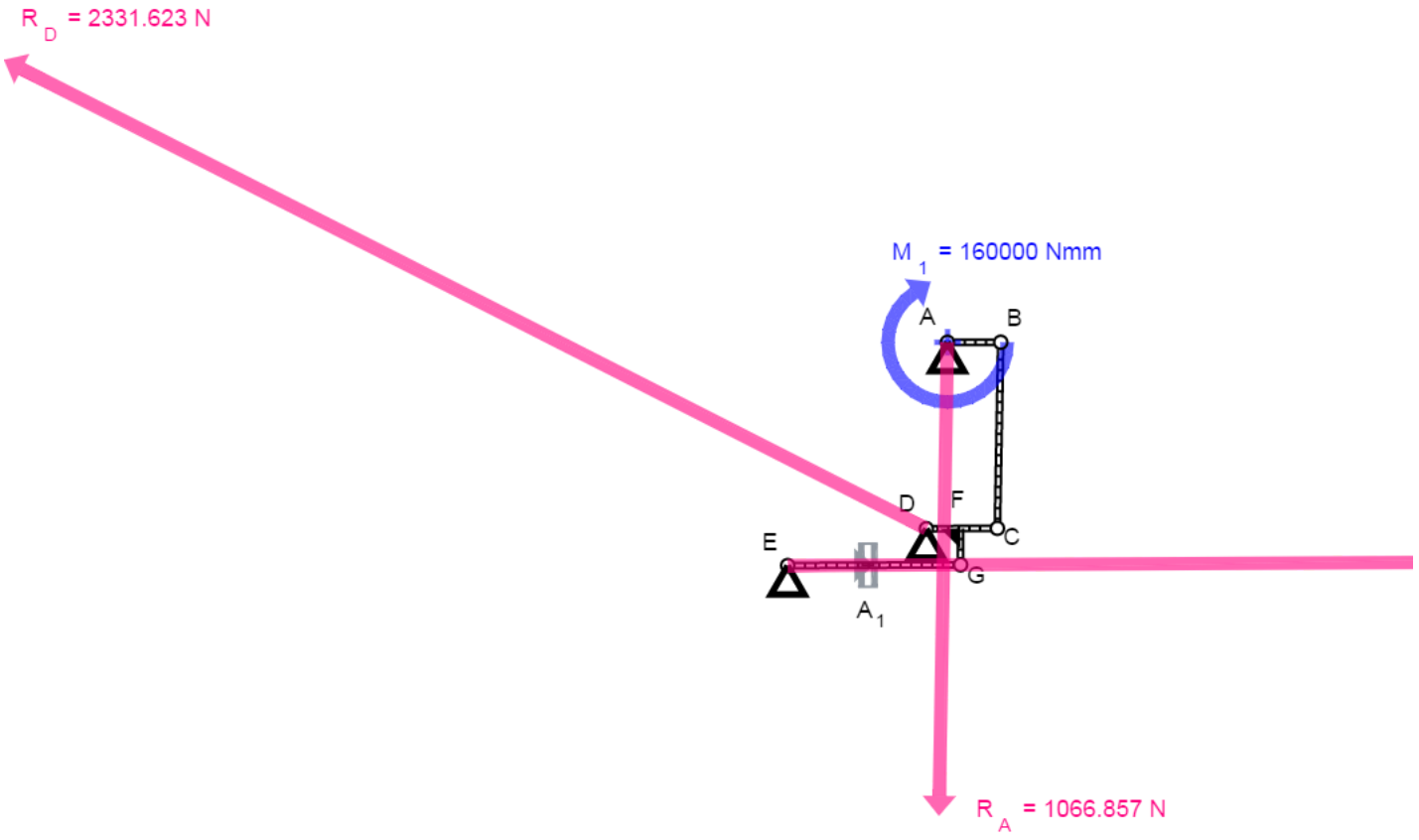
AUTODESK® FORCEEFFECT™



Inputs:

Elements

Element	Length	Weight
A-B	150.000 mm	
B-C	523.887 mm	
C-D	200.000 mm	
E-G	487.106 mm	
F-G	101.838 mm	

Moments

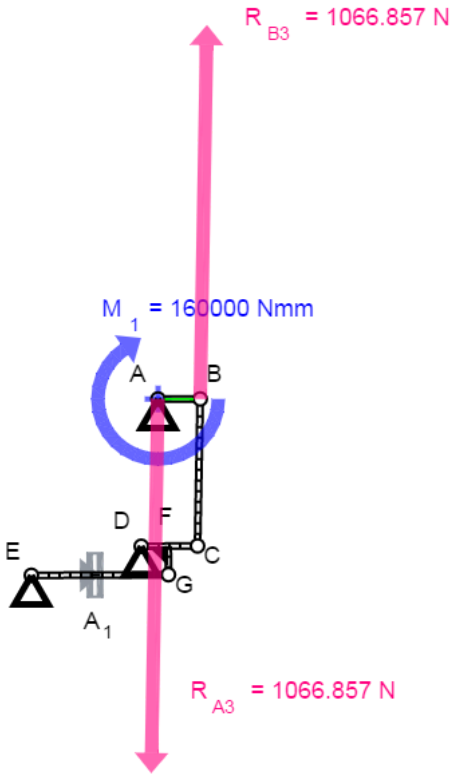
Moment	Direction	Size
M_1	↷	160000.000 Nmm

Results:

