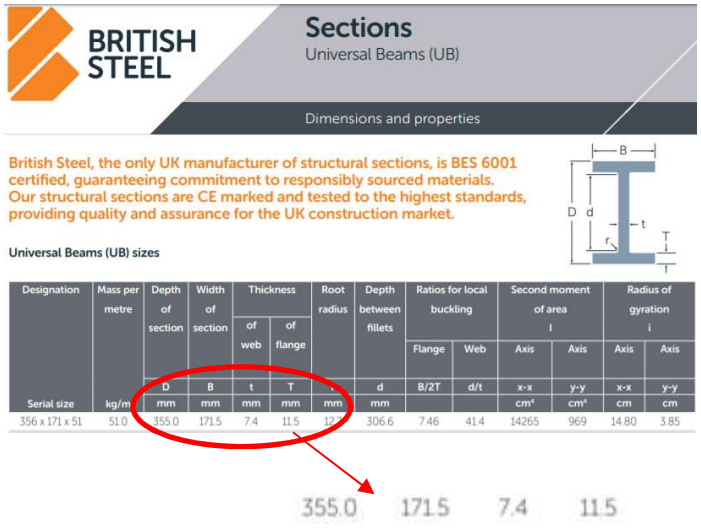
Nedjelja 3
Modeliranje grednih konstrukcija konačnim elementima

Postavka zadatka

Gredna konstrukcija prikazana na slici je izrađena od čeličnih I profila (356x171x51). Odrediti deformacije i napone konstrukcije na koju djeluje kontinuirano opterećenje od q=50 kN/m kao na slici.



BRITISH STEEL

Sections

Universal Beams (UB)

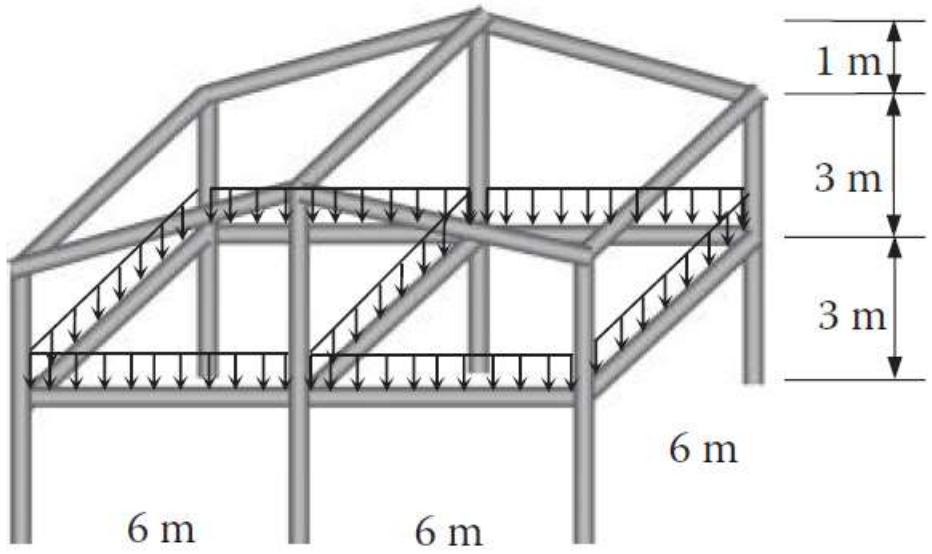
Dimensions and properties

British Steel, the only UK manufacturer of structural sections, is BES 6001 certified, guaranteeing commitment to responsibly sourced materials. Our structural sections are CE marked and tested to the highest standards, providing quality and assurance for the UK construction market.

Universal Beams (UB) sizes

Designation	Mass per metre	Depth of section	Width of section	Thickness of web	Thickness of flange	Root radius	Depth between fillets	Ratios for local buckling: Flange	Ratios for local buckling: Web	Second moment of area I: Axis	Second moment of area I: Axis	Radius of gyration i: Axis	Radius of gyration i: Axis
		D	B	t	T		d	B/2T	d/t	x-x	y-y	x-x	y-y
Serial size	kg/m	mm	mm	mm	mm	mm	mm			cm⁴	cm⁴	cm	cm
356 x 171 x 51	51.0	355.0	171.5	7.4	11.5	12.7	306.6	7.46	41.4	14265	969	14.80	3.85

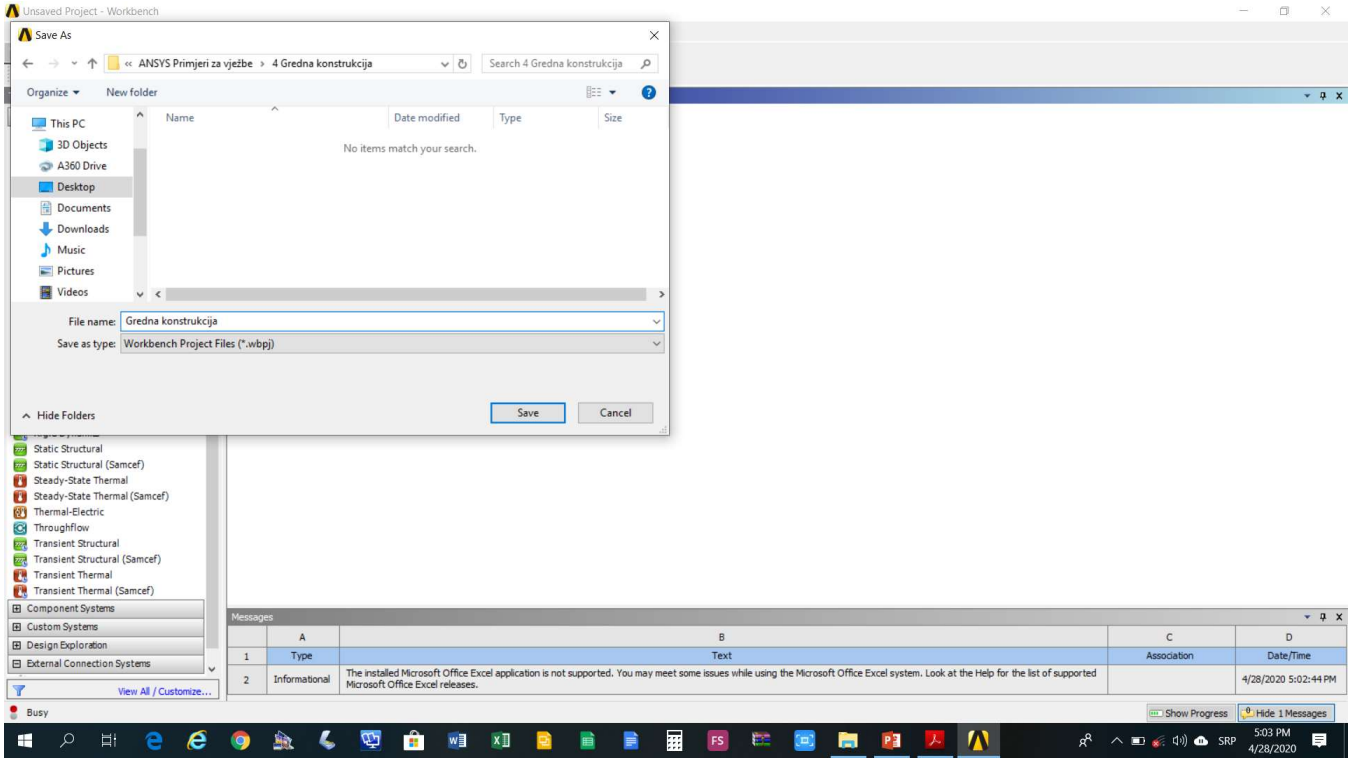
355.0 171.5 7.4 11.5



Noseća konstrukcije mosta

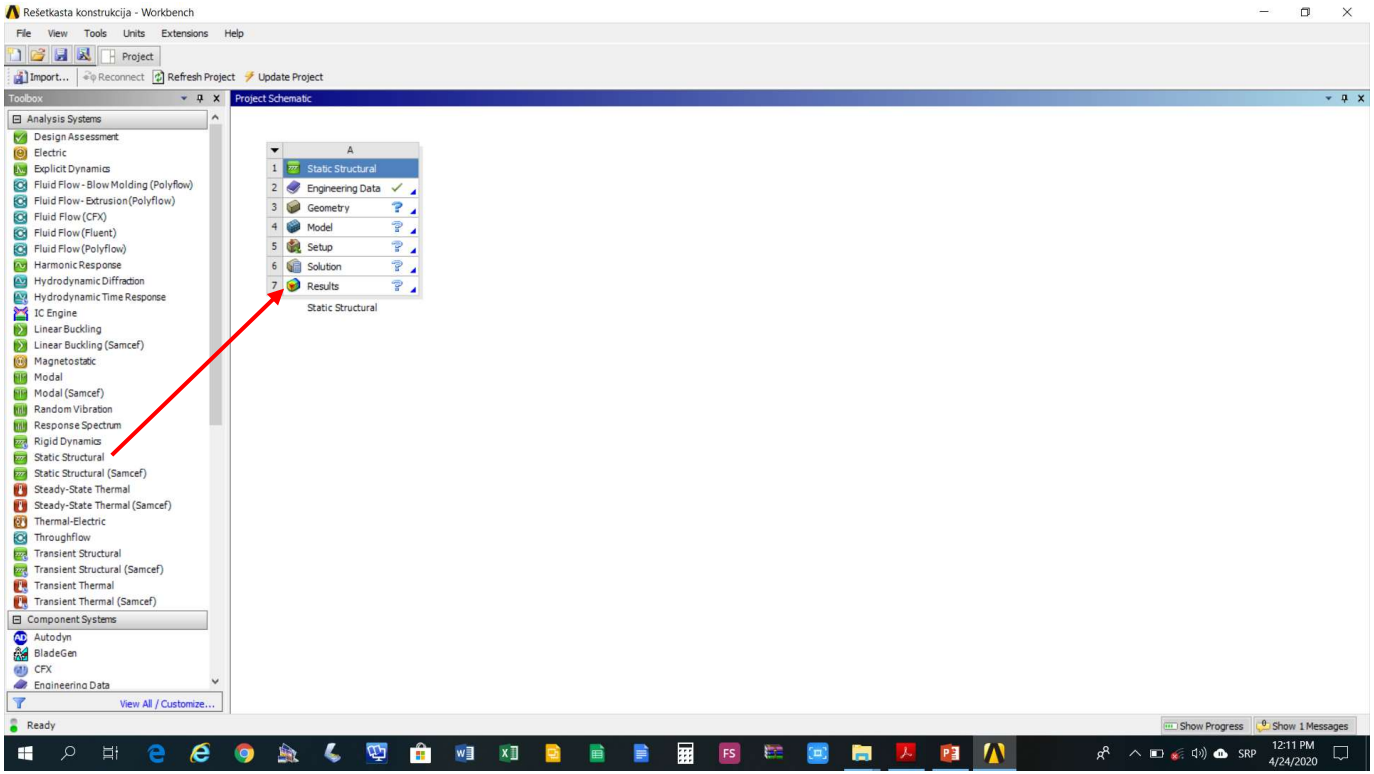
Modeliranje gredne konstrukcije

Aktivirati program ANSYS i sačuvati prazan projekat pod nazivom Gredna konstrukcija



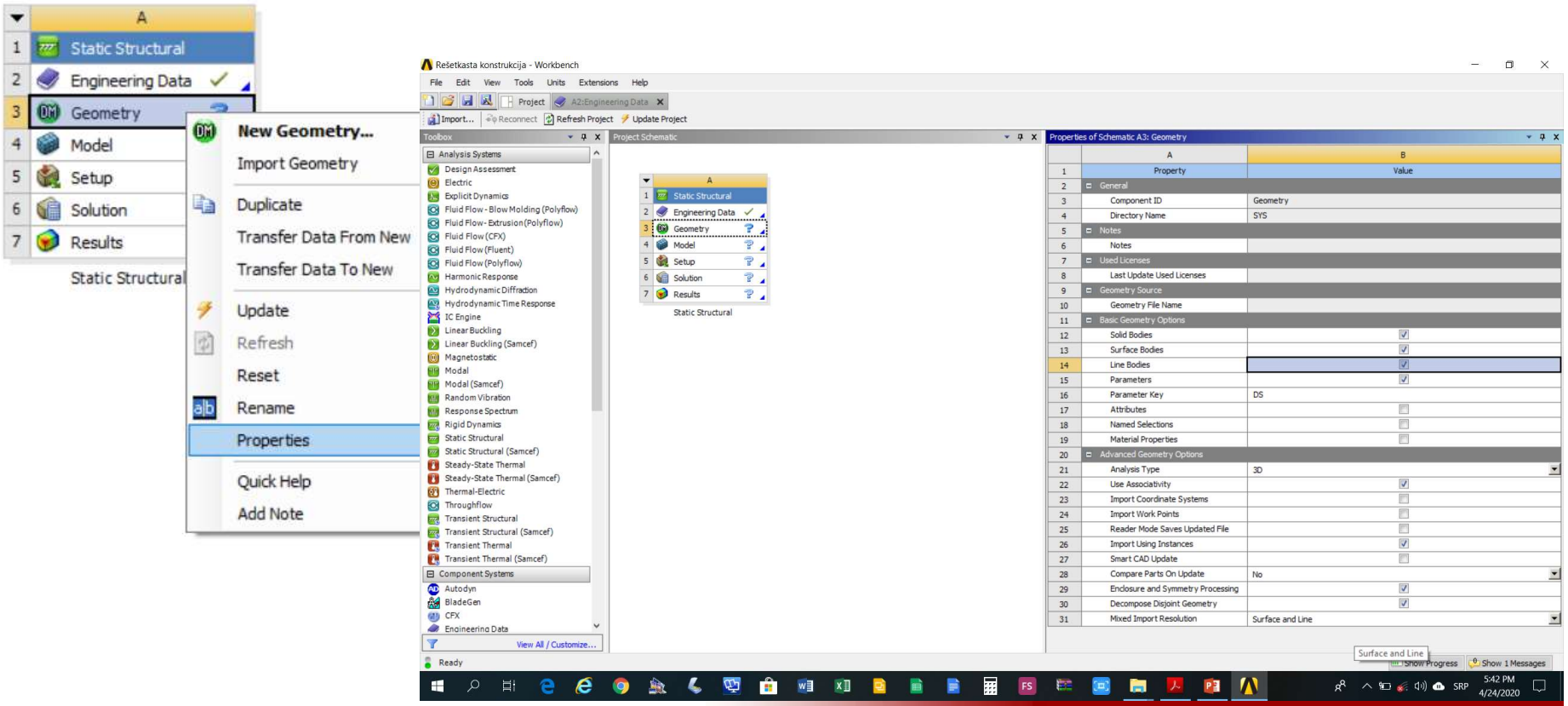
Modeliranje gredne konstrukcije

Kreirati statičku linearnu analizu (*Static Structural*) na shemi projekta (*Project Shematic*)



