RESULTS COMPARISON

CDS-SectionDesigner / Cubs-Fagus

ANALYSIS 1 – Reinforced Concrete

CUBUS-FAGUS

Analyse des contraintes sous effort

Sollicitations

No	AP	P	Flexion et effort normal N [kN]	M_y [kNm]	M_z [kNm]	Effort tranchant et torsion V_y [kN]	V_z [kN]	T [kNm]	Remarques -
1	!ELU		0	6000.0	0				

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

Contraintes et dilatations extrêmes

Nom	Classe	y_Q [m]	z_Q [m]	ε [‰]	σ_d [N/mm²]	γ [-]
C1	C40/50	4.5	2.5	-0.17	-3.721	1.76
C1	C40/50	-1.427	0.	2.28	0.	1.76
P32	B500B	4.	2.45	-0.12	-24.505	1.15
P10	B500B	1.392	0.05	2.23	434.783	1.15

Contraintes calculées dans la section homogène (matériau linéaire)

Nom	Pondération	y_Q [m]	z_Q [m]	σ_{elas} [N/mm²]
C1	1.	4.5	2.5	-1.188
C1	1.	-1.427	0.	2.505

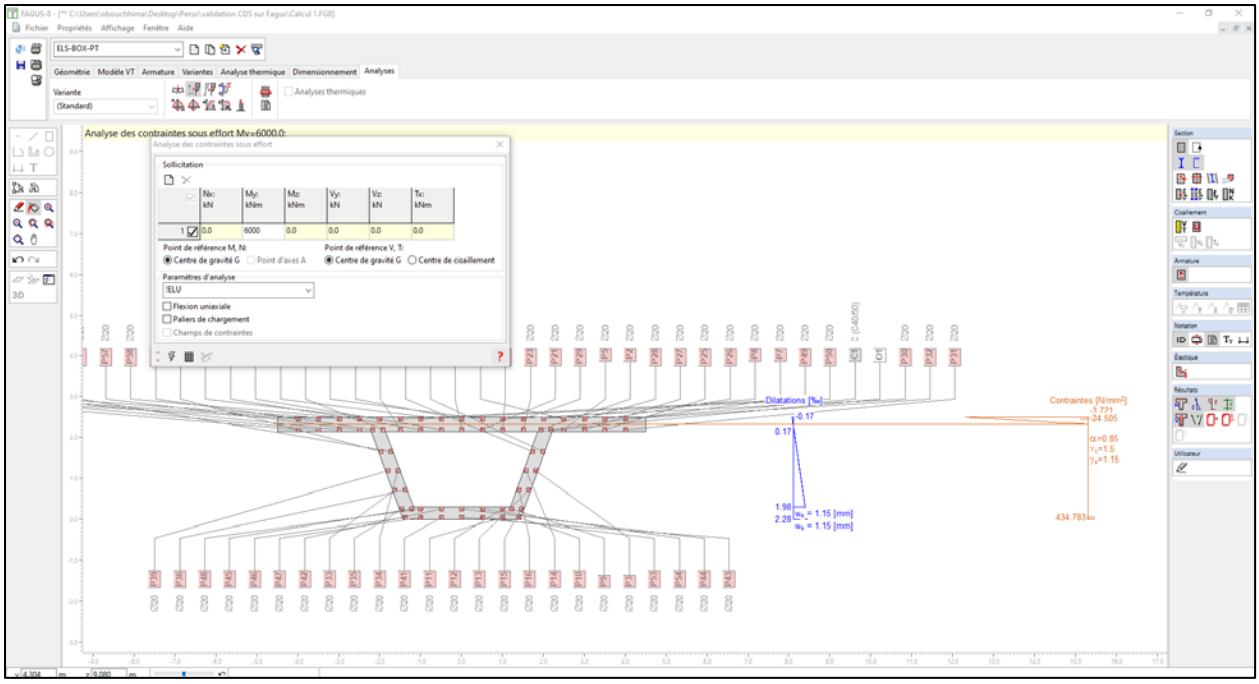
État au dernier pas d'itération

Efforts intérieurs N [kN]	M_y [kNm]	M_z [kNm]	Élongation et courbures ε_κ [‰]	χ_y [km⁻¹]	χ_z [km⁻¹]	Rigidités N/ε_κ [kN]	M_y/χ_y [kNm²]	M_z/χ_z [kNm²]
-1.5	6001.	0.	0.62	1.0	0.0	2376.42	6124208.55	178188959.