Reaction Forces

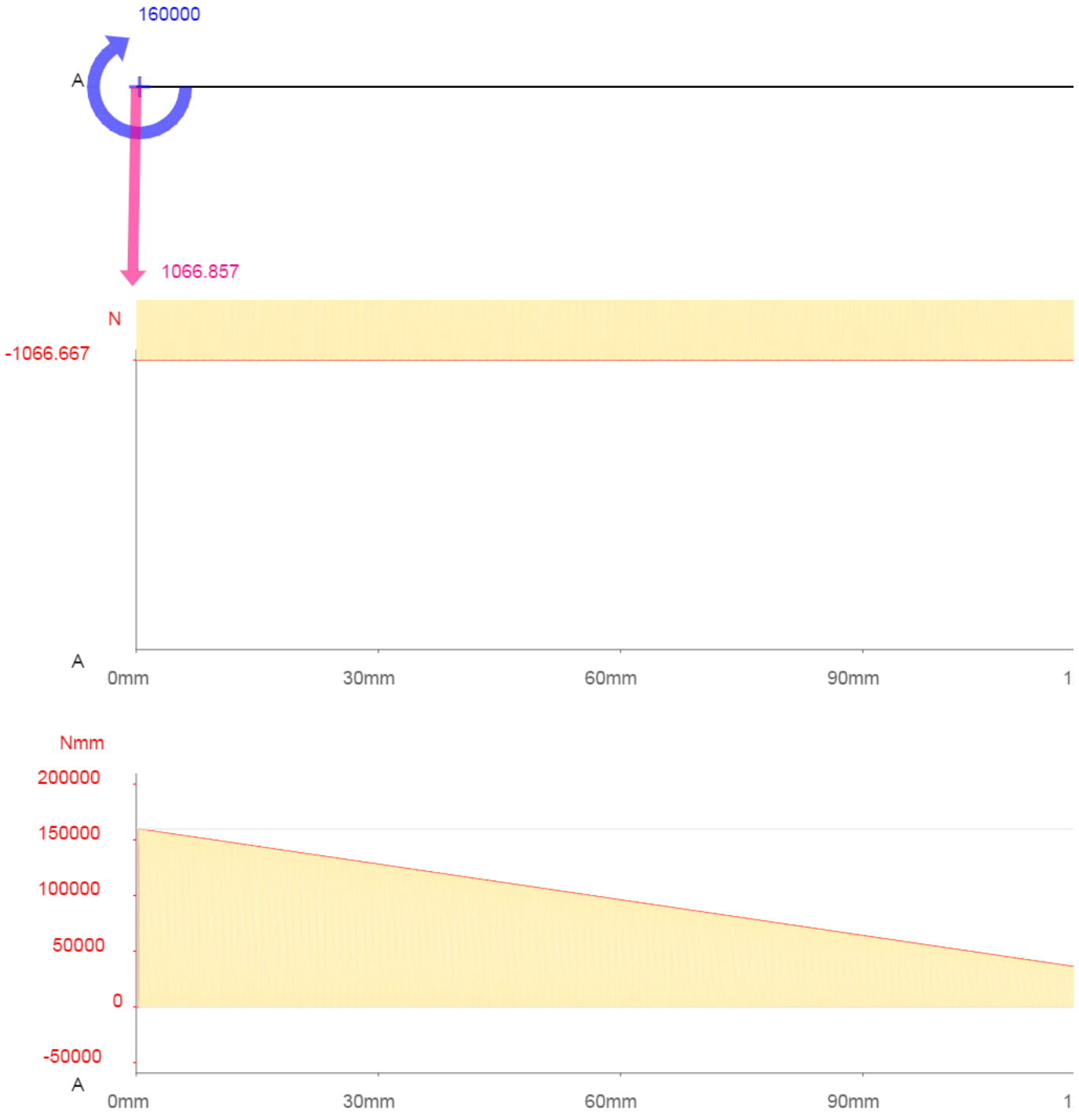
Force	Direction	Size	Angle
R_A	↑	1066.857 N	269.0°
R_D	↑	2331.623 N	153.1°
R_E	↑	2097.875 N	0.3°

Element A-B

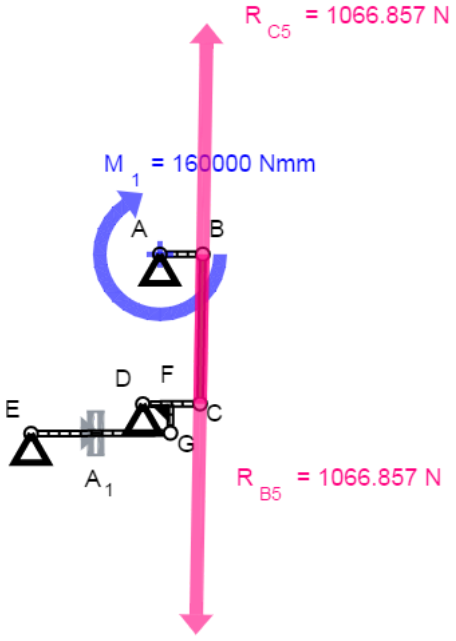


Equations	Results
$\Sigma M = 0 \Rightarrow 150.000 \times R_{B3[Y]} - 0.127 \times R_{B3[X]} = -M_1$	$R_{A3[X]} = -19.225$ N
$\Sigma F_{[X]} = 0 \Rightarrow R_{A3[X]} + R_{B3[X]} = 0$	$R_{A3[Y]} = -1066.683$ N
$\Sigma F_{[Y]} = 0 \Rightarrow R_{A3[Y]} + R_{B3[Y]} = 0$	$R_{B3[X]} = 19.225$ N
$\Sigma F_{[X]} = 0 \Rightarrow R_{A[X]} - R_{A3[X]} = 0$	$R_{B3[Y]} = 1066.683$ N
$\Sigma F_{[Y]} = 0 \Rightarrow R_{A[Y]} - R_{A3[Y]} = 0$	$R_{B5[X]} = -19.225$ N
$\Sigma F_{[X]} = 0 \Rightarrow -R_{B3[X]} - R_{B5[X]} = 0$	$R_{B5[Y]} = -1066.683$ N
$\Sigma F_{[Y]} = 0 \Rightarrow -R_{B3[Y]} - R_{B5[Y]} = 0$	