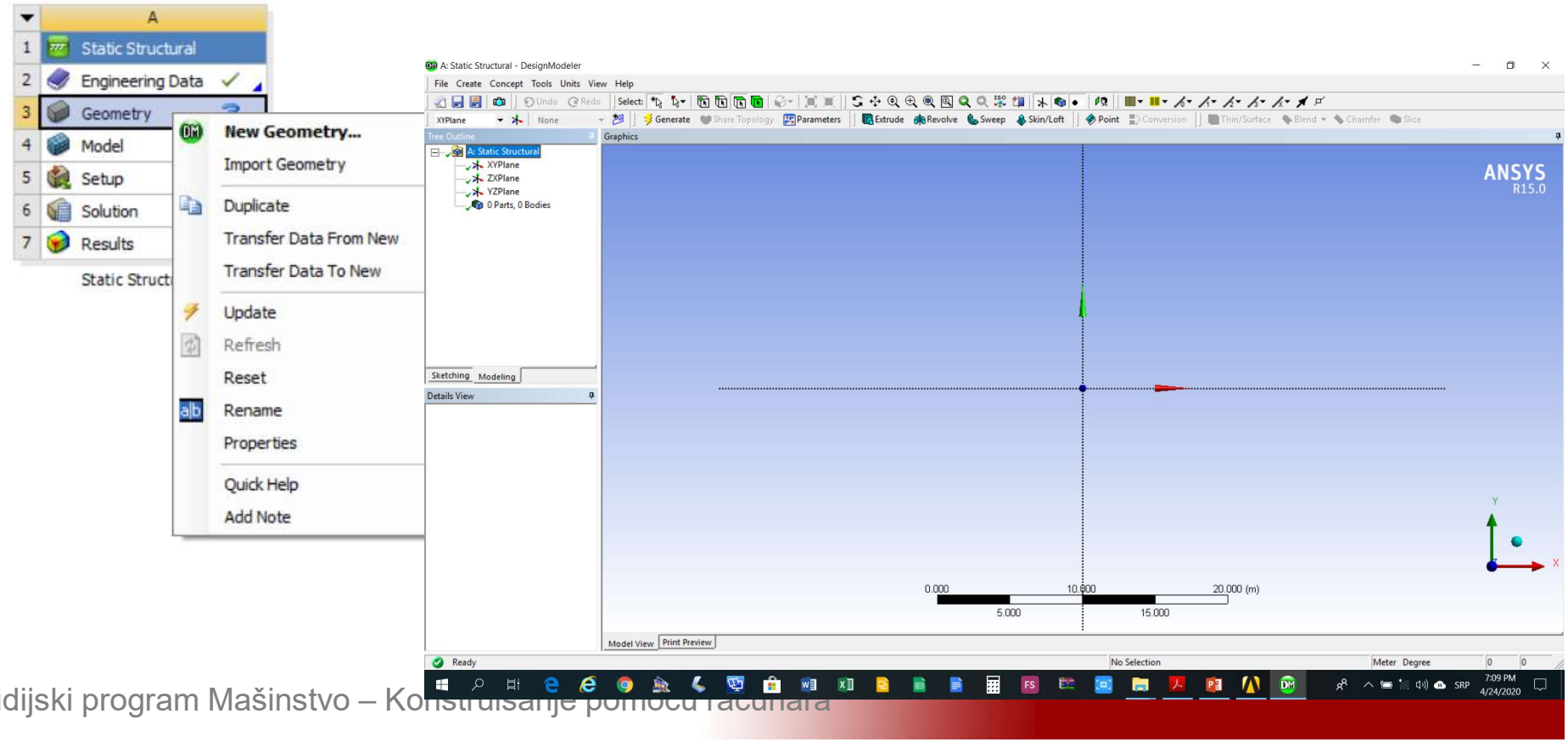
Modeliranje gredne konstrukcije

Izvršiti podešavanja modula Design Modeler (*Geometry->Properties->Line Bodies = On*)



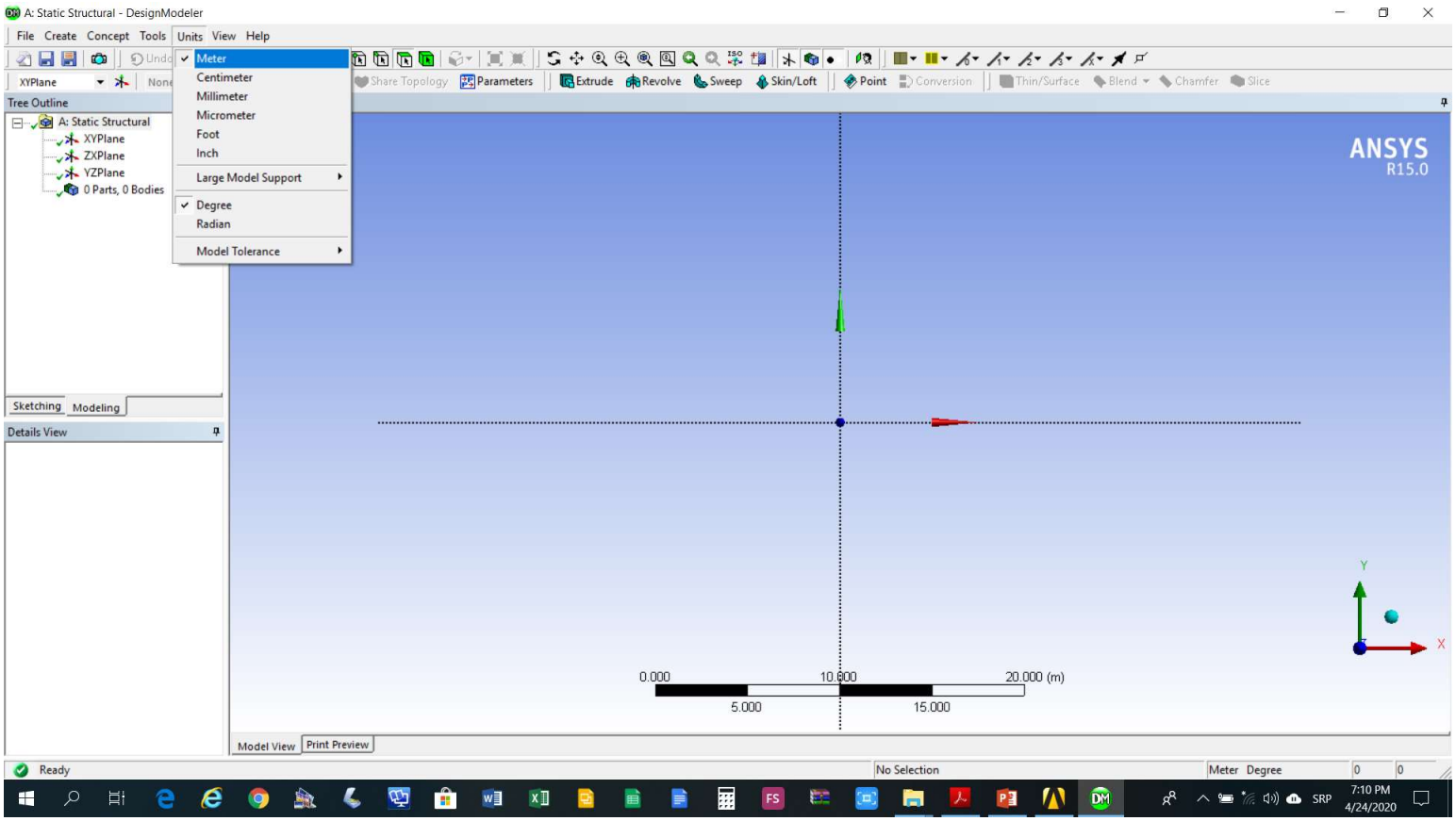
Modeliranje gredne konstrukcije

Aktivirati modul Design Modeler (*Geometry->New Geometry*)



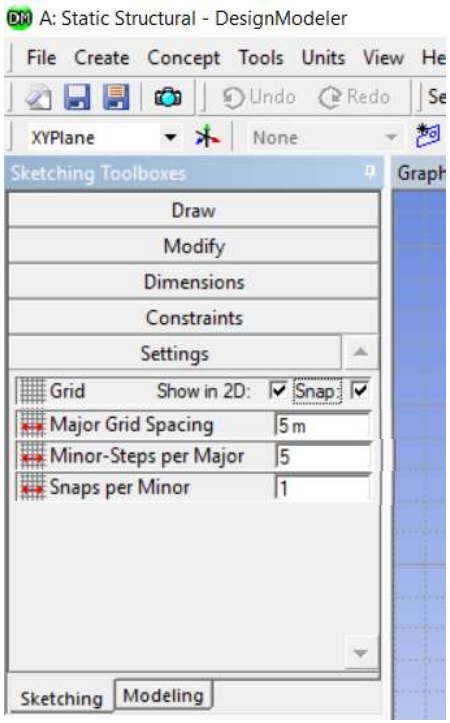
Modeliranje gredne konstrukcije

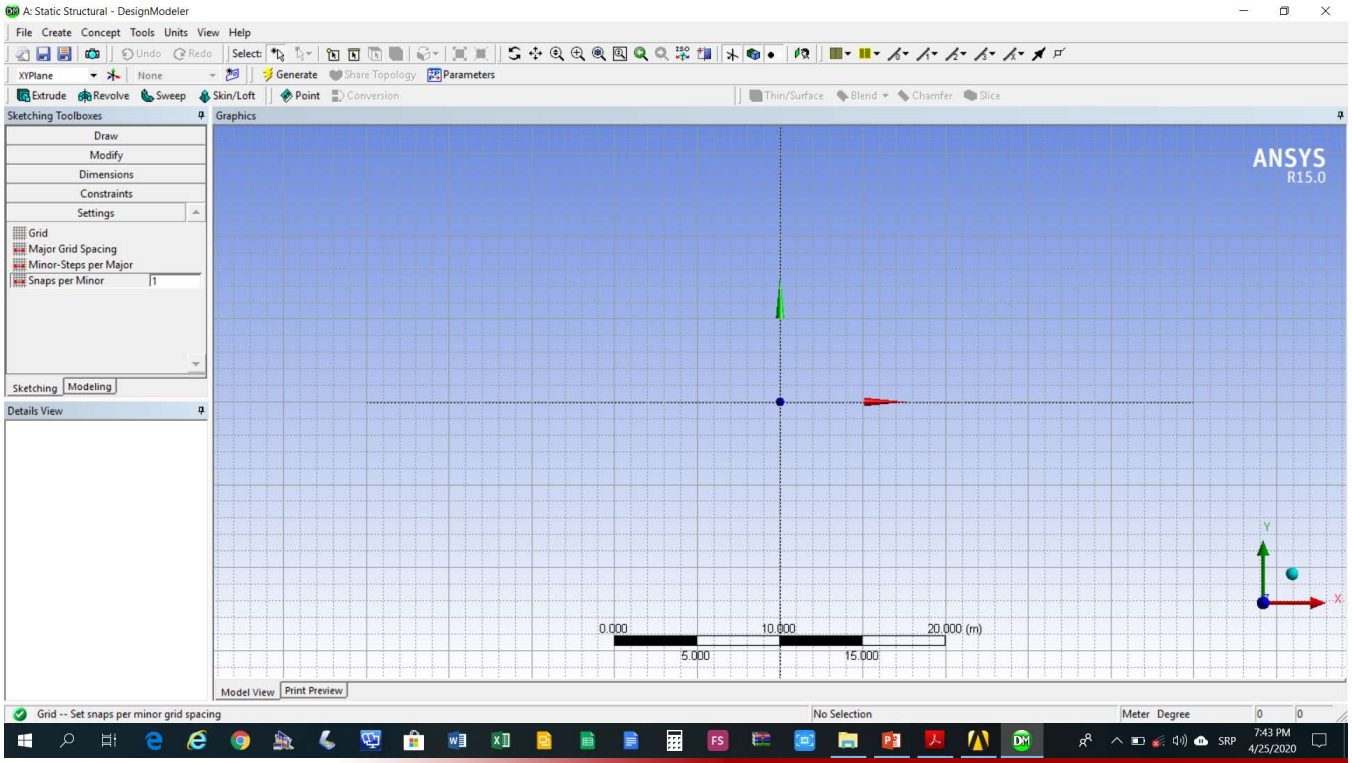
Podesiti dužinske jedinice (Units->*Meter*)