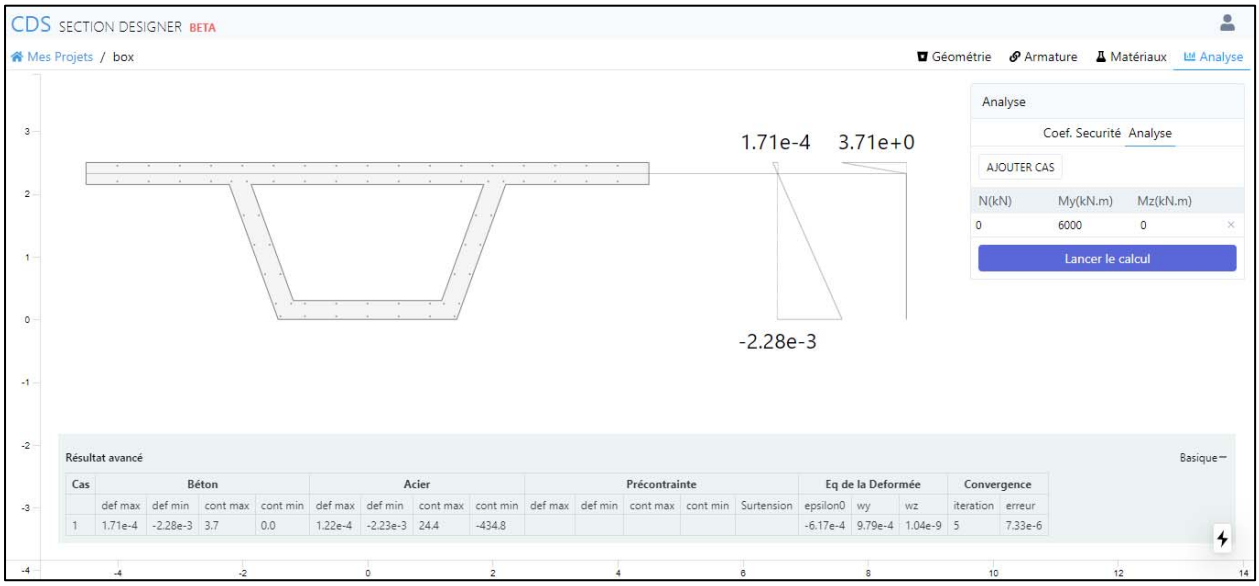
Efforts internes comme un couple de forces :

Efforts intérieurs de traction et compression	Sct princip. [kN]	Armature [kN]	Somme [kN]	Moments M	Unité [kNm]	Valeurs géométriques z	Unité [m]	x, d	Unité [m]
Compr. F_c=	-2961.1	-130.9	-3092.	M_c=	-2306.2	z_c=	0.746	x_c =	0.175
Tract. F_s=	0.	3090.5	3090.5	M_s =	-3694.8	z_s =	1.196	d =	2.
N =			-1.5	M =	-6001.	z =	1.941	x/d =	0.09

Calcul des fissures



CDS-SectionDesigner



Cas	Béton				Acier				Précontrainte					Eq de la Deformée			Convergence	
	def max	def min	cont max	cont min	def max	def min	cont max	cont min	def max	def min	cont max	cont min	Surtension	epsilon0	wy	wz	iteration	erreur
1	1.71e-4	-2.28e-3	3.7	0.0	1.22e-4	-2.23e-3	24.4	-434.8						-6.17e-4	9.79e-4	1.04e-9	5	7.33e-6