Shear Force and Moment Diagram

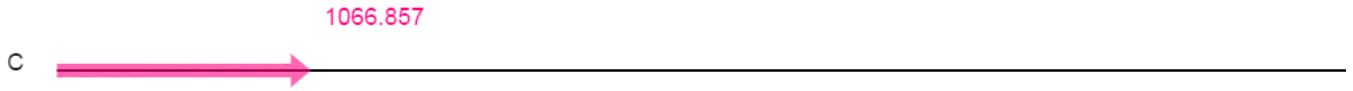

160000
A
1066.857
N
-1066.667
A
0mm
30mm
60mm
90mm
1
Nmm
200000
150000
100000
50000
0
-50000
A
0mm
30mm
60mm
90mm
1

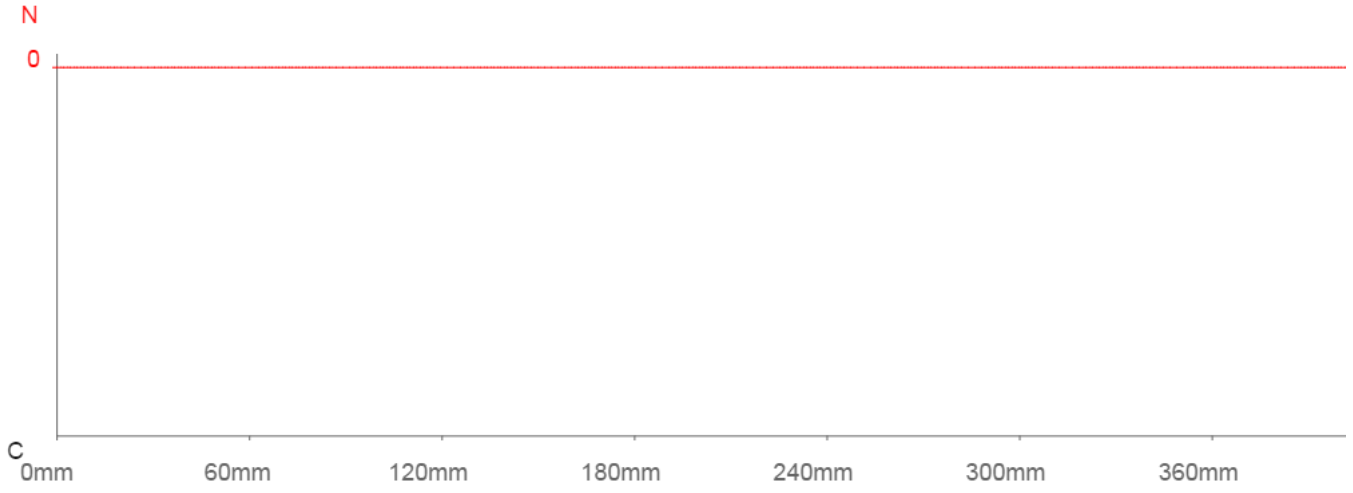
Element B-C

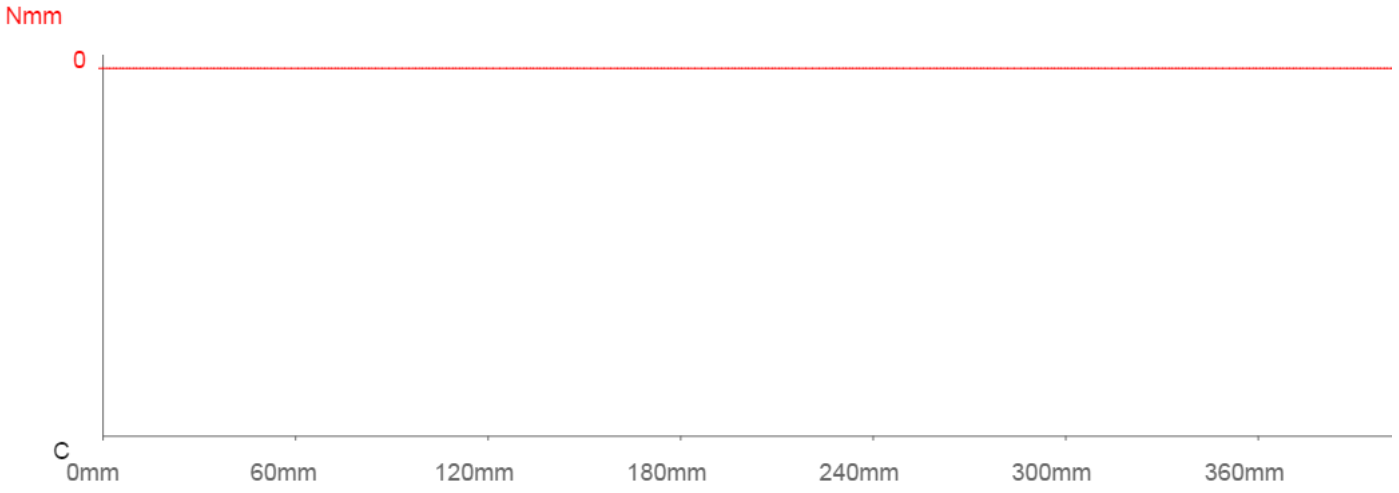


Equations	Results
$\Sigma M = 0 \Rightarrow -9.440 \times R_{C5[Y]} + 523.802 \times R_{C5[X]} = 0$	$R_{B3[X]} = 19.225$ N
$\Sigma F_{[X]} = 0 \Rightarrow R_{B5[X]} + R_{C5[X]} = 0$	$R_{B3[Y]} = 1066.683$ N
$\Sigma F_{[Y]} = 0 \Rightarrow R_{B5[Y]} + R_{C5[Y]} = 0$	$R_{B5[X]} = -19.225$ N
$\Sigma F_{[X]} = 0 \Rightarrow -R_{B3[X]} - R_{B5[X]} = 0$	$R_{B5[Y]} = -1066.683$ N
$\Sigma F_{[Y]} = 0 \Rightarrow -R_{B3[Y]} - R_{B5[Y]} = 0$	$R_{C5[X]} = 19.225$ N
$\Sigma F_{[X]} = 0 \Rightarrow -R_{C5[X]} - R_{C7[X]} = 0$	$R_{C5[Y]} = 1066.683$ N
$\Sigma F_{[Y]} = 0 \Rightarrow -R_{C5[Y]} - R_{C7[Y]} = 0$	$R_{C7[X]} = -19.225$ N
	$R_{C7[Y]} = -1066.683$ N