Modeliranje gredne konstrukcije

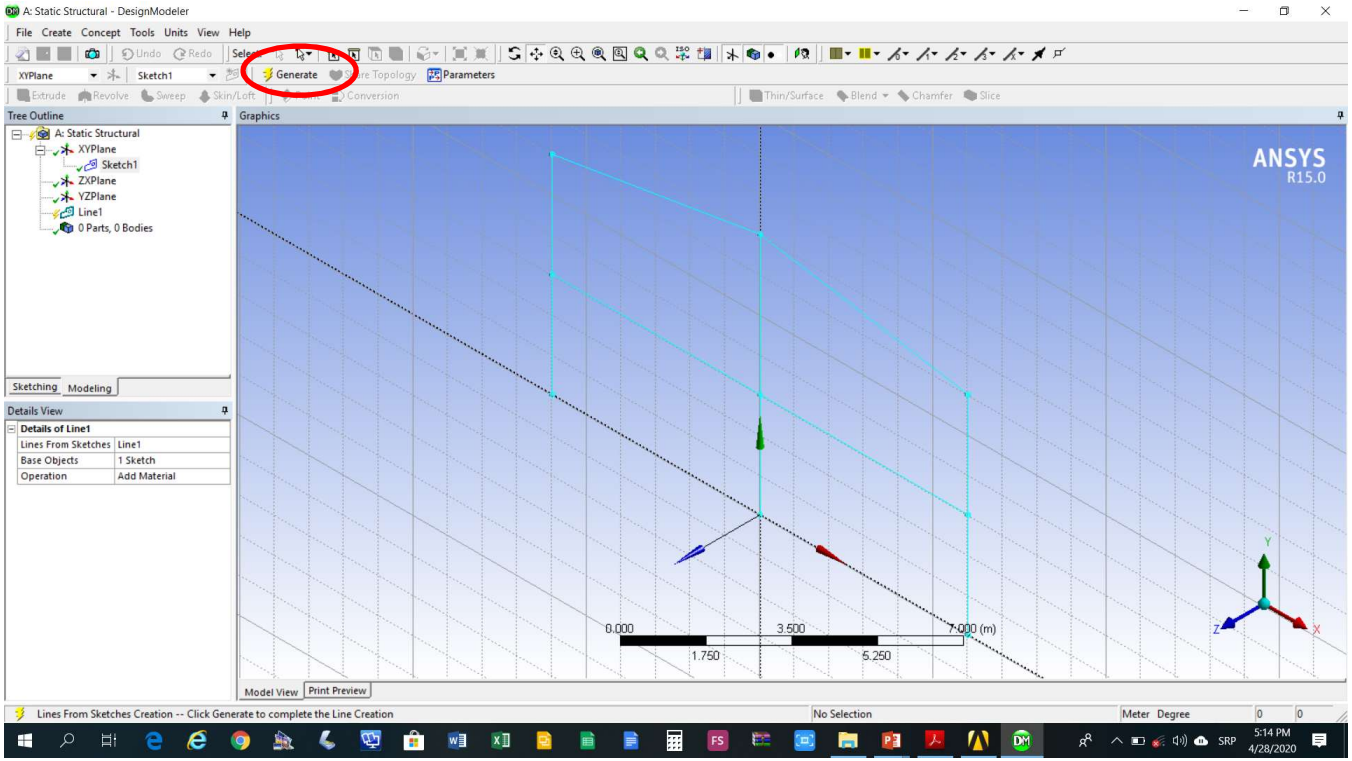
Podesiti parametre mreže i skokovitog kretanja (*Sketching->Settings->Grid*) (*Show in 2D = On*) (*Snap = On*)





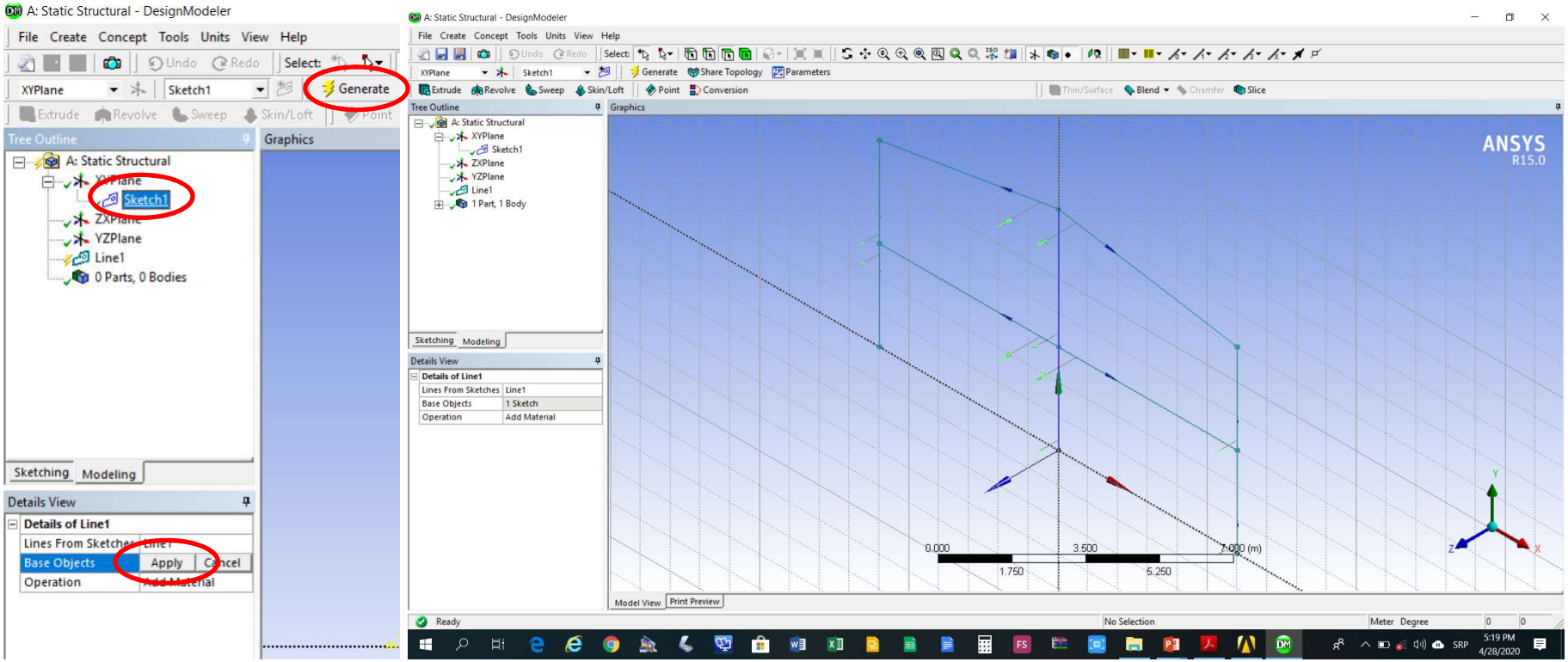
Modeliranje gredne konstrukcije

Nacrtati konstrukciju (*Sketching->Draw->Line*) okončati crtanje skice komandom *Generate*



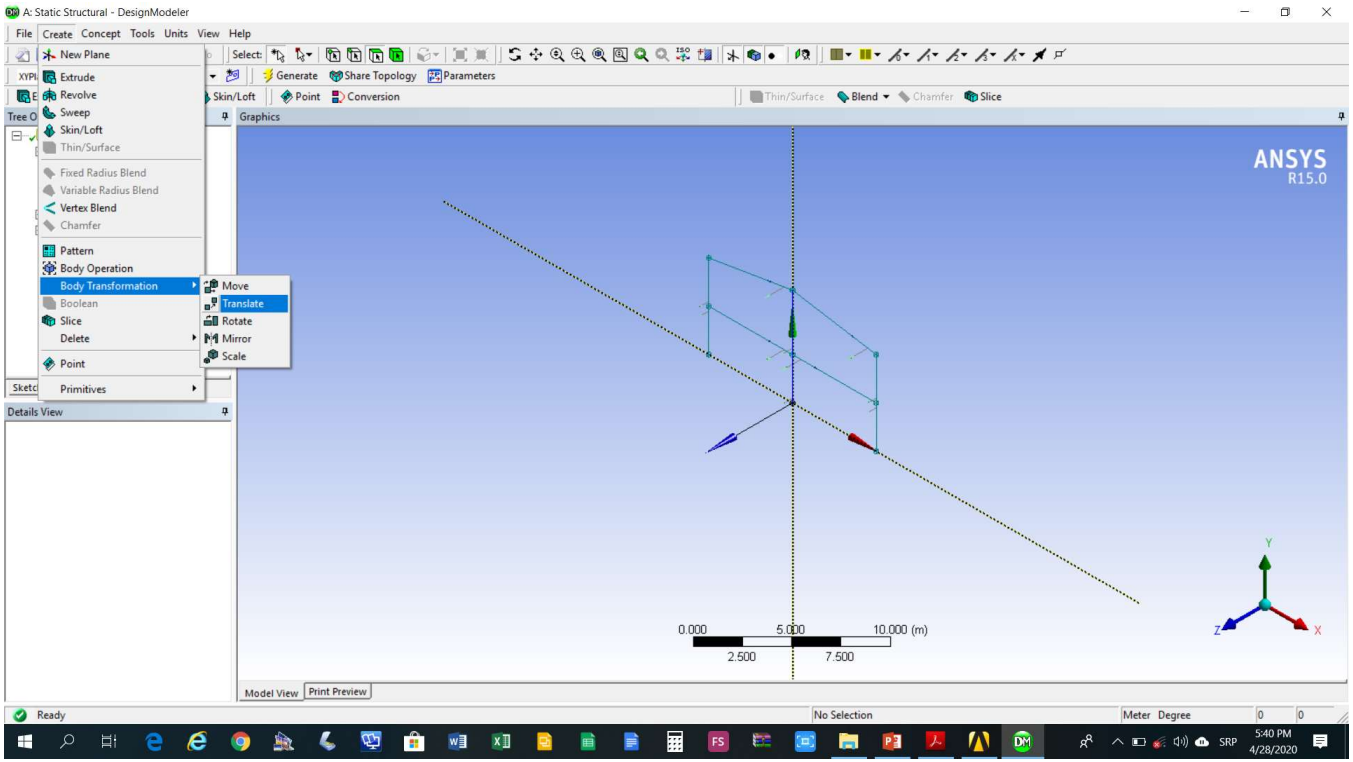
Modeliranje gredne konstrukcije

Aktivirati opciju (*Concept->Lines from Sketches*)



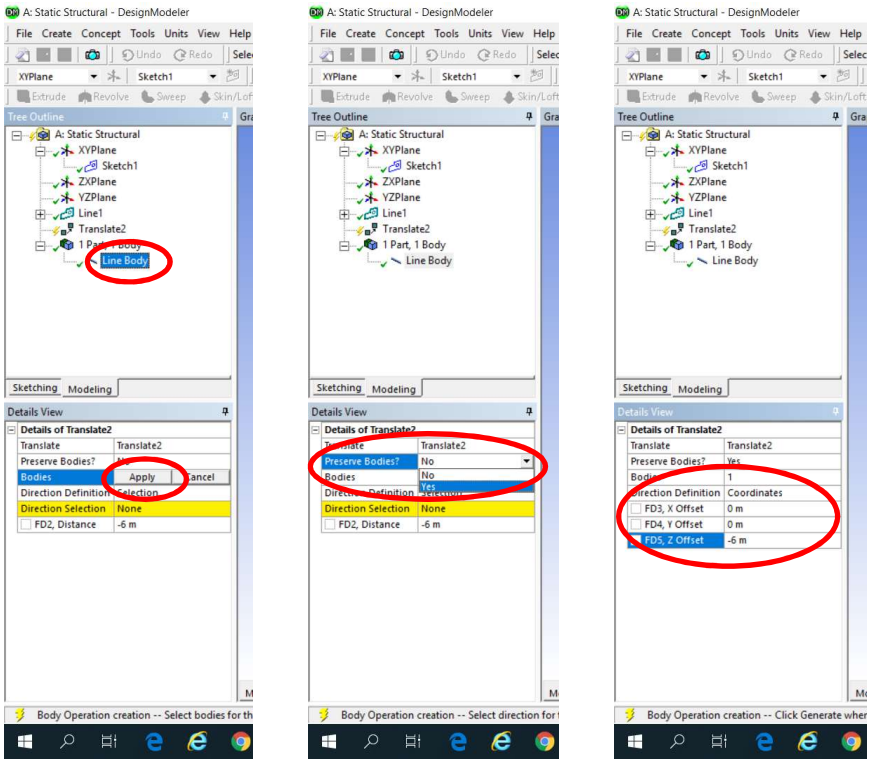
Modeliranje gredne konstrukcije

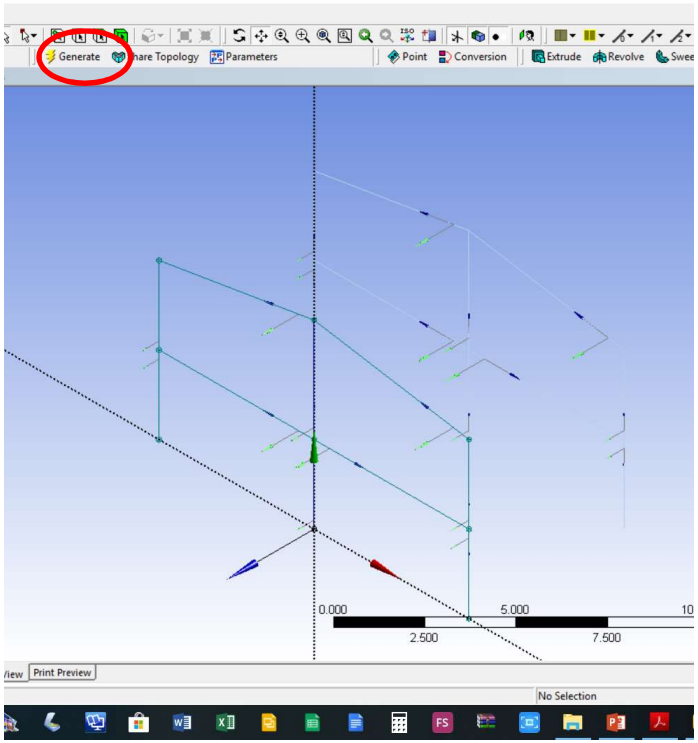
Aktivirati opciju (*Create->Body Transformation->Translation*)