Results comparison

	CDS-SectionDesigner	Fagus	Error (%)
Deformation at COG (e^{-3})	0.62	0.62	0.0
Curvature about Y (e^{-3})	1	1	0.0
Curvature about Z (e^{-3})	0	0	0.0
Stress - Concrete (MPa)	-3.7	-3.7	0.0
Stress Rebar – Steel Min (MPa)	-24.4	-24.5	-0.4
Stress Rebar – Steel Max (MPa)	-434.8	-434.8	0.0

ANALYSIS 2 – Reinforced Concrete

CUBUS-FAGUS

Analyse des contraintes sous effort

Sollicitations

No	AP	P	Flexion et effort normal N [kN]	M_y [kNm]	M_z [kNm]	Effort tranchant et torsion V_y [kN]	V_z [kN]	T [kNm]	Remarques -
1	!ELU		0	6000.0	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/mm²]	γ [-]
C1	C40/50	4.5	2.5	-1.15	-18.592	1.76
C1	C40/50	-4.5	2.15	4.53	0.	1.76
P32	B500B	4.	2.45	-0.82	-164.78	1.15
P51	B500B	-4.	2.2	4.2	434.783	1.15

Contraintes calculées dans la section homogène (matériau linéaire)

Nom	Pondération	y_q [m]	z_q [m]	σ_{elas} [N/mm²]
C1	1.	4.5	2.5	-6.439
C1	1.	-4.5	2.15	4.579