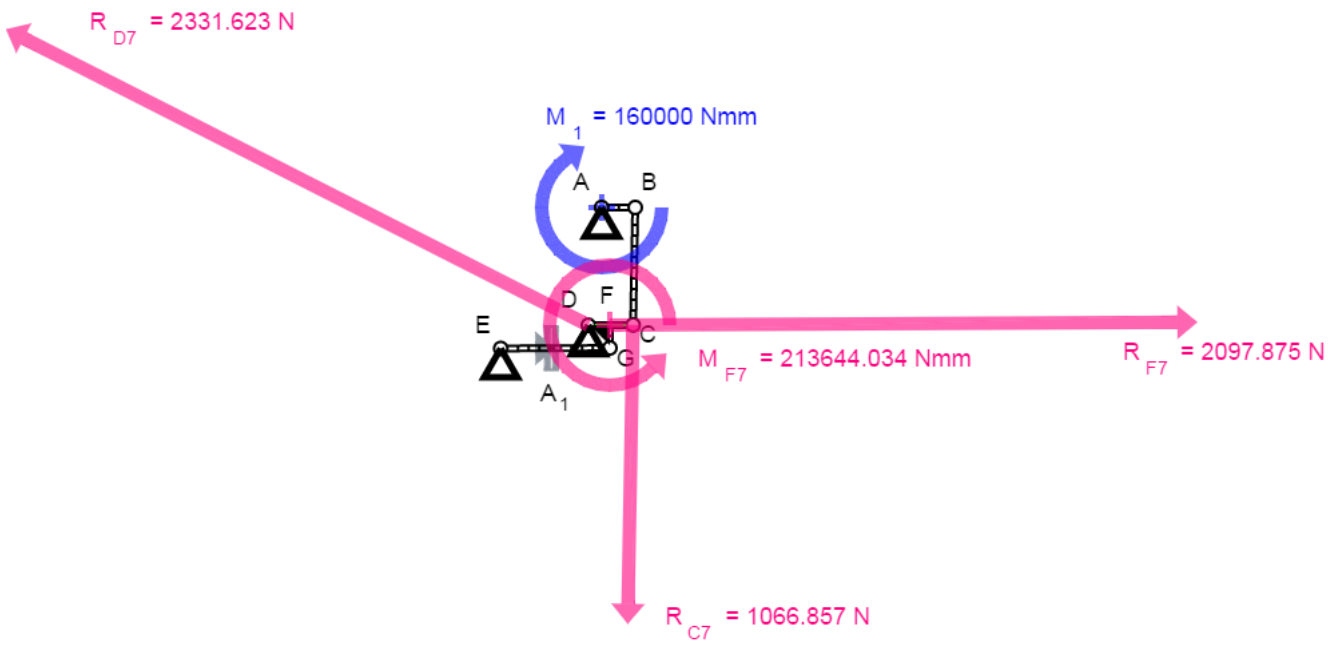
Shear Force and Moment Diagram


1066.857
C


N
0
C
0mm
60mm
120mm
180mm
240mm
300mm
360mm

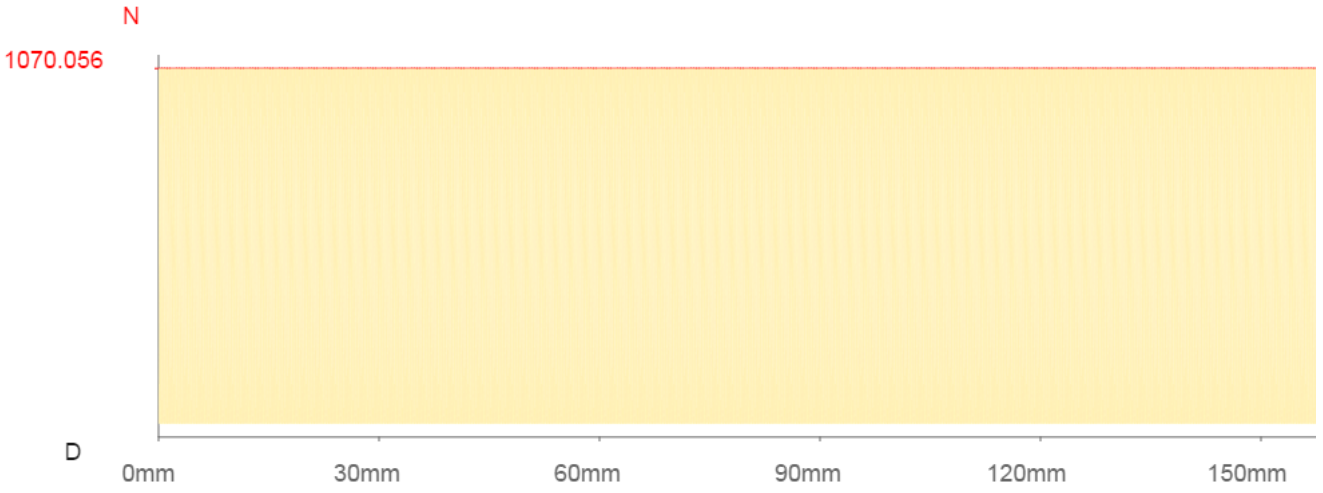

Nmm
0
C
0mm
60mm
120mm
180mm
240mm
300mm
360mm

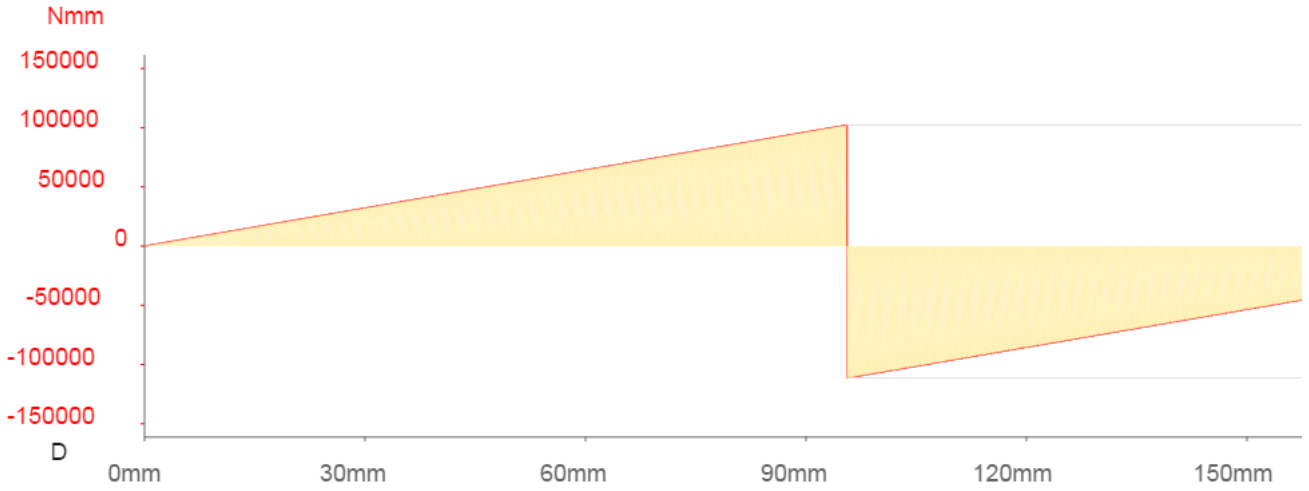
Element C-D



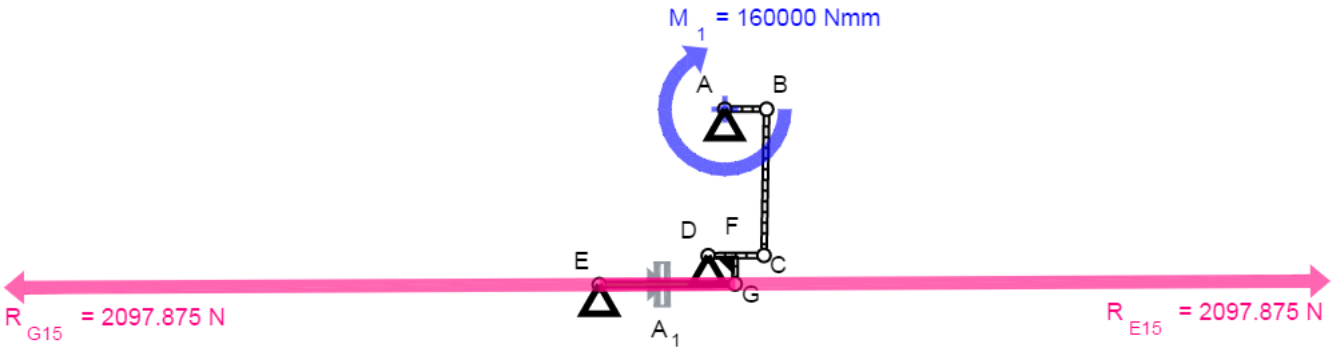
Equations	Results
$\Sigma M = 0 \Rightarrow -199.996 \times R_{D7[Y]} + 1.325 \times R_{D7[X]} - 104.209 \times R_{F7[Y]} + 0.690 \times R_{F7[X]} + M_{F7} = 0$	$R_{C5[X]} = 19.225$ N
$\Sigma F_{[X]} = 0 \Rightarrow R_{C7[X]} + R_{D7[X]} + R_{F7[X]} = 0$	$R_{C5[Y]} = 1066.683$ N
$\Sigma F_{[Y]} = 0 \Rightarrow R_{C7[Y]} + R_{D7[Y]} + R_{F7[Y]} = 0$	$R_{C7[X]} = -19.225$ N
$\Sigma F_{[X]} = 0 \Rightarrow -R_{C5[X]} - R_{C7[X]} = 0$	$R_{C7[Y]} = -1066.683$ N
$\Sigma F_{[Y]} = 0 \Rightarrow -R_{C5[Y]} - R_{C7[Y]} = 0$	$R_{D7[X]} = -2078.624$ N
$\Sigma F_{[X]} = 0 \Rightarrow R_{D[X]} - R_{D7[X]} = 0$	$R_{D7[Y]} = 1056.308$ N
$\Sigma F_{[Y]} = 0 \Rightarrow R_{D[Y]} - R_{D7[Y]} = 0$	