Modeliranje gredne konstrukcije

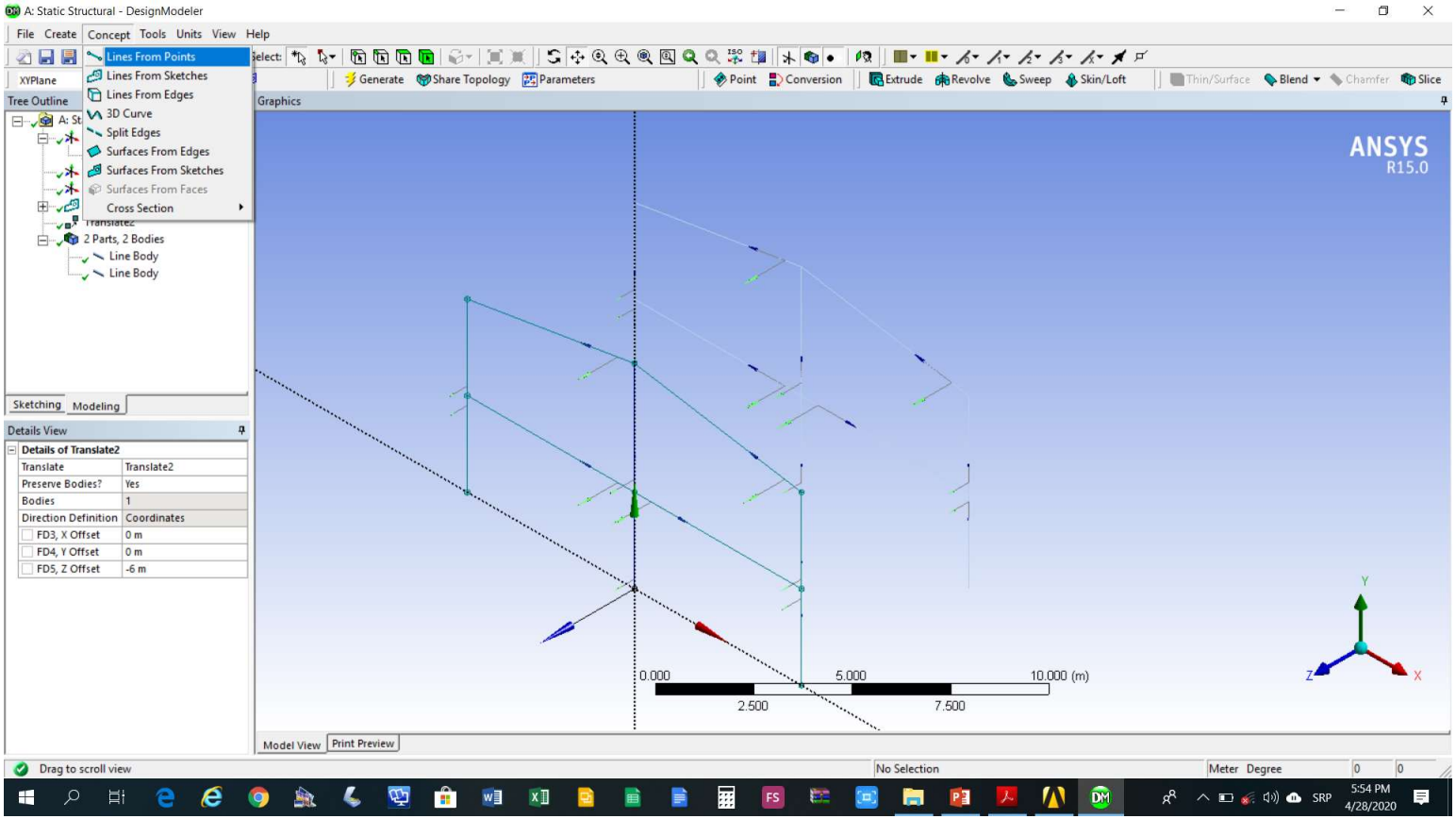
Podesiti parametre Translate1 (Details of Translate1)





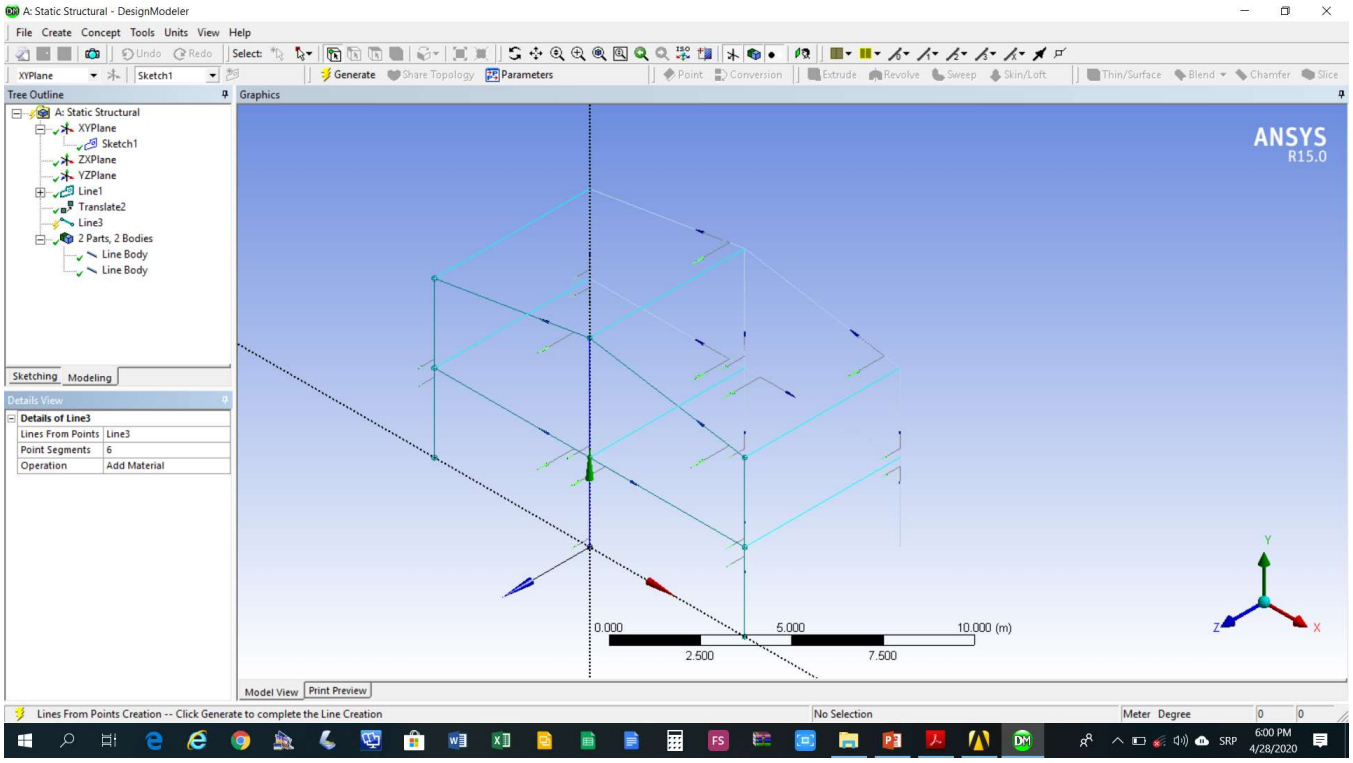
Modeliranje gredne konstrukcije

Aktivirati opciju (*Concept->Lines from Points*)



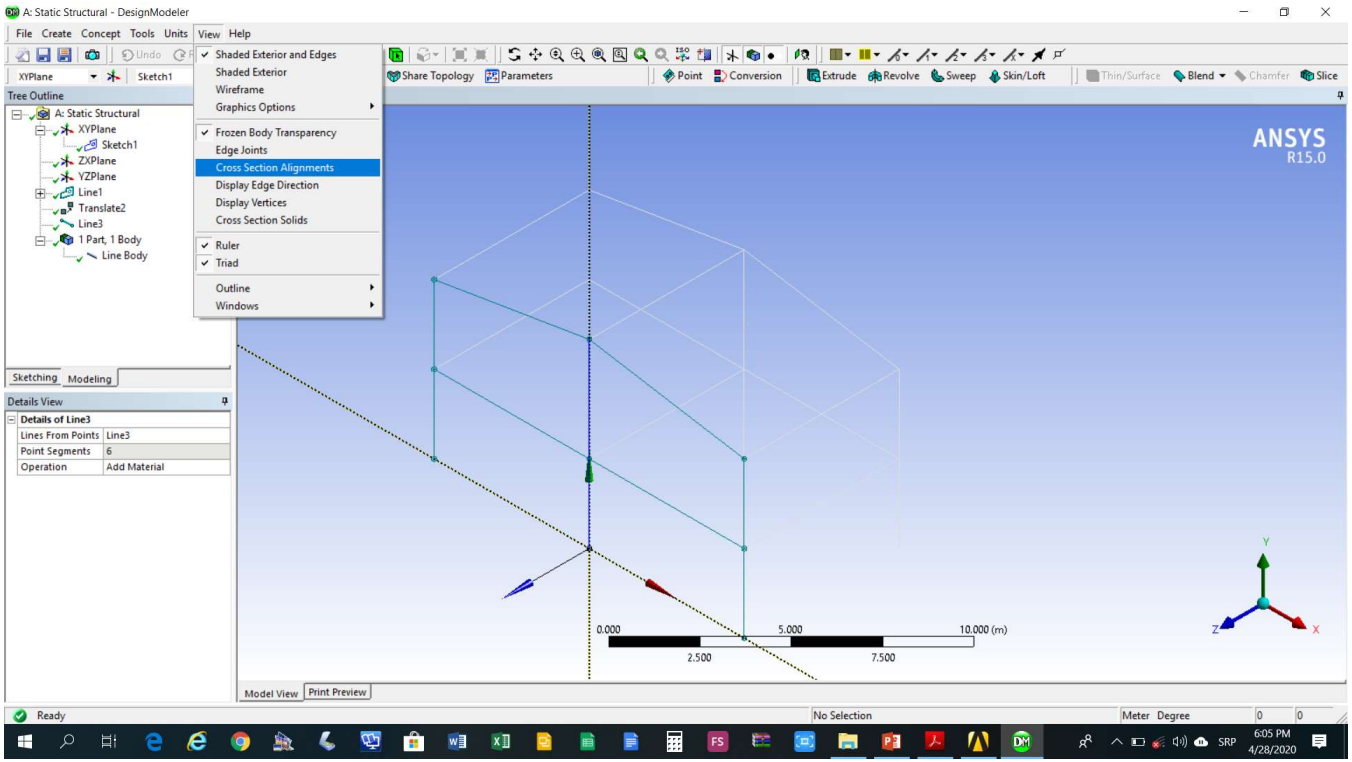
Modeliranje gredne konstrukcije

Dodati 6 uzdužnih grede konstrukcije (izabrati početnu tačku grede, a potom i krajnju uz CTRL)



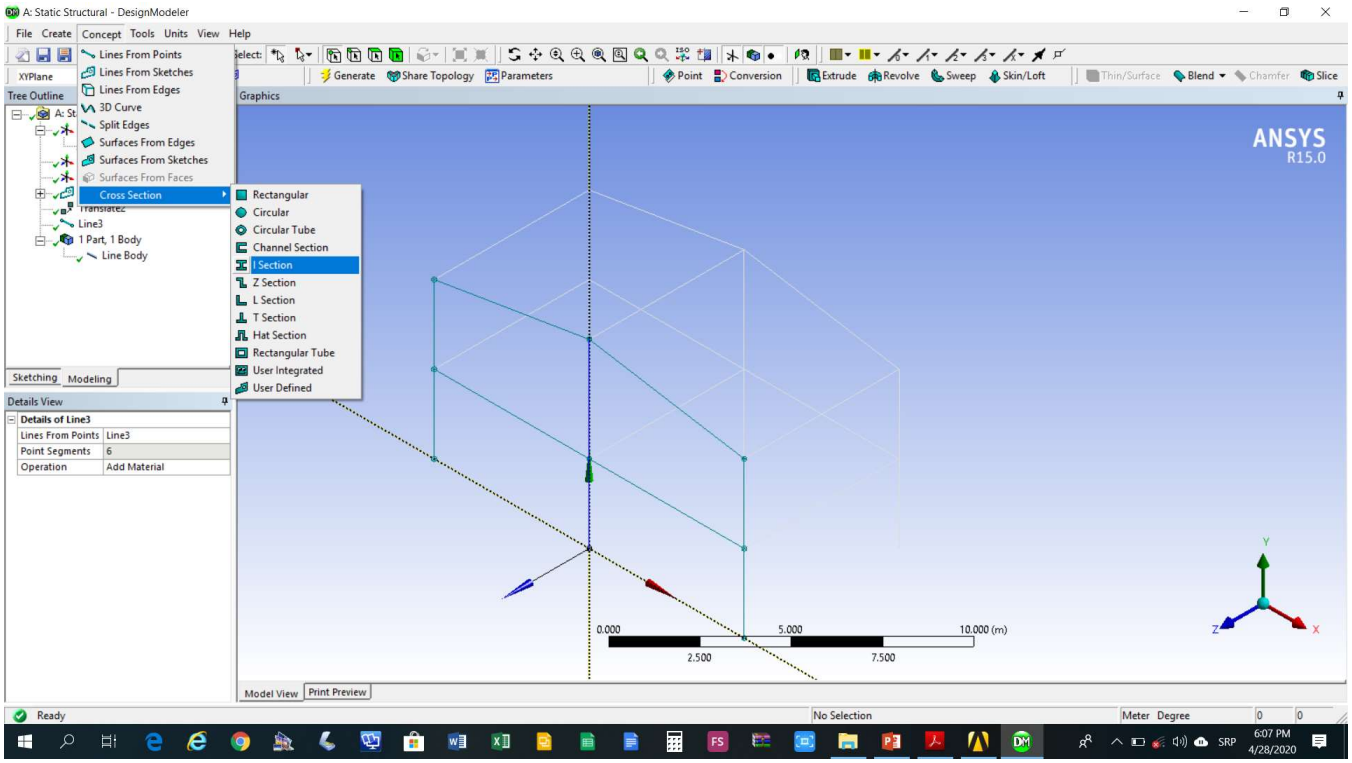
Modeliranje gredne konstrukcije

Isključiti prikazivanje lokalnih koordinatnih sistema (*View->Cross Sections Alignments*)