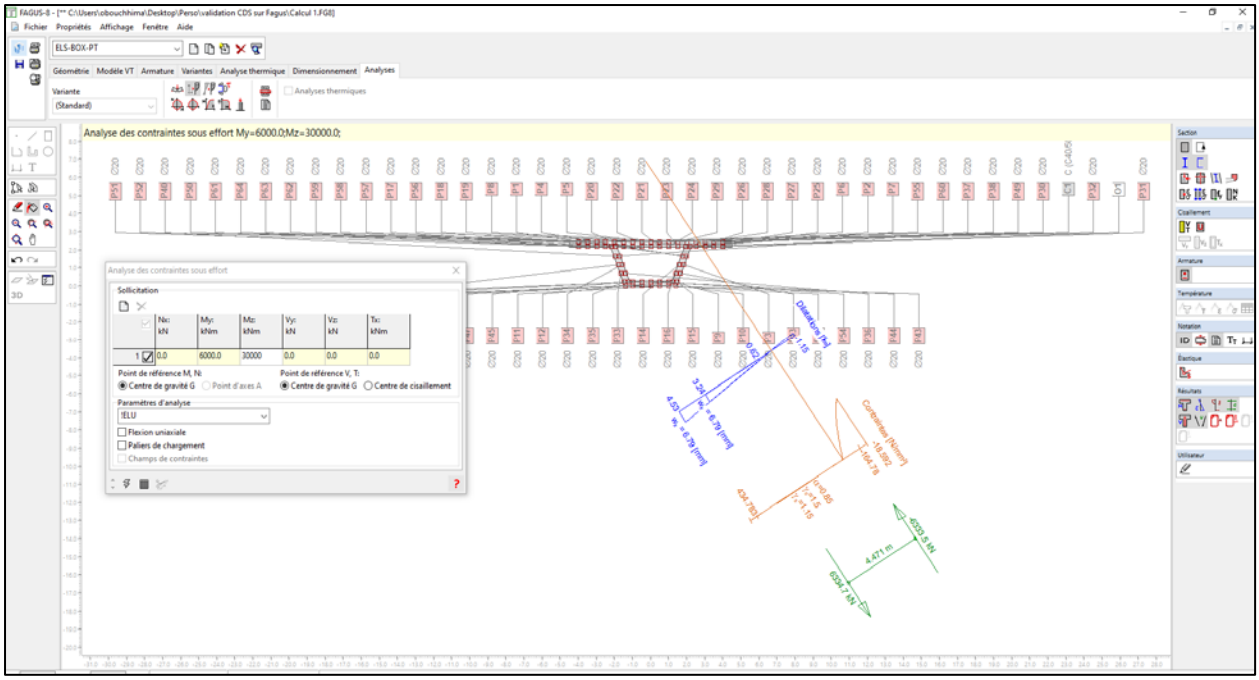
État au dernier pas d'itération

Efforts intérieurs N [kN]	M_y [kNm]	M_z [kNm]	Élongation et courbures ε_x [‰]	χ_y [km⁻¹]	χ_z [km⁻¹]	Rigidités N/ε_x [kN]	M_y/χ_y [kNm²]	M_z/χ_z [kNm²]
1.2	5999.2	29994.5	1.95	0.4	0.6	641.76	14722850.9	48725033.9

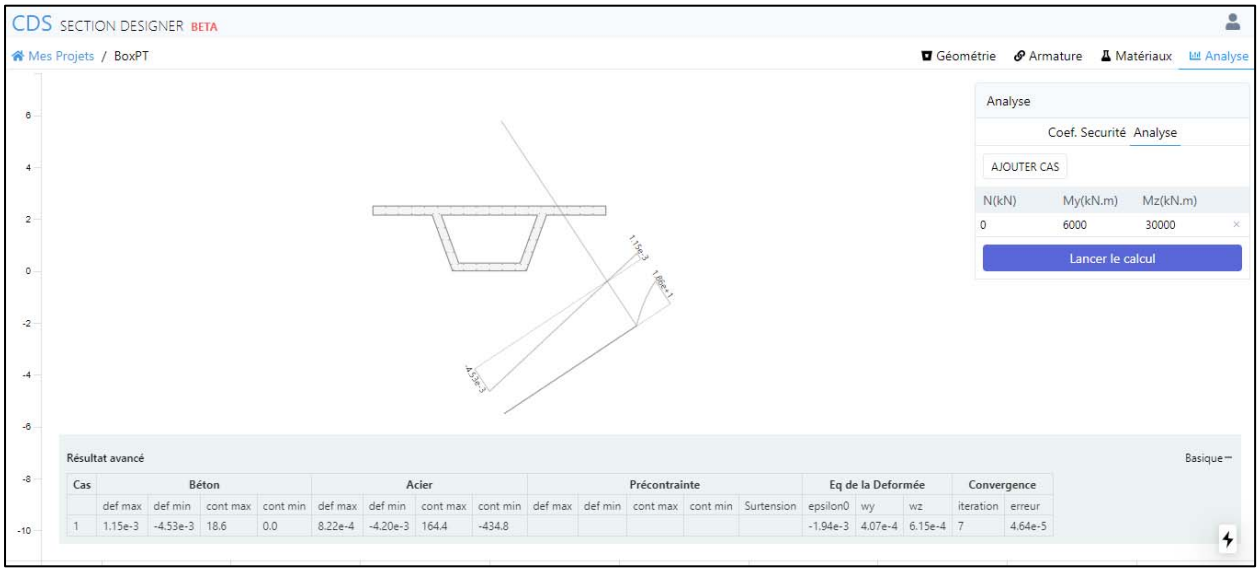
Efforts internes comme un couple de forces :

Efforts intérieurs de traction et compression	Sct princip. [kN]	Armature [kN]	Somme [kN]	Moments M	Unité [kNm]	Valeurs géométriques z	Unité [m]	x, d	Unité [m]
Compr. F_c=	-6158.2	-175.3	-6333.5	M_c=	-22698.2	z_c=	3.584	x_c =	1.561
Tract. F_s=	0.	6334.7	6334.7	M_s =	-5622.8	z_s =	0.888	d =	5.084
N =			1.2	M =	-28321.	z =	4.471	x/d =	0.31

Calcul des fissures



CDS-SectionDesigner



Results comparison

	CDS-SectionDesigner	Fagus	Error (%)
Deformation at COG (e^{-3})	1.94	1.95	-0.5
Curvature about Y (e^{-3})	0.4	0.4	0.0
Curvature about Z (e^{-3})	0.6	0.6	0.0
Stress - Concrete (MPa)	-18.6	-18.6	0.0
Stress Rebar – Steel Min (MPa)	-164.4	-164.8	-0.2
Stress Rebar – Steel Max (MPa)	434.8	434.8	0.0