Shear Force and Moment Diagram


N
1070.056
D
0mm
30mm
60mm
90mm
120mm
150mm

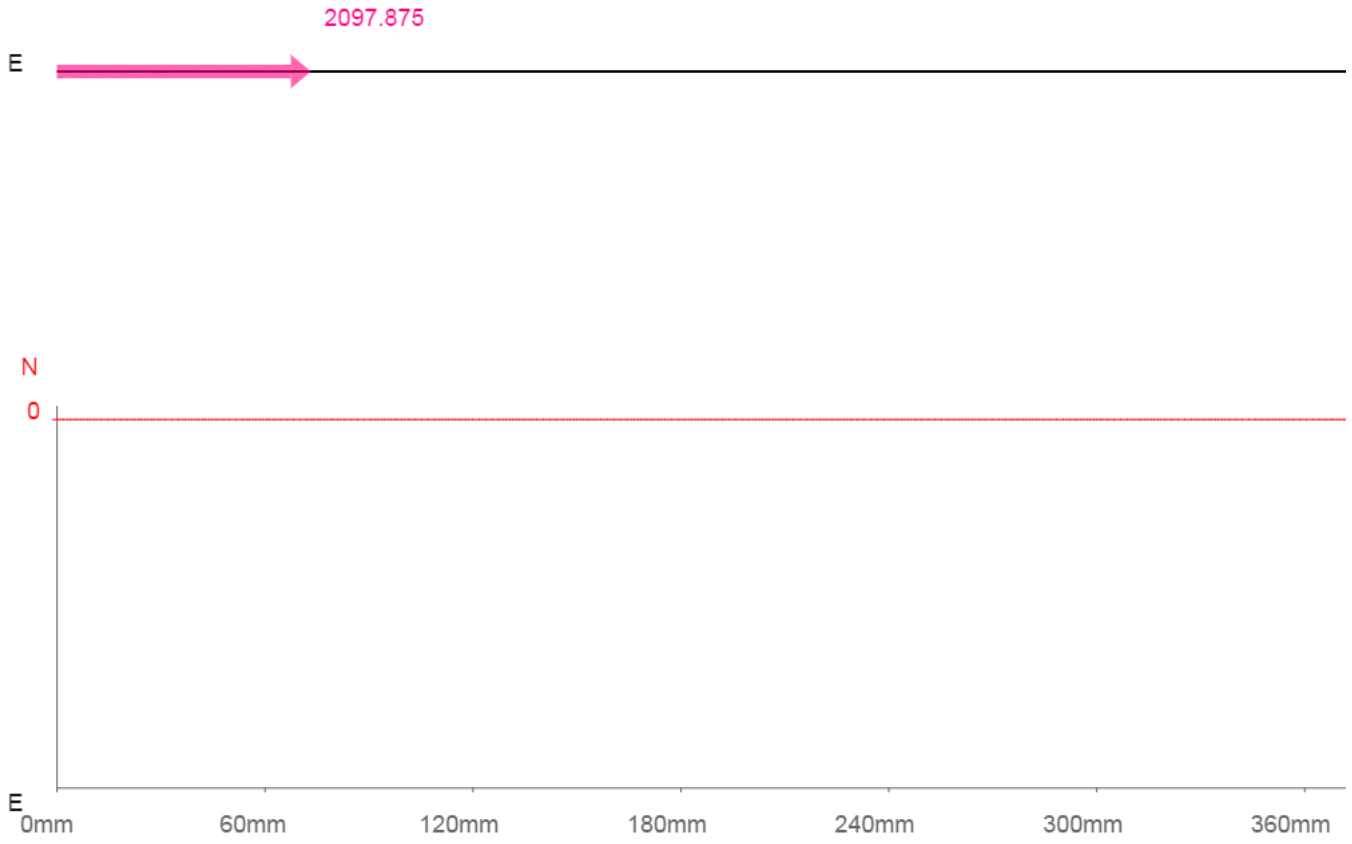

Nmm
150000
100000
50000
0
-50000
-100000
-150000
D
0mm
30mm
60mm
90mm
120mm
150mm