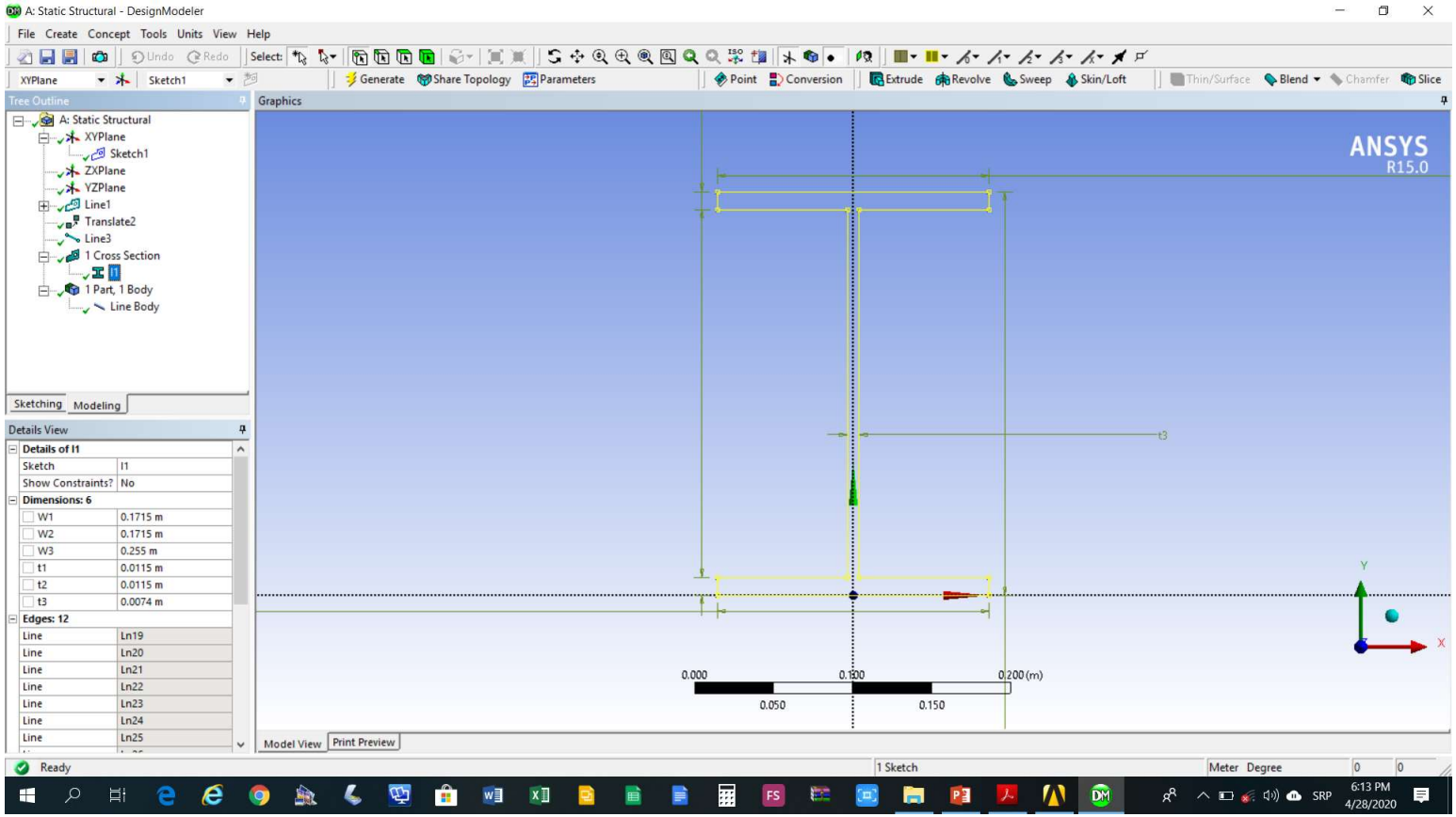
Modeliranje gredne konstrukcije

Izbor poprečnog presjeka (*Concept->Cross Sections->I Section*)



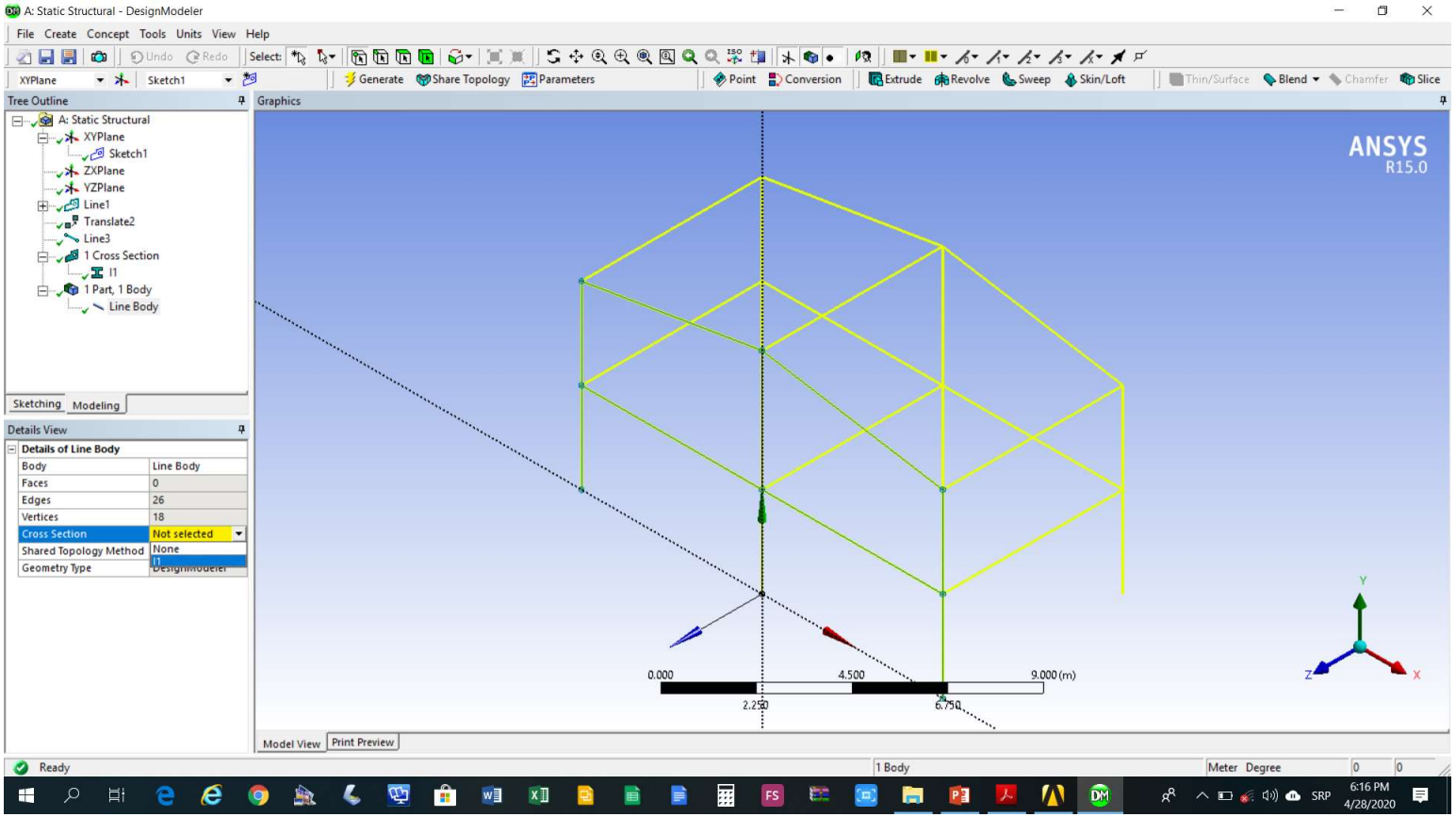
Modeliranje gredne konstrukcije

Podešavanje parametara poprečnog presjeka (*Details of I1*)



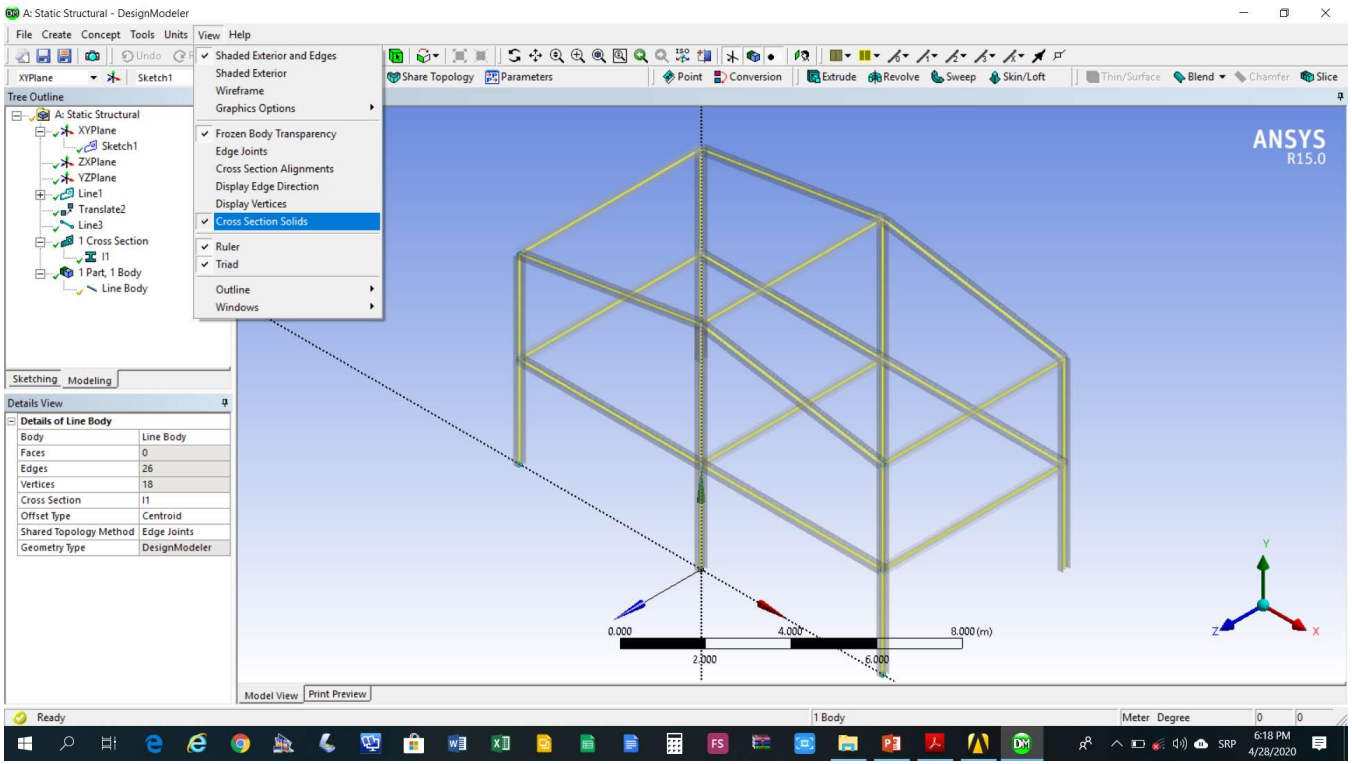
Modeliranje gredne konstrukcije

Dodjeliti poprečni presjek elementima konstrukcije



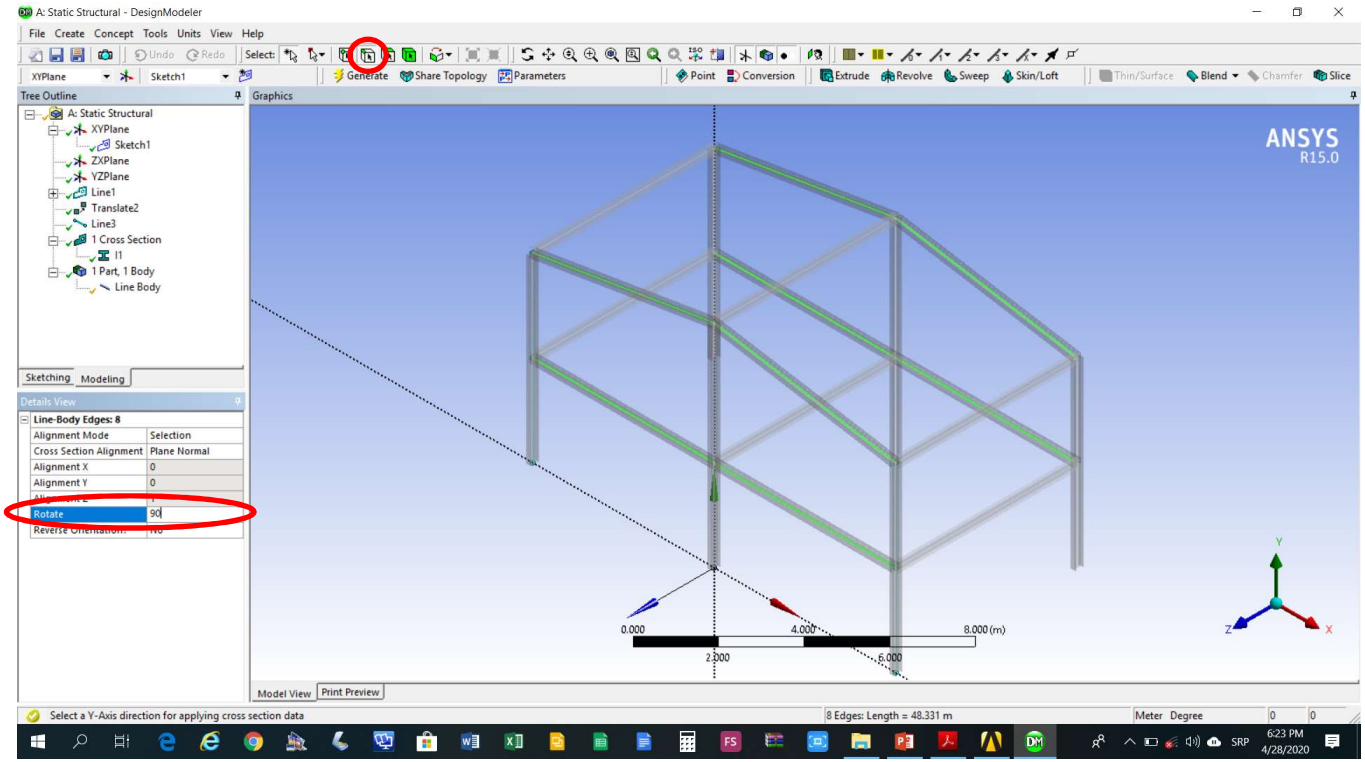
Modeliranje gredne konstrukcije

Uključiti prikazivanje elemenata konstrukcije kao punih tijela (*View->Cross Sections Solids*)