ANALYSIS 3 – Reinforced Concrete

CUBUS-FAGUS

Analyse des contraintes sous effort

Sollicitations

No	AP	P	Flexion et effort normal N [kN]	M_y [kNm]	M_z [kNm]	Effort tranchant et torsion V_y [kN]	V_z [kN]	T [kNm]	Remarques -
1	!ELU		-20000.0	6000.0	-50000.0				

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

Contraintes et dilatations extrêmes

Nom	Classe	y_q [m]	z_q [m]	ε [‰]	σ_d [N/mm²]	γ [-]
C1	C40/50	-4.5	2.5	-0.82	-14.806	1.76
C1	C40/50	4.5	2.15	0.61	0.	1.76
P52	B500B	-4.	2.45	-0.74	-148.25	1.15
P31	B500B	4.	2.2	0.53	105.058	1.15

Contraintes calculées dans la section homogène (matériau linéaire)

Nom	Pondération	y_q [m]	z_q [m]	σ_{elas} [N/mm²]
C1	1.	-4.5	2.5	-13.688
C1	1.	4.5	2.15	4.331

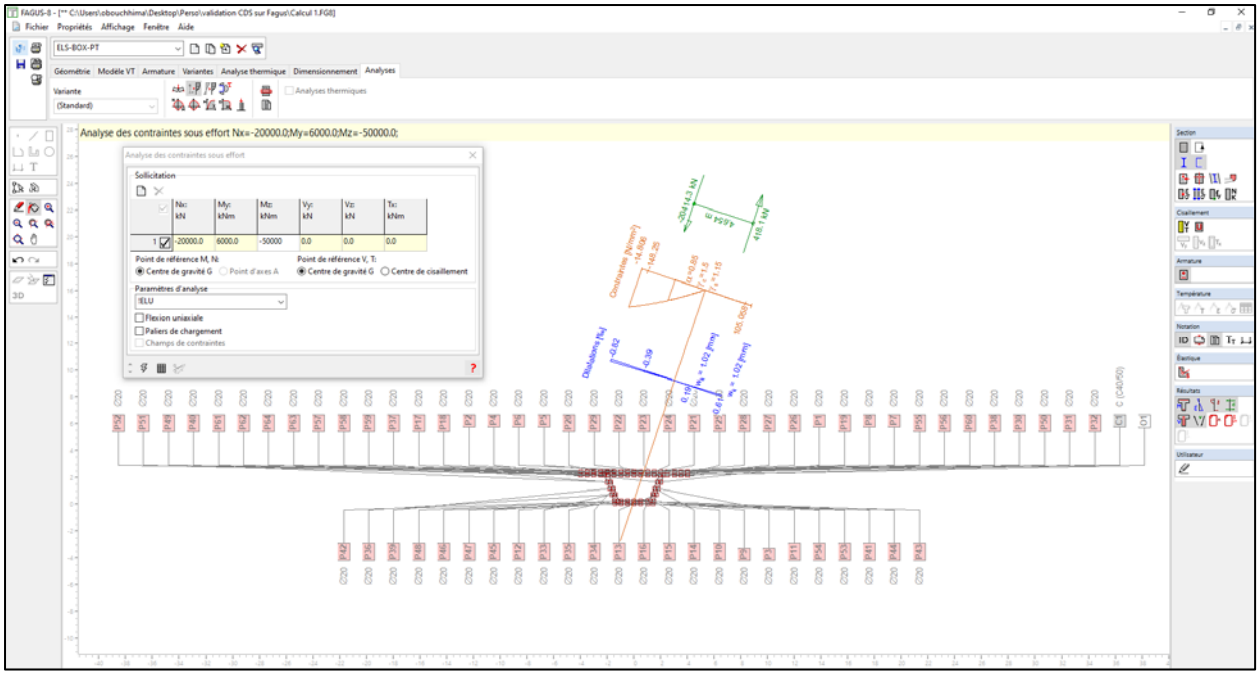
État au dernier pas d'itération

Efforts intérieurs N [kN]	M_y [kNm]	M_z [kNm]	Élongation et courbures ε_x [‰]	χ_y [km⁻¹]	χ_z [km⁻¹]	Rigidités N/ε_x [kN]	M_y/χ_y [kNm²]	M_z/χ_z [kNm²]
-19996.2	5999.	-49987.2	-0.07	0.1	-0.2	267092835.	114011092.	319053654.