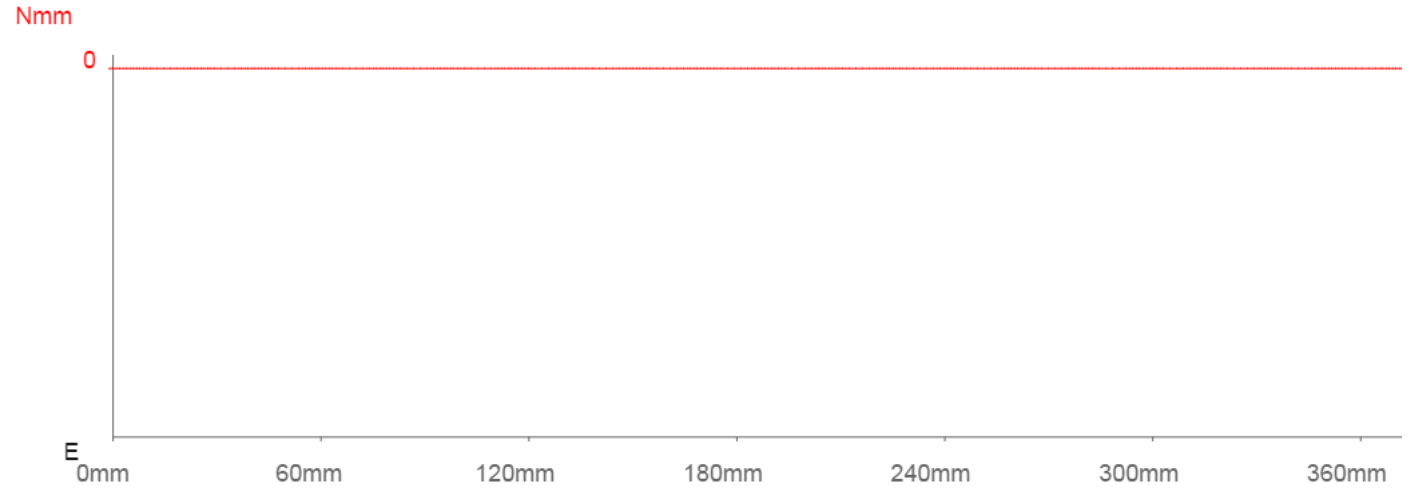
Element E-G



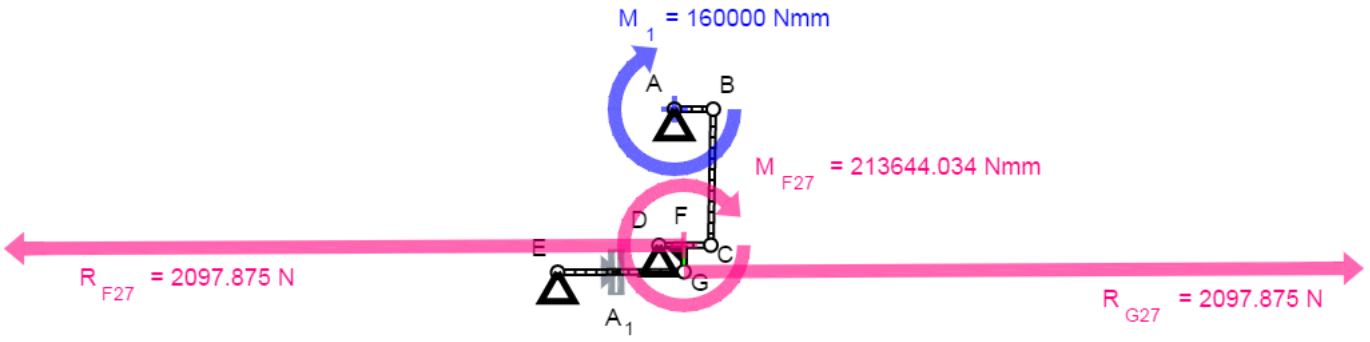
Equations	Results
$\Sigma M = 0 \Rightarrow 487.100 \times R_{G15[Y]} - 2.409 \times R_{G15[X]} = 0$	$R_{E15[X]} = 2097.849$ N
$\Sigma F_{[X]} = 0 \Rightarrow R_{E15[X]} + R_{G15[X]} = 0$	$R_{E15[Y]} = 10.376$ N
$\Sigma F_{[Y]} = 0 \Rightarrow R_{E15[Y]} + R_{G15[Y]} = 0$	$R_{G15[X]} = -2097.849$ N
$\Sigma F_{[X]} = 0 \Rightarrow R_{E[X]} - R_{E15[X]} = 0$	$R_{G15[Y]} = -10.376$ N
$\Sigma F_{[Y]} = 0 \Rightarrow R_{E[Y]} - R_{E15[Y]} = 0$	$R_{G27[X]} = 2097.849$ N
$\Sigma F_{[X]} = 0 \Rightarrow -R_{G15[X]} - R_{G27[X]} = 0$	$R_{G27[Y]} = 10.376$ N
$\Sigma F_{[Y]} = 0 \Rightarrow -R_{G15[Y]} - R_{G27[Y]} = 0$	