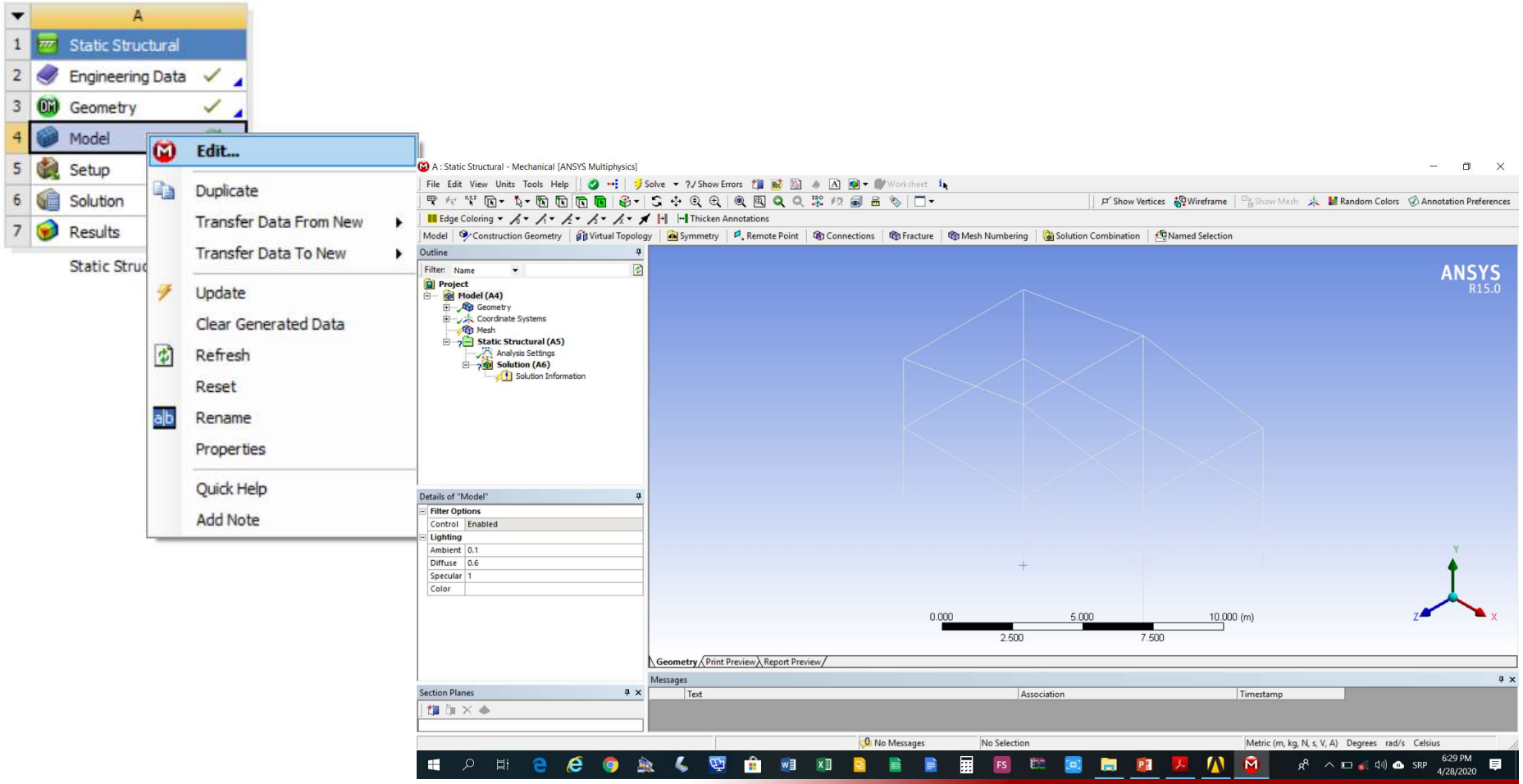
Modeliranje gredne konstrukcije

8 zelenih elemenata konstrukcije treba zarotitati za 90^{o} kako bi se doveli u potrebni položaj



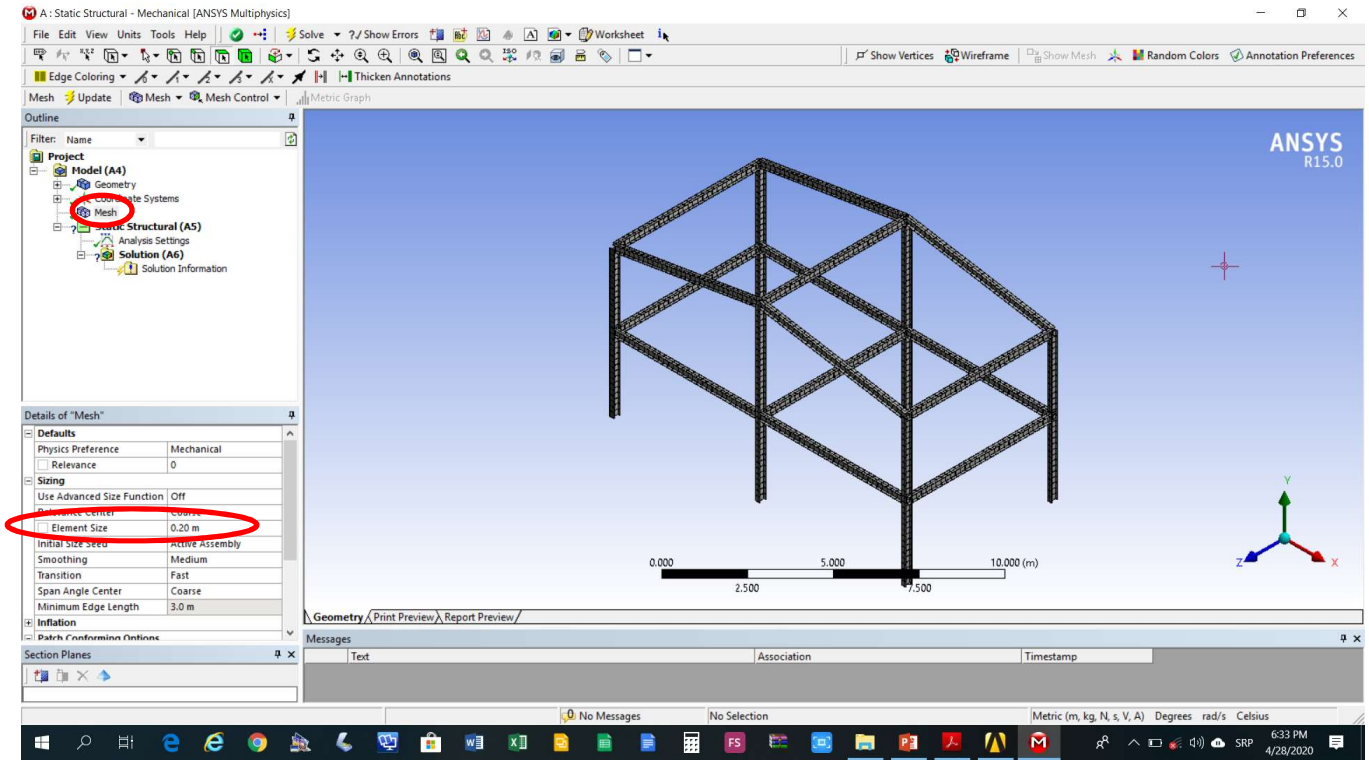
Modeliranje gredne konstrukcije

Aktivirati modul Static Structural *(Model->Edit)*



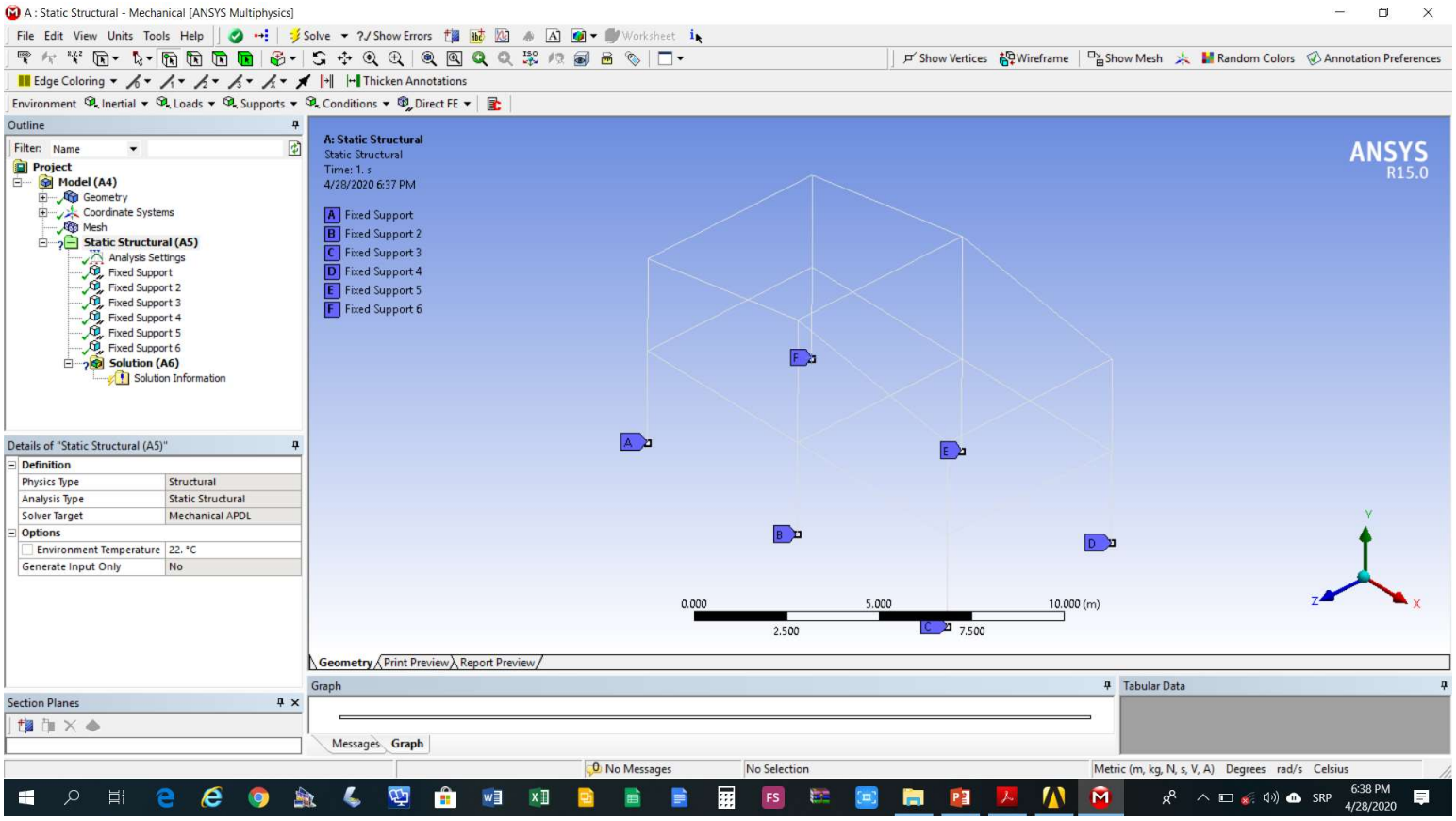
Modeliranje gredne konstrukcije

Podesiti veličinu konačnog elementa na 0.2 m i generisati mrežu konačnih elemeneta



