNm]	ε _c [‰]	χ _y [km ⁻¹]	χ _z [km ⁻¹]	N/ε _c [kN]	M _y /χ _y [kNm ²]	M _z /χ _z [kNm ²]
9994.2	-5996.9	5997.8	-0.07	-0.0	0.0	146921659.	463238648.	302067799.

Forces de précontrainte P(t=0) au début du chargement

N _p [kN]	M _{yp} [kNm]	M _{zp} [kNm]
-30615.0	1172.9	2039.3

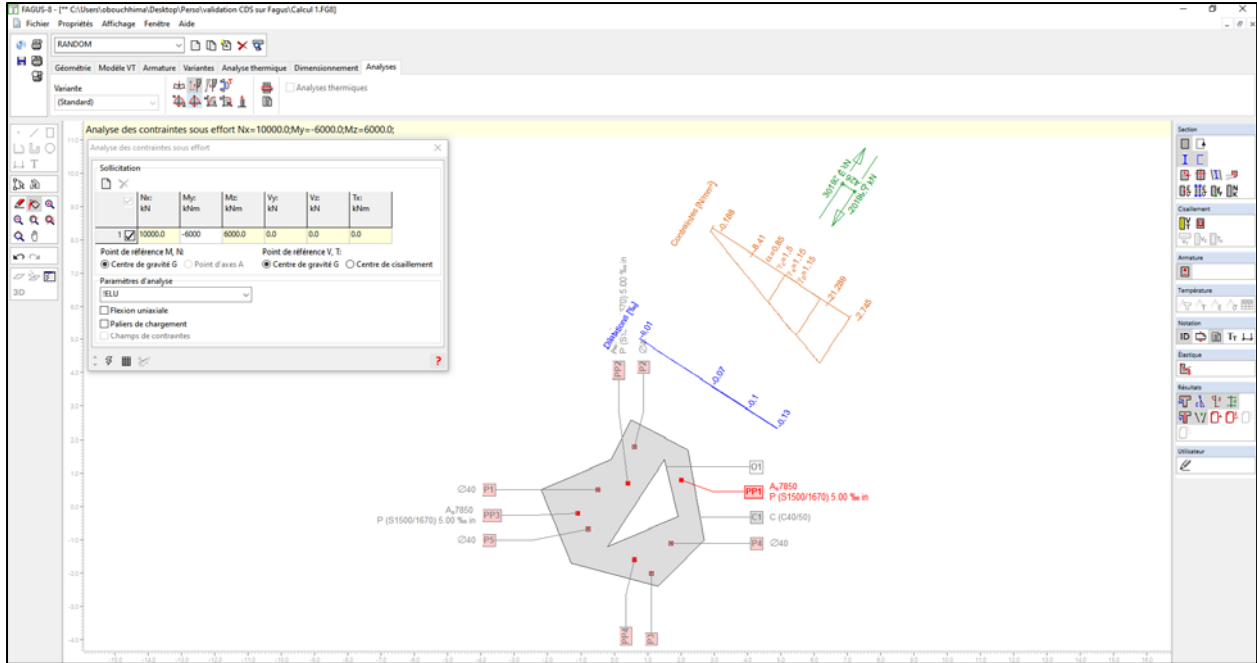
Efforts internes comme un couple de forces :

	Efforts intérieurs de traction et compression			Moments		z	Valeurs géométriques		
	Sct princip. [kN]	Armature [kN]	Somme [kN]	M	Unité [kNm]		Unité [m]	x, d	Unité [m]
Compr. F _c =	-20110.4	-88.7	-20199.1	M _c =	-9232.	z _c =	0.457	x _c =	0.
Tract. F _s =	0.	30193.4	30193.4	M _s =	932.7	z _s =	-0.031	d =	4.924
N =			9994.2	M =	-8299.3	z =	0.426	x/d =	1.

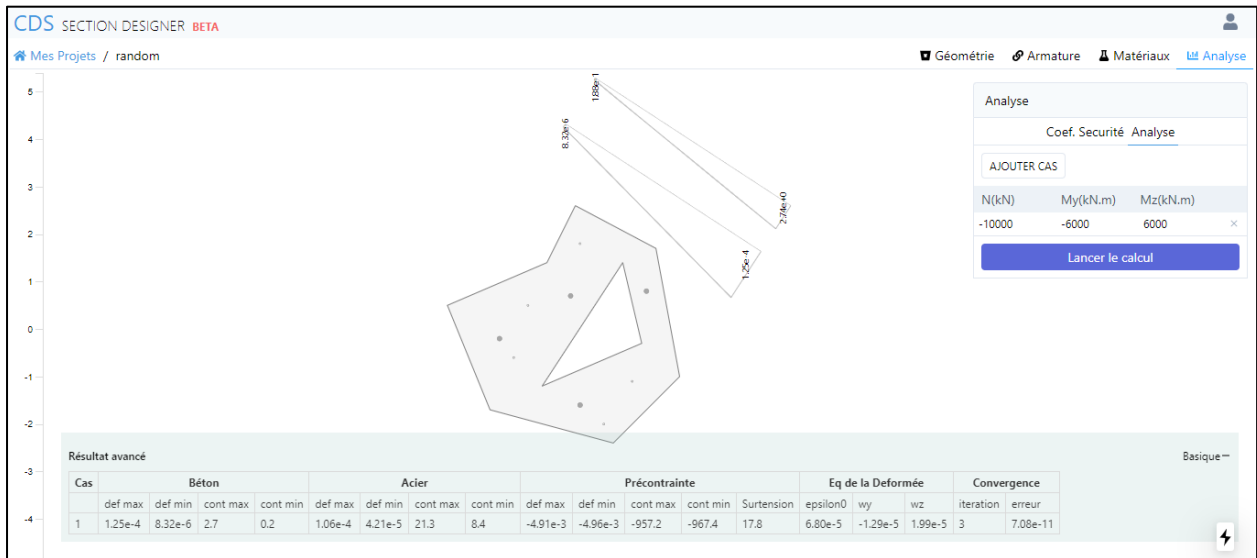
Calcul des fissures

Points de résultat

TECHINCAL NOTE – RANDOM CONCRETE SECTION



CDS-SectionDesigner



Results comparison

	CDS-SectionDesigner	Fagus	Error (%)
Deformation at COG (e^{-3})	-0.07	-0.07	0.0
Curvature about Y (e^{-3})	0.0	0.0	0.0
Curvature about Z (e^{-3})	0.0	0.0	0.0
Stress - Concrete (MPa)	-2.7	-2.7	0.0
Stress - Steel Min (MPa)	-21.3	-21.3	0.0
Stress - Steel Max (MPa)	-8.4	-8.4	0.0
Stress - PT Min (MPa)	957.2	957.2	0.0
Stress - PT Max (MPa)	967.4	967.3	0.0