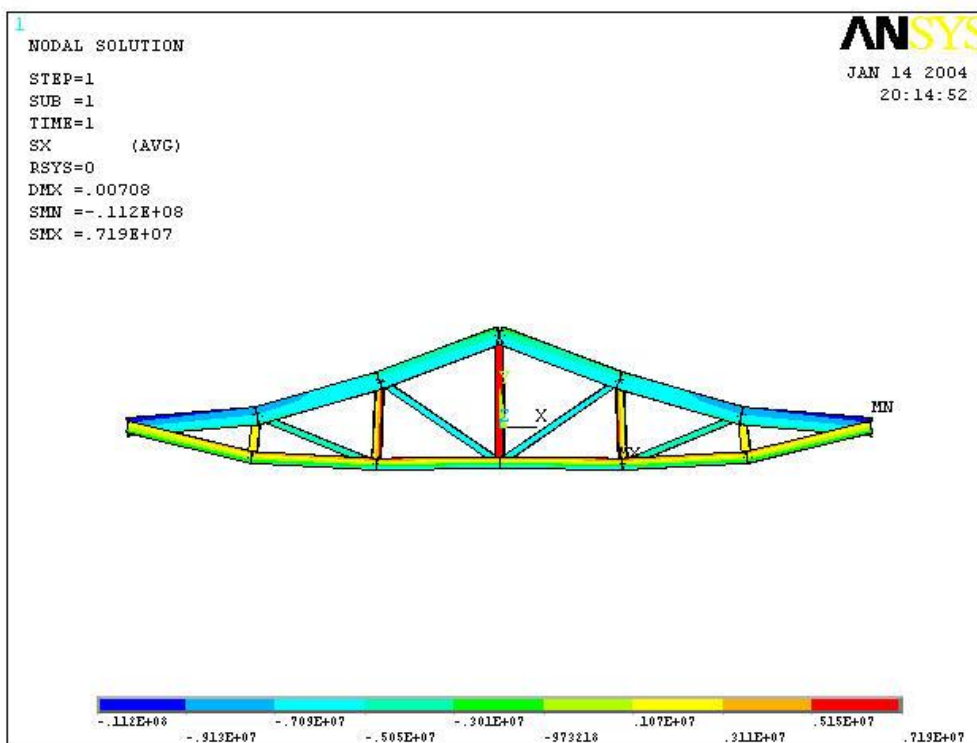
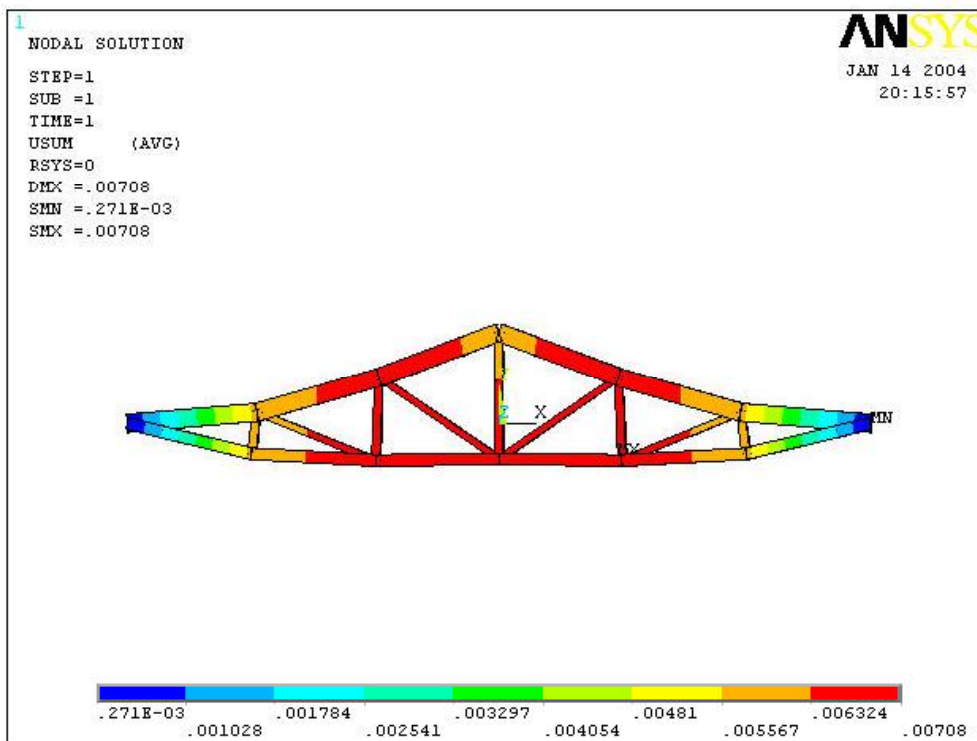