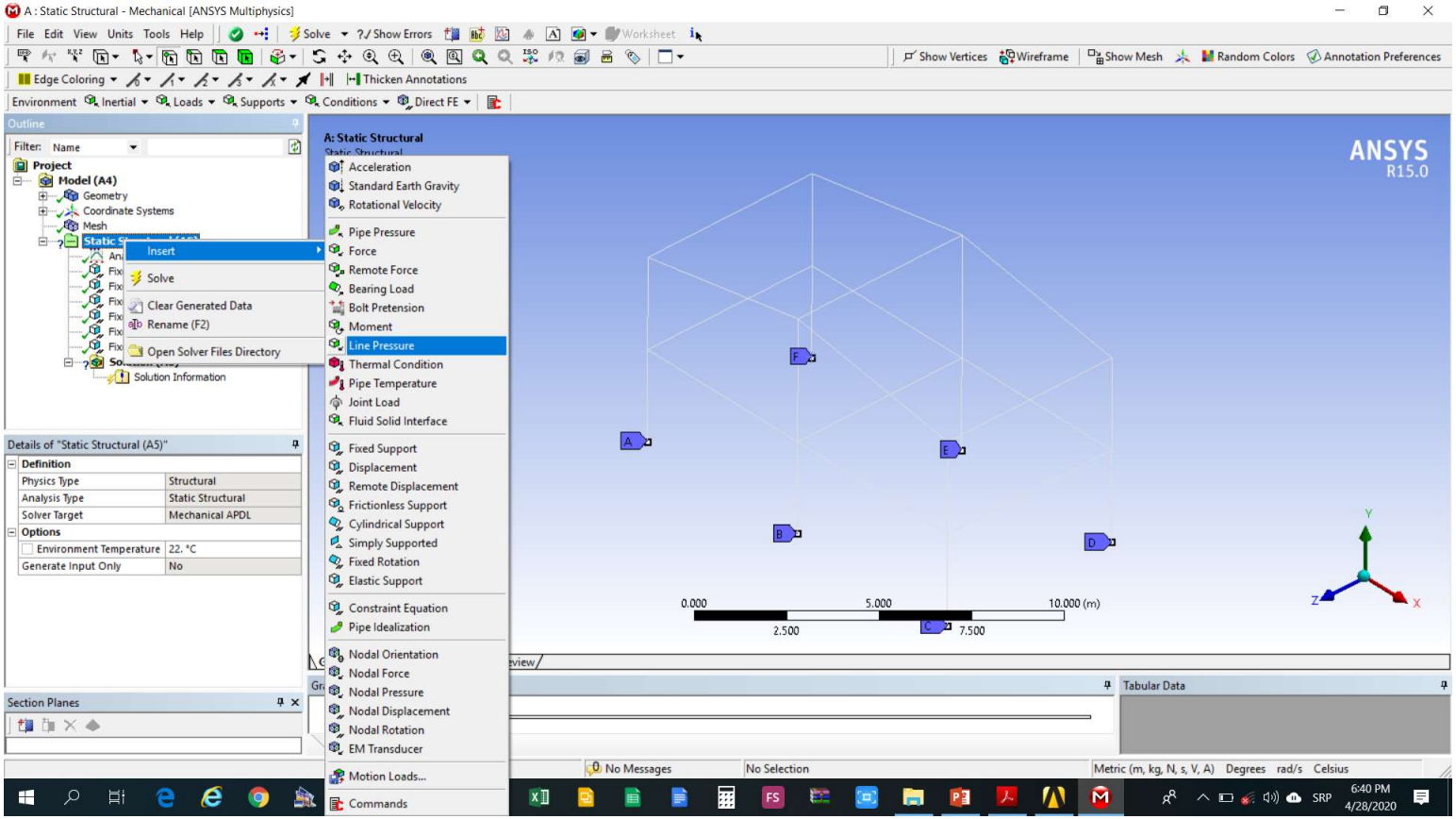
Modeliranje gredne konstrukcije

Postaviti nepokretne oslonce



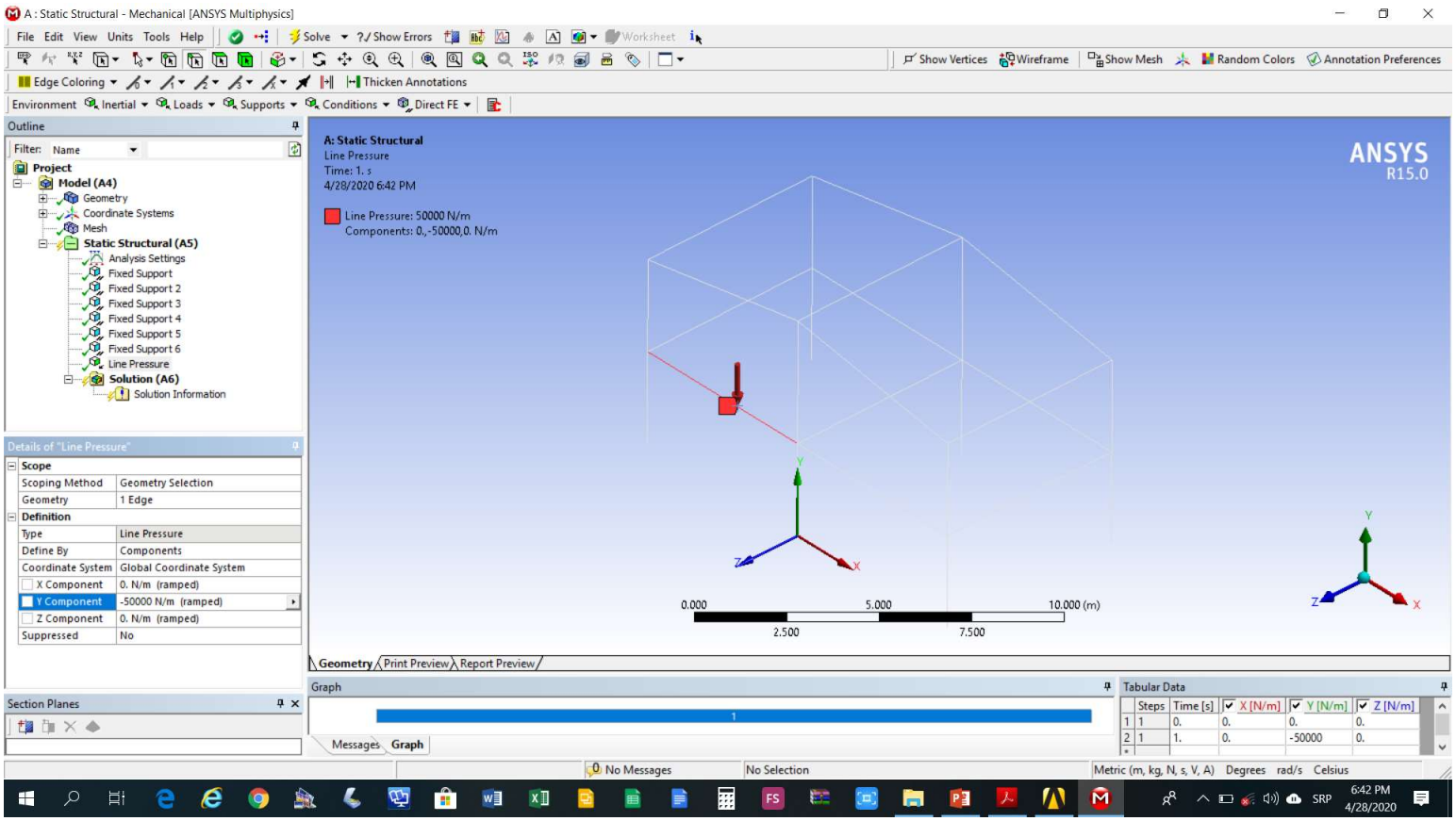
Modeliranje gredne konstrukcije

Zadati opterećenje



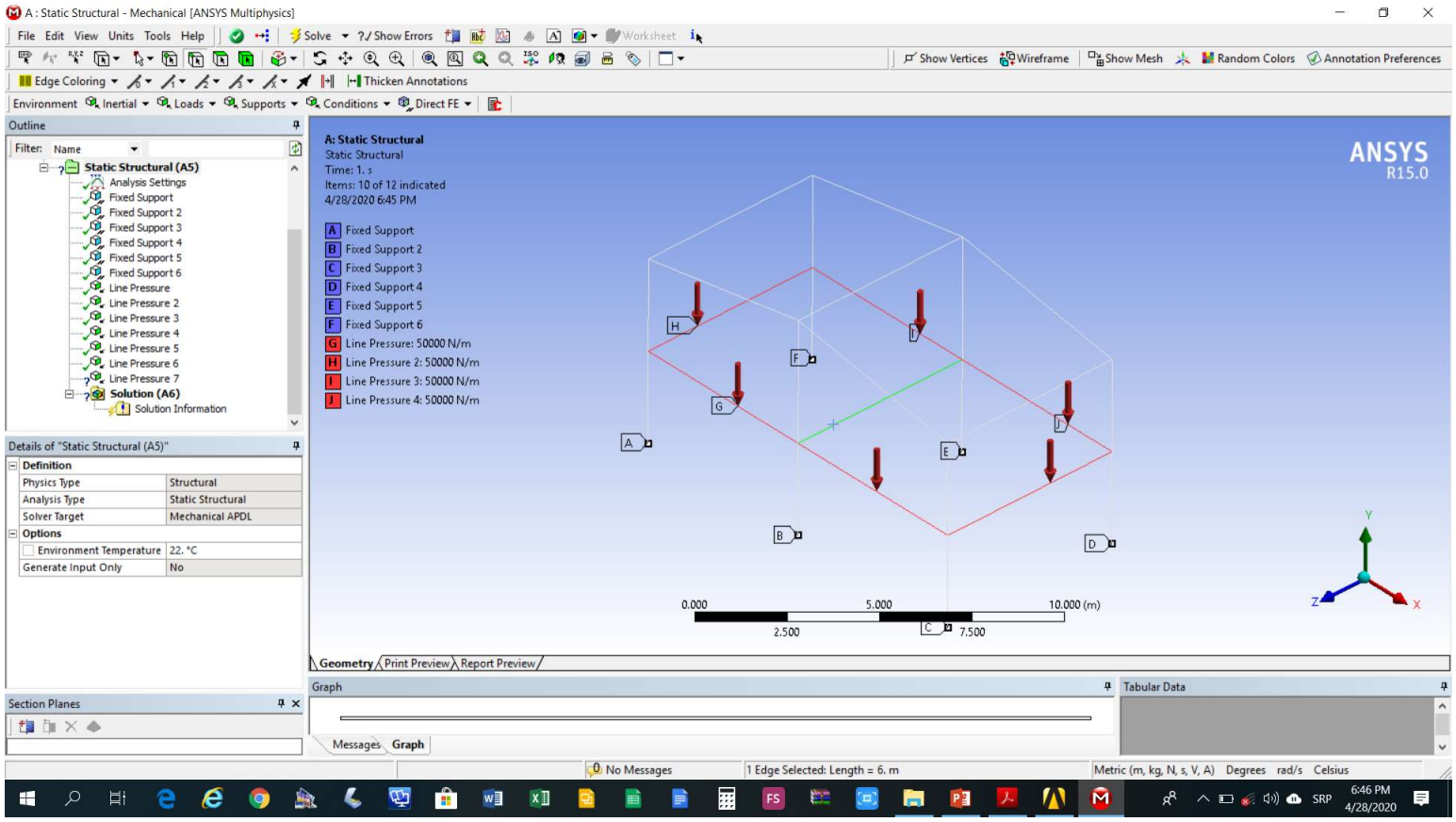
Modeliranje gredne konstrukcije

Podesiti parametre opterećenje (intezitet i greda)