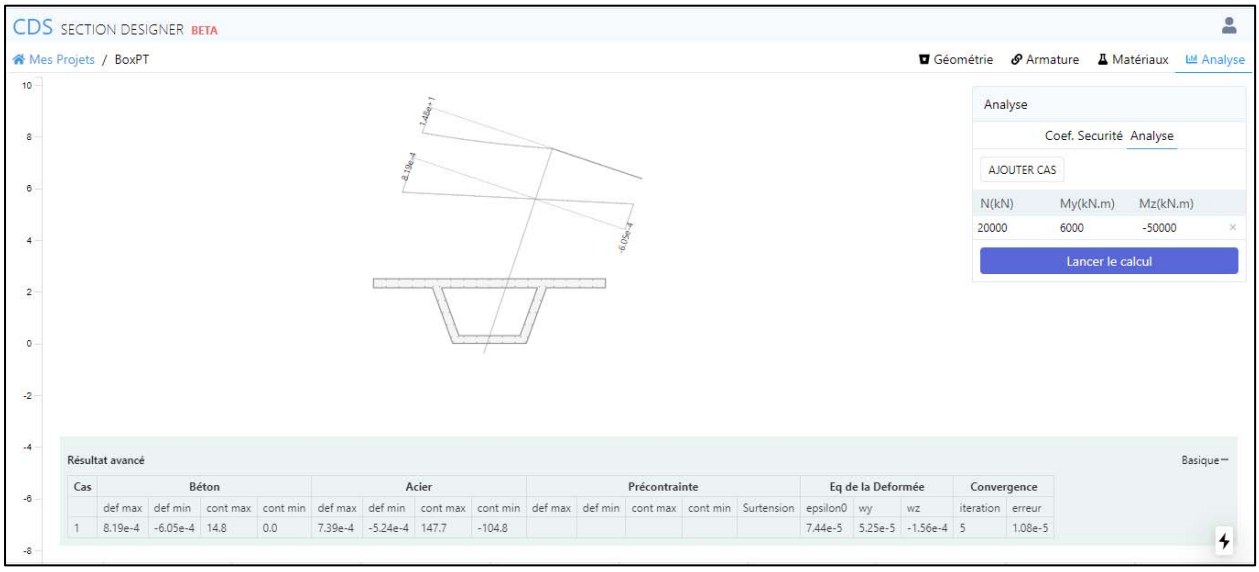
Efforts internes comme un couple de forces :

Efforts intérieurs de traction et compression	Sct princip. [kN]	Armature [kN]	Somme [kN]	Moments M	Unité [kNm]	Valeurs géométriques z	Unité [m]	x, d	Unité [m]
Compr. F_c=	-19722.1	-692.2	-20414.3	M_c=	-48339.5	z_c=	2.368	x_c =	4.975
Tract. F_s=	0.	418.1	418.1	M_s =	-955.7	z_s =	2.286	d =	6.808
N =			-19996.2	M =	-49295.2	z =	4.654	x/d =	0.73

Calcul des fissures



CDS-SectionDesigner



Results comparison

	CDS-SectionDesigner	Fagus	Error (%)
Deformation at COG (e^{-3})	-0.07	-0.07	0.0
Curvature about Y (e^{-3})	0.1	0.1	0.0
Curvature about Z (e^{-3})	-0.2	-0.2	0.0
Stress - Concrete (MPa)	-14.8	-14.8	0.0
Stress Rebar – Steel Min (MPa)	-147.7	-148.3	-0.4
Stress Rebar – Steel Max (MPa)	104.8	105.0	-0.2