Shear Force and Moment Diagram



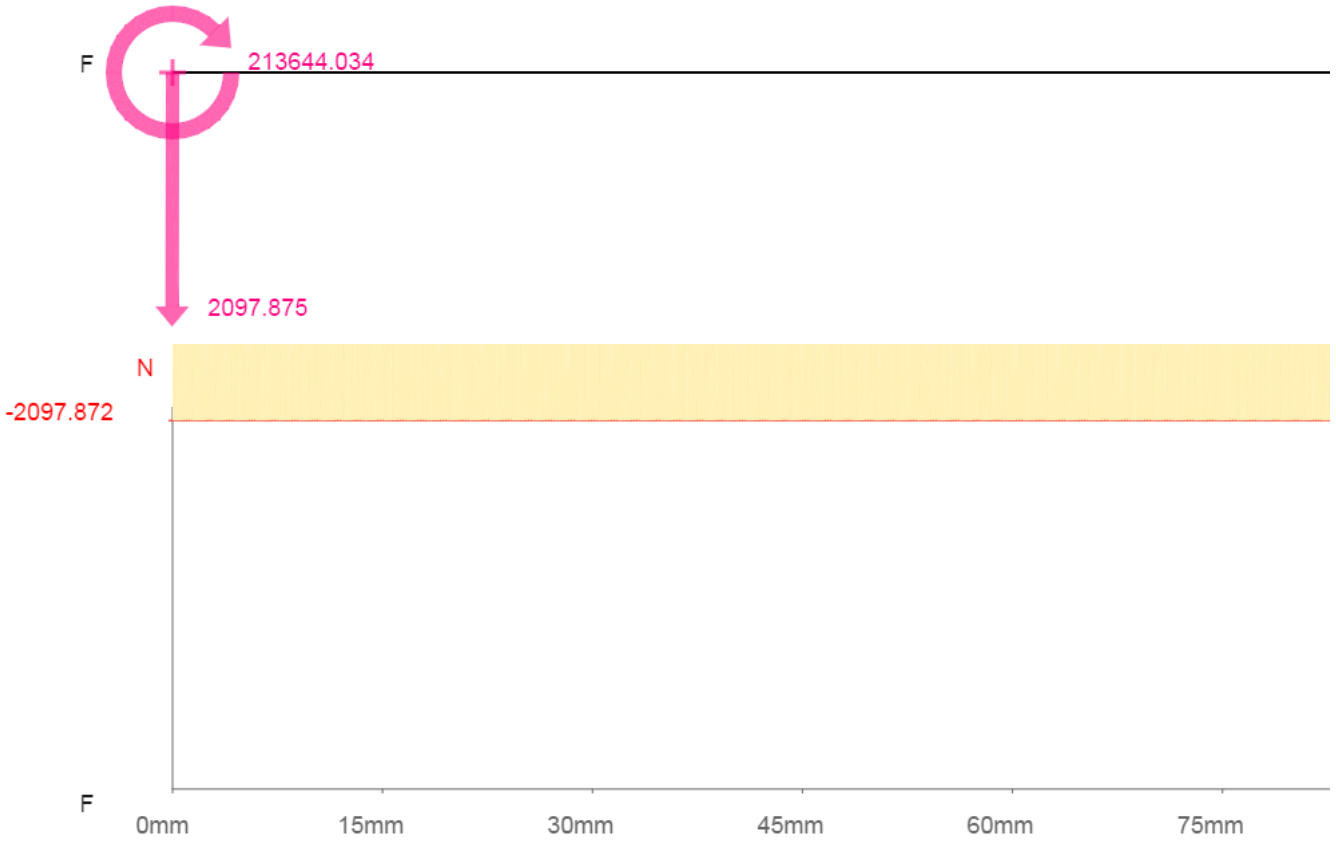

Nmm
0
E
0mm
60mm
120mm
180mm
240mm
300mm
360mm

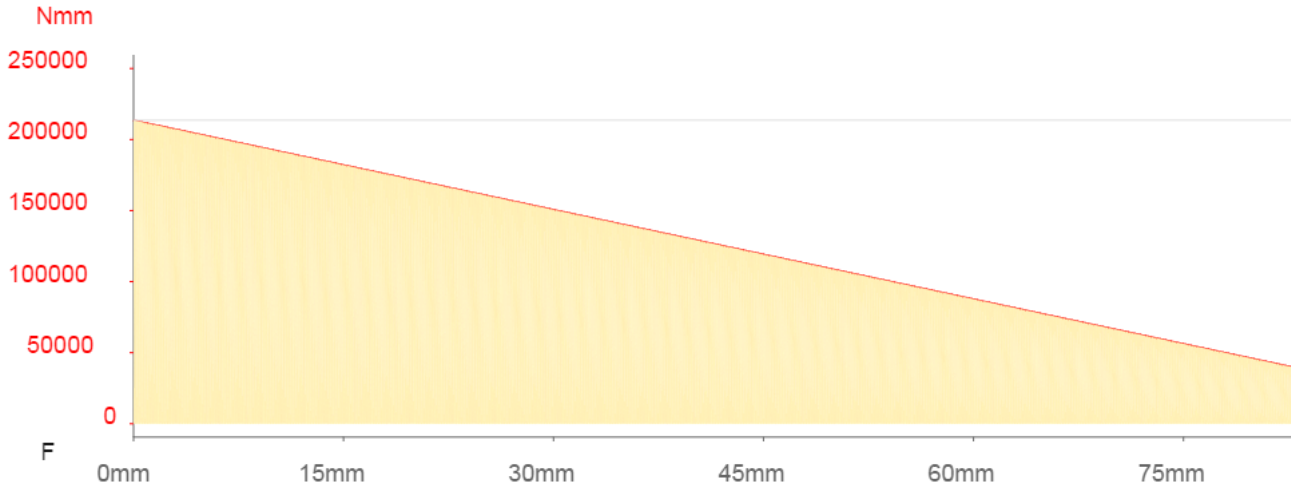
Element F-G



Equations	Results
$\Sigma M = 0 \Rightarrow M_{F27} + 0.675 \times R_{G27[Y]} + 101.836 \times R_{G27[X]} = 0$	$M_{F27} = -213644.034$ Nmm
$\Sigma F_{[X]} = 0 \Rightarrow R_{F27[X]} + R_{G27[X]} = 0$	$M_{F7} = 213644.034$ Nmm
$\Sigma F_{[Y]} = 0 \Rightarrow R_{F27[Y]} + R_{G27[Y]} = 0$	$R_{F27[X]} = -2097.849$ N
$\Sigma M = 0 \Rightarrow -M_{F7} - M_{F27} = 0$	$R_{F27[Y]} = -10.376$ N
$\Sigma F_{[X]} = 0 \Rightarrow -R_{F7[X]} - R_{F27[X]} = 0$	$R_{F7[X]} = 2097.849$ N
$\Sigma F_{[Y]} = 0 \Rightarrow -R_{F7[Y]} - R_{F27[Y]} = 0$	$R_{F7[Y]} = 10.376$ N
$\Sigma F_{[X]} = 0 \Rightarrow -R_{G15[X]} - R_{G27[X]} = 0$	$R_{G15[X]} = -2097.849$ N
$\Sigma F_{[Y]} = 0 \Rightarrow -R_{G15[Y]} - R_{G27[Y]} = 0$	$R_{G15[Y]} = -10.376$ N
	$R_{G27[X]} = 2097.849$ N
	$R_{G27[Y]} = 10.376$ N

Shear Force and Moment Diagram




Nmm
250000
200000
150000
100000
50000
0
F
0mm
15mm
30mm
45mm
60mm
75mm