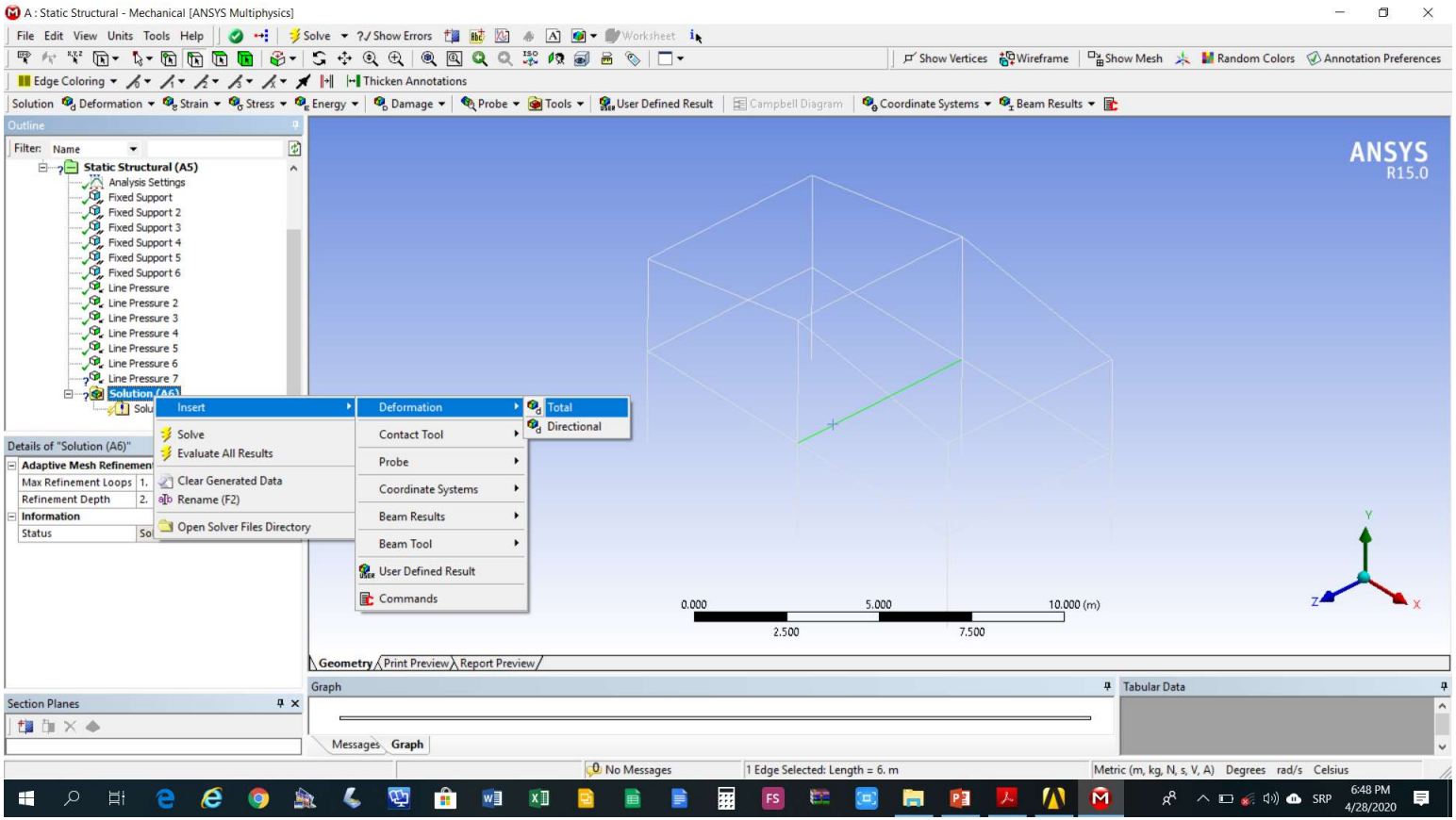
Modeliranje gredne konstrukcije

Oslonci i opterećenje gredne konstrukcije



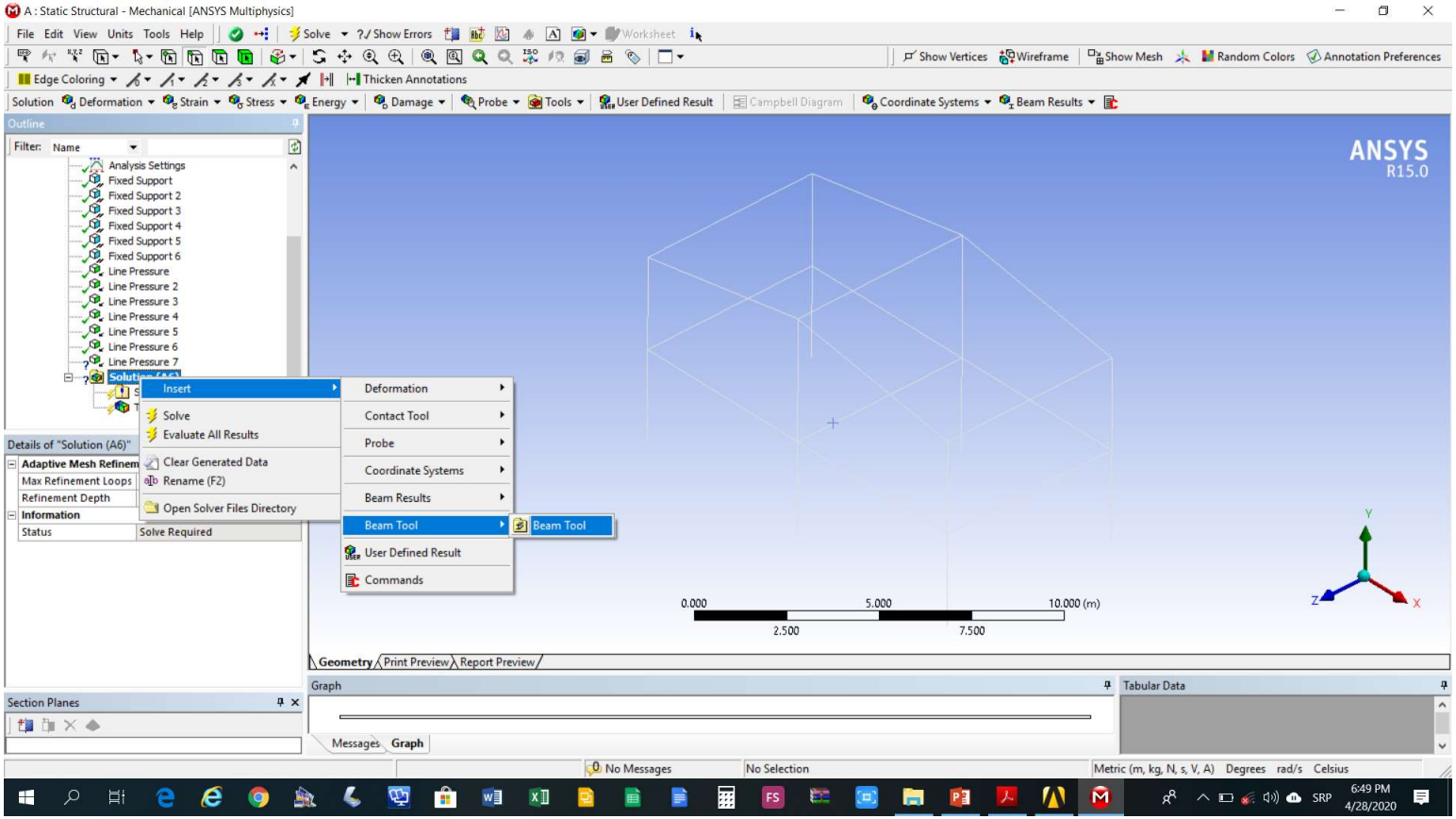
Modeliranje gredne konstrukcije

Izabrati analizu pomjeranja



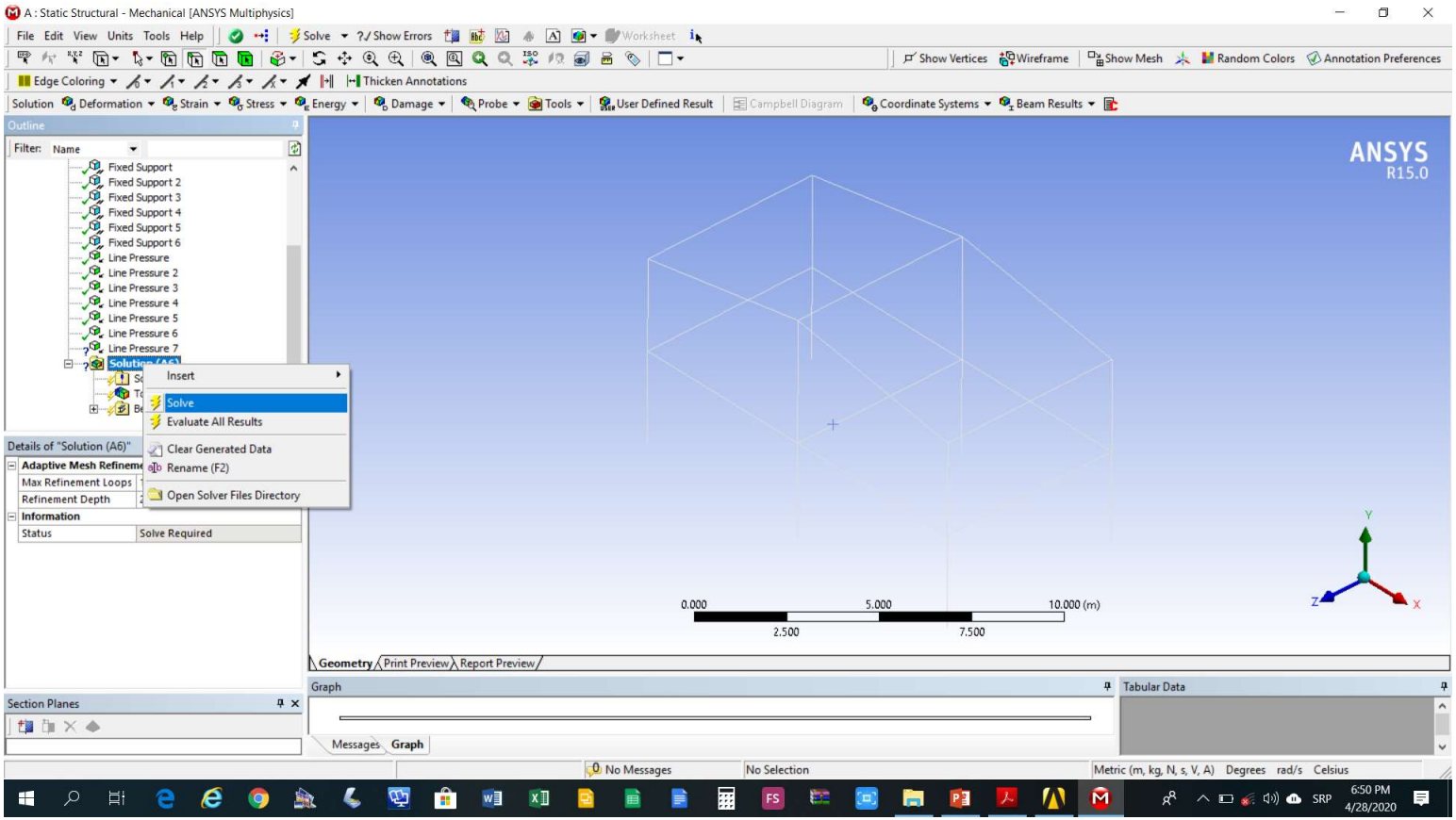
Modeliranje gredne konstrukcije

Izabrati alat za analizu grednih konstrukcija



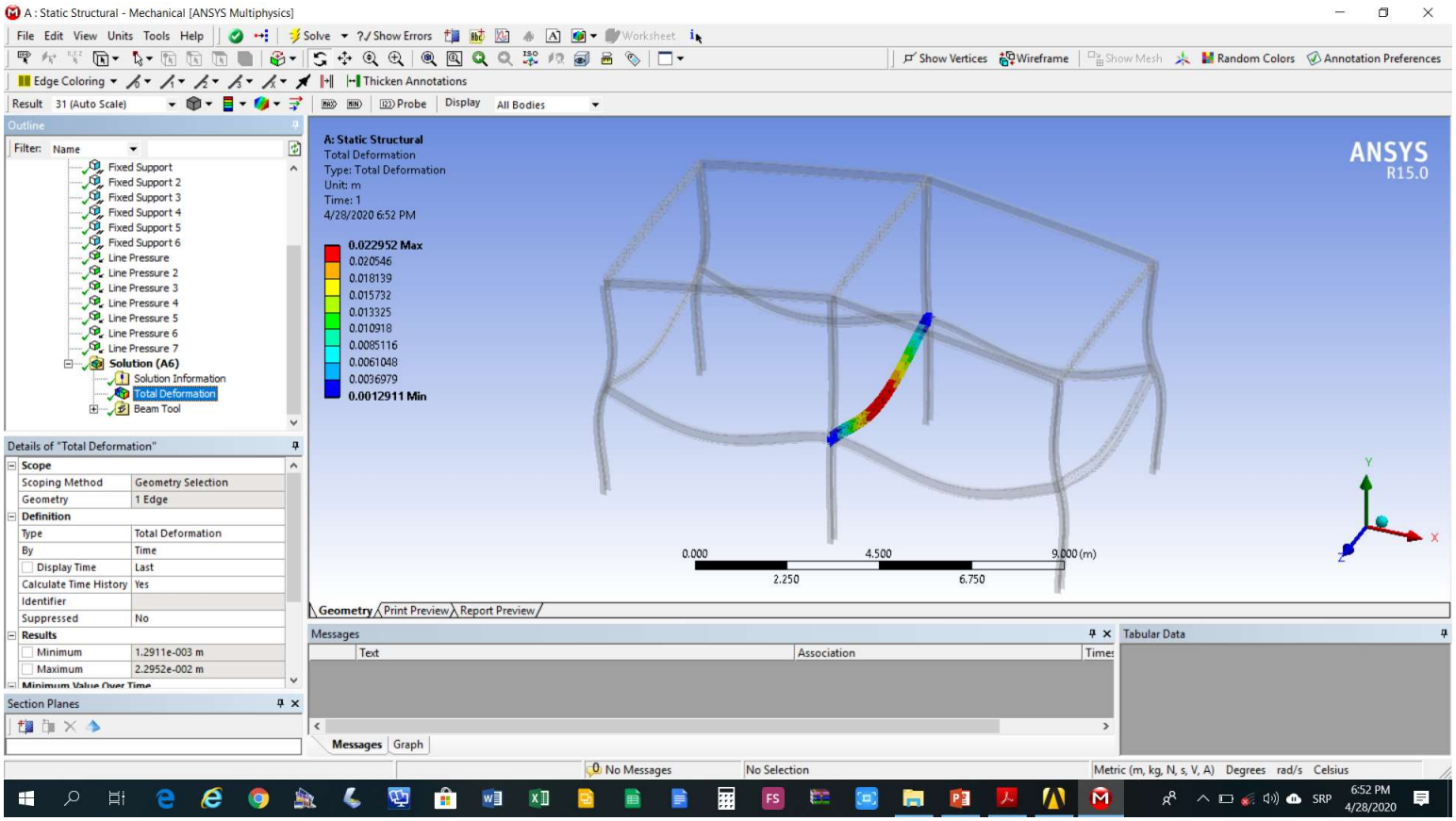
Modeliranje gredne konstrukcije

Aktivirati rješavanje problema



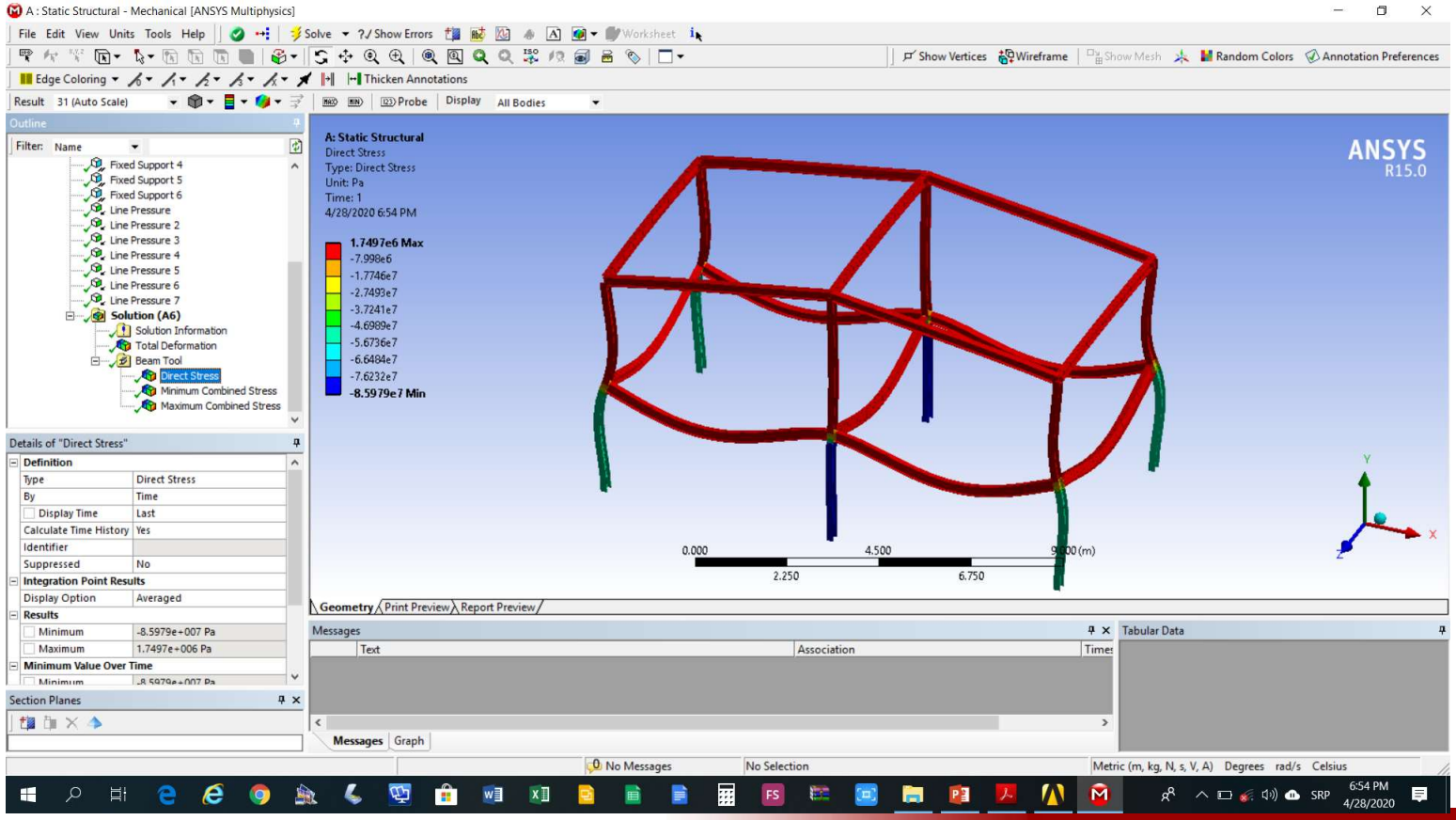
Modeliranje gredne konstrukcije

Pomjeranja konstrukcije



Modeliranje gredne konstrukcije

Aksijalni naponi konstrukcije (*Beam Tool->Direct Stress*)



Modeliranje gredne konstrukcije

Kombinocija aksijalnog napona i maksimalnog napona savijanja konstrukcije (*Beam Tool->Maximum Combined Stress*)