ANALYSIS 4 – Reinforced Concrete

CUBUS-FAGUS

Analyse des contraintes sous effort

Sollicitations

No	AP	P	Flexion et effort normal N [kN]	M_y [kNm]	M_z [kNm]	Effort tranchant et torsion V_y [kN]	V_z [kN]	T [kNm]	Remarques -
1	!ELU		-30000.0	0	60000.0				

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

Contraintes et dilatations extrêmes

Nom	Classe	y_q [m]	z_q [m]	ε [‰]	σ_d [N/mm²]	γ [-]
C1	C40/50	4.5	2.15	-0.93	-16.196	1.76
C1	C40/50	-4.5	2.5	0.55	0.	1.76
P31	B500B	4.	2.2	-0.85	-169.615	1.15
P52	B500B	-4.	2.45	0.47	93.055	1.15

Contraintes calculées dans la section homogène (matériau linéaire)

Nom	Pondération	y_q [m]	z_q [m]	σ_{elas} [N/mm²]
C1	1.	4.5	2.15	-16.125
C1	1.	-4.5	2.5	4.877

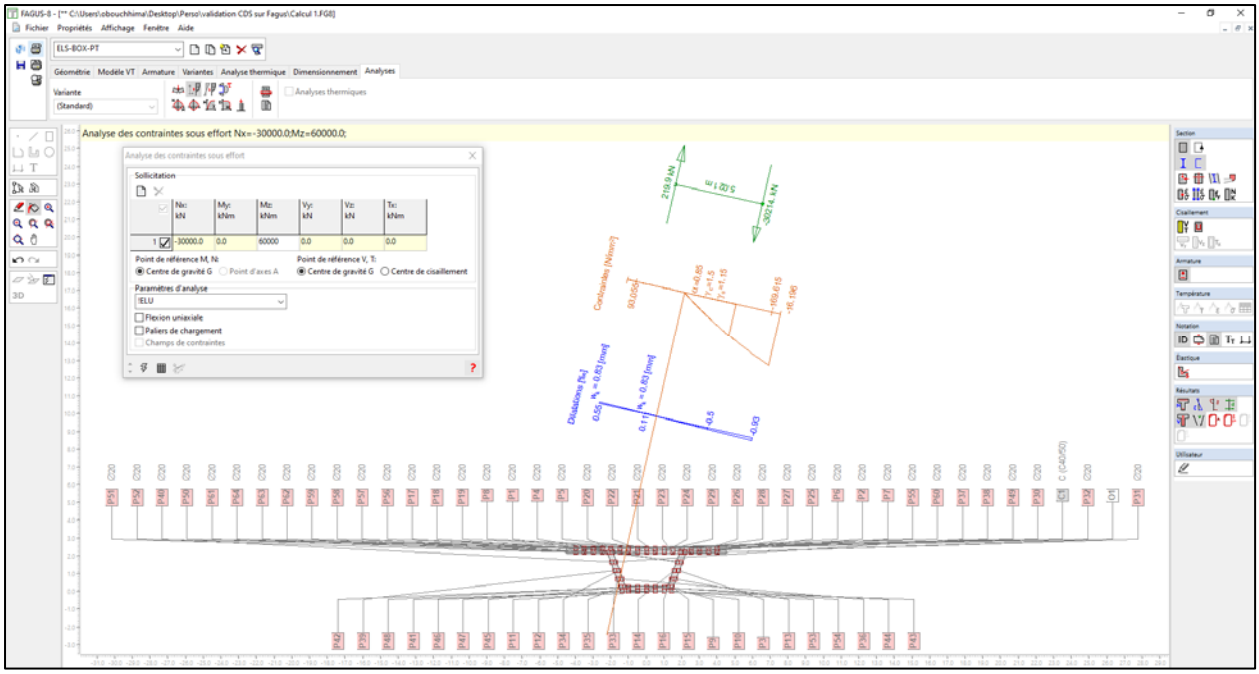
État au dernier pas d'itération

Efforts intérieurs N [kN]	M_y [kNm]	M_z [kNm]	Élongation et courbures ε_κ [‰]	χ_y [km⁻¹]	χ_z [km⁻¹]	Rigidités N/ε_κ [kN]	M_y/χ_y [kNm²]	M_z/χ_z [kNm²]
-29994.1	-0.2	59983.9	-0.21	-0.0	0.2	139735786.	4419.39	367966709.