ANSYS galīgo elementu optimizācija:



Robežvērtības (State Variables) Optimālās vērtības (Design Variables)

SMAXI (SV)	0.65493E+07	H	(DV)	0.93949E-01
SMAJ (SV)	-0.10117E+08	H1	(DV)	0.14433
SMINI (SV)	-0.17945E+07	H2	(DV)	0.53333E-01
SMINJ (SV)	-0.62961E+06	H3	(DV)	0.66111E-01

VTOT (OBJ) 0.14478 86 kg

Eksperimenta plāns:

Izmantojot D-optimālais plānus izplānoju eksperimentu ar mainīgo robežām:

$$0.05 < X1 < 0.15$$

$$0.1 < X2 < 0.3$$

$$0.03 < X3 < 0.15$$

$$0.03 < X4 < 0.15$$

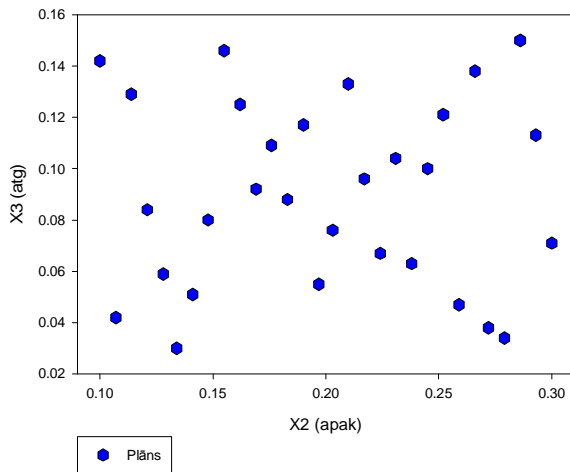
Apakšējie kopnes elementi

Augšējie kopnes elementi

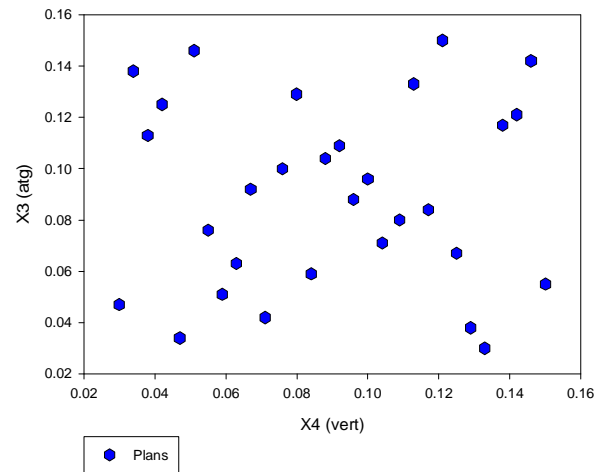
Slīpo atgāžņu kopnes elementi

Vertikālo atgāžņu kopnes elementi

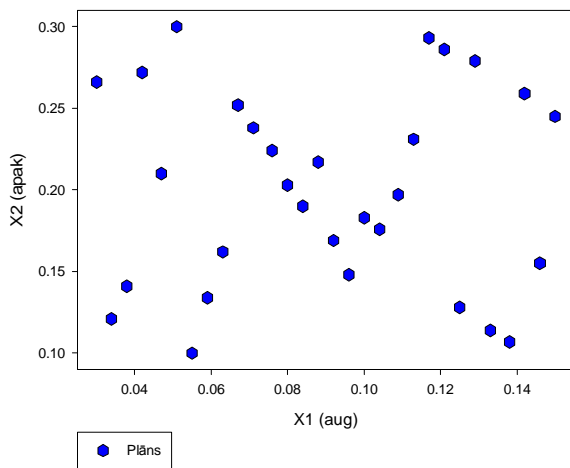
2D X2 vs X3



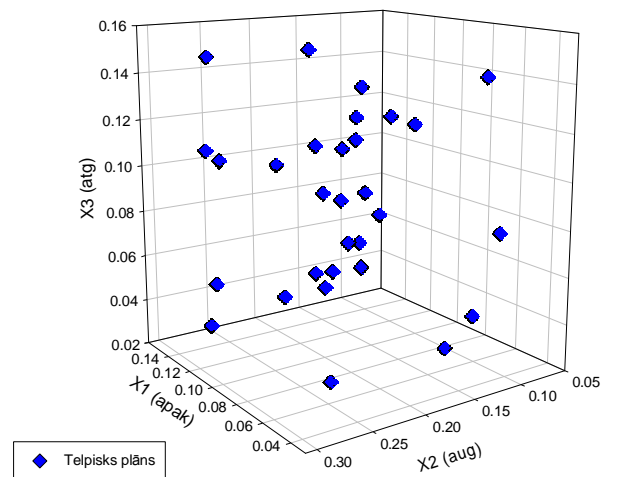
2D X3 vs X4



2D X1 vs X2

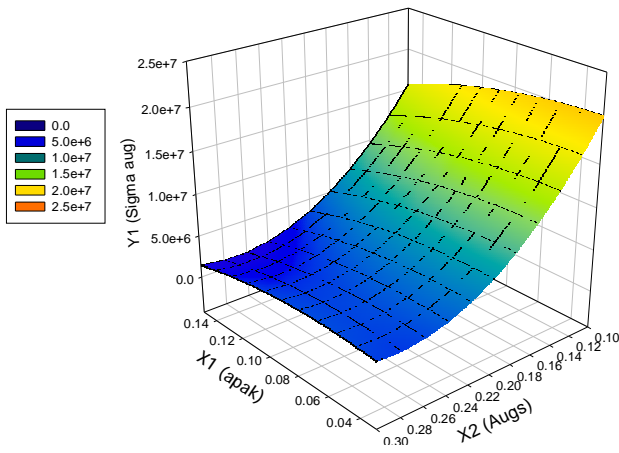


3D X1 vs X2 vs X3

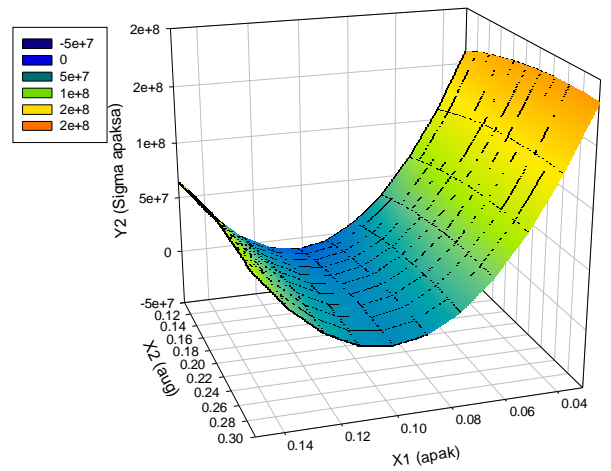


Funkciju ietekmes grafiki:

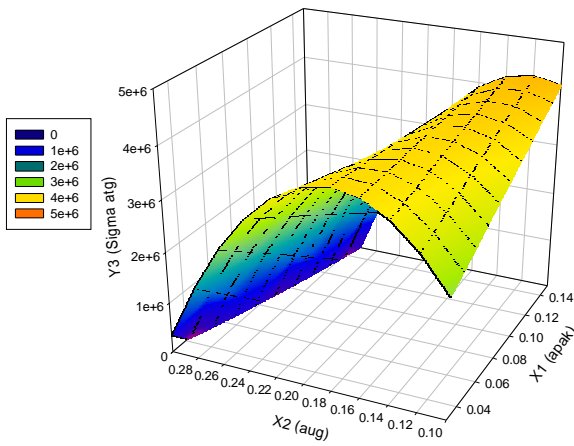
3D Y1 vs X1 vs X2



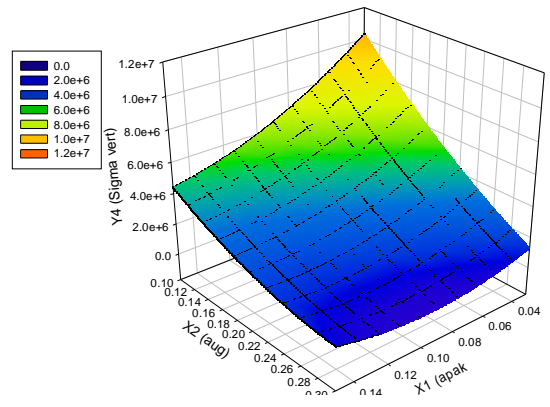
3D Y2 vs X1 vs X2



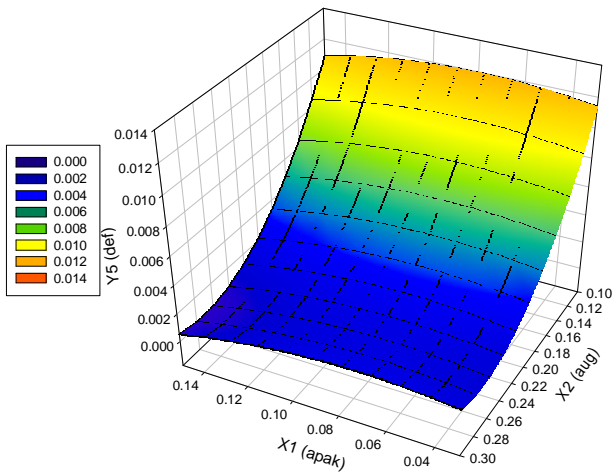
3D Y3 vs X1 vs X2



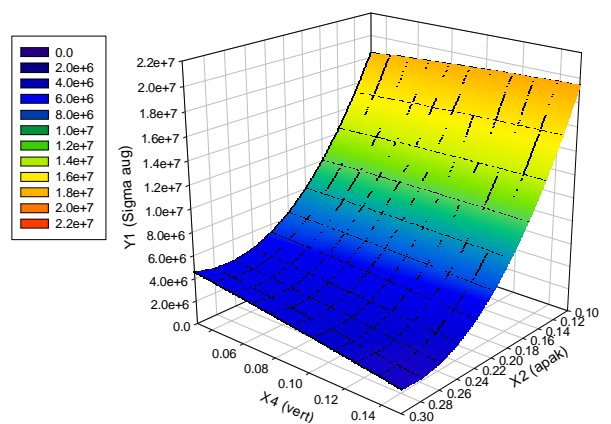
3D Y4 vs X1 vs X2



3D Y5 vs X1 vs X2



3D Graph 1



Aproksimācijas kļūdas:

Approximation of Response Surface: 30 x 4.prj

Experiment No. Total=30

Aprox Order: Third, Second, First-linear

Buttons: Calculate Point, View Coefficients, Save Result, OK, Aproximate, View Graphs, Clear Table, Cancel, Help

