Bolt and Nut Specification Tables M16 2mm Pitch Coarse Threads Class 4.6 Bolt		
Proof Load	35.3	kN
Torque	112.96	Nm
Tensile Stress Area	157	mm^2
Tensile Strength	400	MPa
Proof Strength	225	MPa

M16 2mm Pitch Coarse Threads Class 04 Nut		
Proof Load	59.7	kN

Used for FEA Model AISI E4340 H Steel oil quenched 845 deg C temper 425 deg C		
Modulus of Elasticity	212	GPa
Poisson's Ratio	0.3	non-dim
Density	7.85	g/cc
CTE	1.24E-05	1/K
Yield Strength	1475	MPa
Fatigue Strength	614	MPa

The above information was taken from various websites. Bolts are standardized items, so there is no need in re-engineering them.

The proof strength is the maximum amount of stress the bolt can handle without permanently deforming.

The CAD model dimensions of the bolt, nut, and washers were also taken from various websites.

The bolt is a full thread 50mm length.

Bolt head fillet radius is 3mm.

mecway	241	MPa	tensile stress in the bolt shank, located behind the washer at top of nut (i.e. first thread)
diff	7%		

mecway	347	MPa	the bolt head fillet tensile stress is much higher though
diff	54%		

mecway	924.2	MPa	peak von mises stress, located in bolt head contact patch
diff	311%		

The FEA material properties for the bolt, nut, and washers are not the same as the part specification tables, because those properties aren't listed.

NL Static						
Solver	mins	sec	total (mins)	diff	iterations	notes
PARDISO	10	11	10.183	n/a	8	can handle slightly more nodes than pastix
PASTIX	8	54	8.900	-12.60%	8	had the computer reboot during solve, when node count was raised

178735   # nodes (this is about the max for 16GB of memory, PARDISO can go a little higher though)

533373   # equations

20190480   number of nonzero lower triangular matrix elements before contact   **diff**

22312374   number of nonzero lower triangular matrix elements after contact   10.51%

22.3   millions of equations solved (22 million equations is about the limit for 16GB of memory)

number of equations solved is the true metric, to gage memory usage. however, that is not known prior to solve. node count can be used instead, with some caveats. it's most accurate when there is no contact. node count varies a lot with type of analysis as well. i have had times when i could solve 1-3 million nodes. other times only 100-200k.