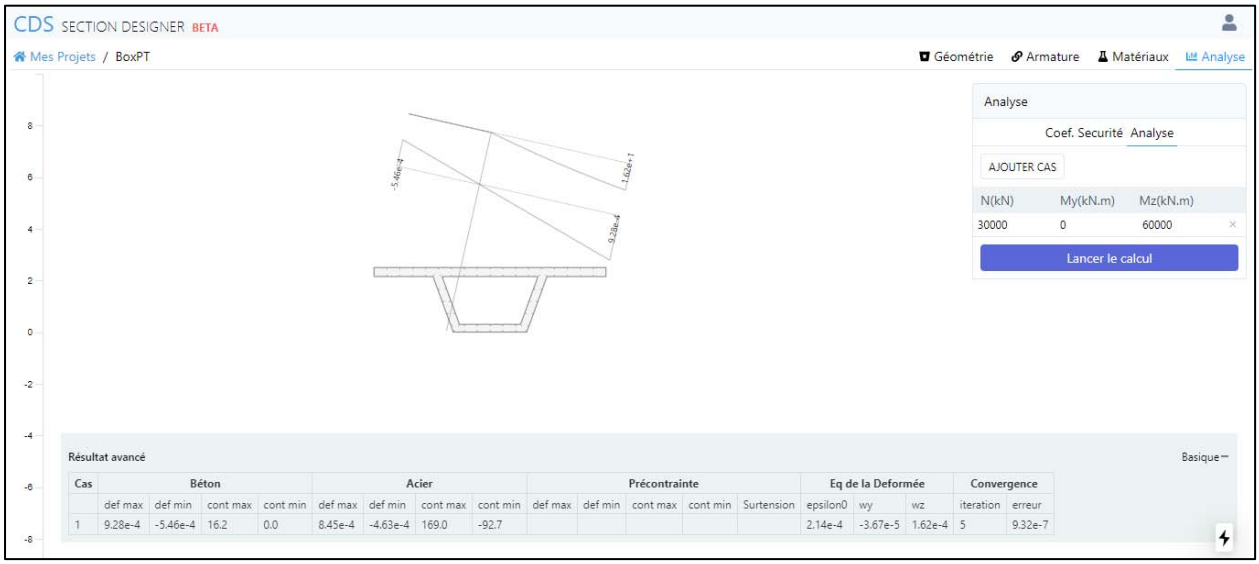
Efforts internes comme un couple de forces :

Efforts intérieurs de traction et compression	Sct princip. [kN]	Armature [kN]	Somme [kN]	Moments M	Unité [kNm]	Valeurs géométriques z	Unité [m]	x, d	Unité [m]
Compr. F_c=	-29112.	-1102.1	-30214.	M_c=	-57817.6	z_c=	1.914	x_c =	5.573
Tract. F_s=	0.	219.9	219.9	M_s =	-683.5	z_s =	3.108	d =	7.396
N =			-29994.1	M =	-58501.1	z =	5.021	x/d =	0.75

Calcul des fissures



CDS-SectionDesigner



Results comparison

	CDS-SectionDesigner	Fagus	Error (%)
Deformation at COG (e^{-3})	-0.21	-0.21	0.0
Curvature about Y (e^{-3})	0	0	0.0
Curvature about Z (e^{-3})	0.2	0.2	0.0
Stress - Concrete (MPa)	-16.2	-16.2	0.0
Stress Rebar – Steel Min (MPa)	-169.0	-169.6	-0.4
Stress Rebar – Steel Max (MPa)	92.7	93.0	-0.3