Functions Yi:	Izliece	Max augsej	Max apaks	Max vert	Max skers
Sigma	0.000266	499271.340521	3103111.499075	514287.830985	309186.286137
Sigma%	5.344743	5.483254	10.925808	9.214013	7.883538
Sigma0	0.000410	767585.864792	5067359.858465	790672.400876	475346.777523
Sigma0%	8.217074	8.430021	17.841769	14.165737	12.120247
MaxError	-0.000461	852814.627592	7315030.053124	-1042334.778271	711676.151220
Bad Point No.	25	10	3	7	29
Max Rel Error	25.54%	17.53%	95.00%	33.40%	43.93%
BadRelPointNo.	30	29	3	25	29
No.ofActualExp	26	26	24	26	26

Filter Experiment for All Functions: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

Input No to Filter Experiment for Each Function Separately: Automatic Elimination View Elimination Graphs

No.ofFilteredExp:	4	4	6	4	4
1)	2	30	25	2	23
2)	28	2	11	30	28
3)	11	11	2	11	2
4)	5	5	8	13	5
5)			21		
6)			9		
7)					
8)					
9)					
10)					
11)					
12)					
13)					
14)					
15)					
16)					

Lieko punkti skaits mazlietiņ pārsniedz rekomendēto, bet nepārsniedz 6 tādejādi nodrošinot aproksimācijas precizitāti 10% robežās. Lielākā aproksimācijas kļūda novērojama apakšējā kopnes elementā, uz kuru pielikta izklidēta slodze. Lai samazinātu aproksimācijas kļūdu nepieciešams ir izvēlēties ierobežotāku aprēķina apgabalu kā piemēram palielināt minimālo aprēķina robežu parametram X1 no 0.05 uz 0.1 m.

Optimālā svara aprēķins ar EDaOpt:

Optimization: 30 x 4.prj

Criterion: $1897.365 \times X_2 \times X_2 + 3600 \times X_1 \times X_1 + 2400 \times X_3 \times X_3 + 2707.128 \times X_4 \times X_4$ = 82.424001 Optimize Iterations: 1000000

Indices No	Min	Type	Max	Criterion	82.423006	82.422703	82.424001	???				82.422703
1) X1:	0.05	0	0.15	1) X1=	0.06534789	0.06534584	0.06535010	???				0.06534584
2) X2:	0.1	0	0.3	2) X2=	0.16649832	0.16649753	0.16649937	???				0.16649753
3) X3:	0.03	0	0.15	3) X3=	0.06483180	0.06483532	0.06482994	???				0.06483532
4) X4:	0.03	0	0.15	4) X4=	0.04015022	0.04015049	0.04014963	???				0.04015049
5) Y1: Izliece	0	2	0.015	5) Y1=	0.0068	0.0068	0.0068	???				0.0068
6) Y2: Max augsej	0	2	1000000	6) Y2=	9999755.50	9999740.10	9999699.50	???				9999740.10
7) Y3: Max apaks	0	2	1000000	7) Y3=	9993493.20	9999098.80	9987319.70	???				9999098.80
8) Y4: Max vert	0	2	1400000	8) Y4=	13999691.0	13999659.0	13999847.0	???				13999659.0
9) Y5: Max skers	0	2	1000000	9) Y5=	9999904.50	9999668.60	9999925.60	???				9999668.60

0 Functional Constraints:

Add Constraint Criterion for Xmin Clear Results Table
Delete Constraint Criterion for Xmax
View Additional Dig Hints
 Off
 On
ε = 1.0 % Criterion Sections

Optimālais svars: **82.4 kg**

Robežfunkcijas Y2; Y3; Y4; Y5 visas iziet uz aprēķina robežām, tātad visi parametri tiek iesaistīti aprēķinā.

Optimālie kopnes elementu augstumi:

0.0653	Apakšējie kopnes elementi
0.1664	Augšējie kopnes elementi
0.0648	Slīpo atgāžņu kopnes elementi
0.0415	Vertikālo atgāžņu kopnes elementi