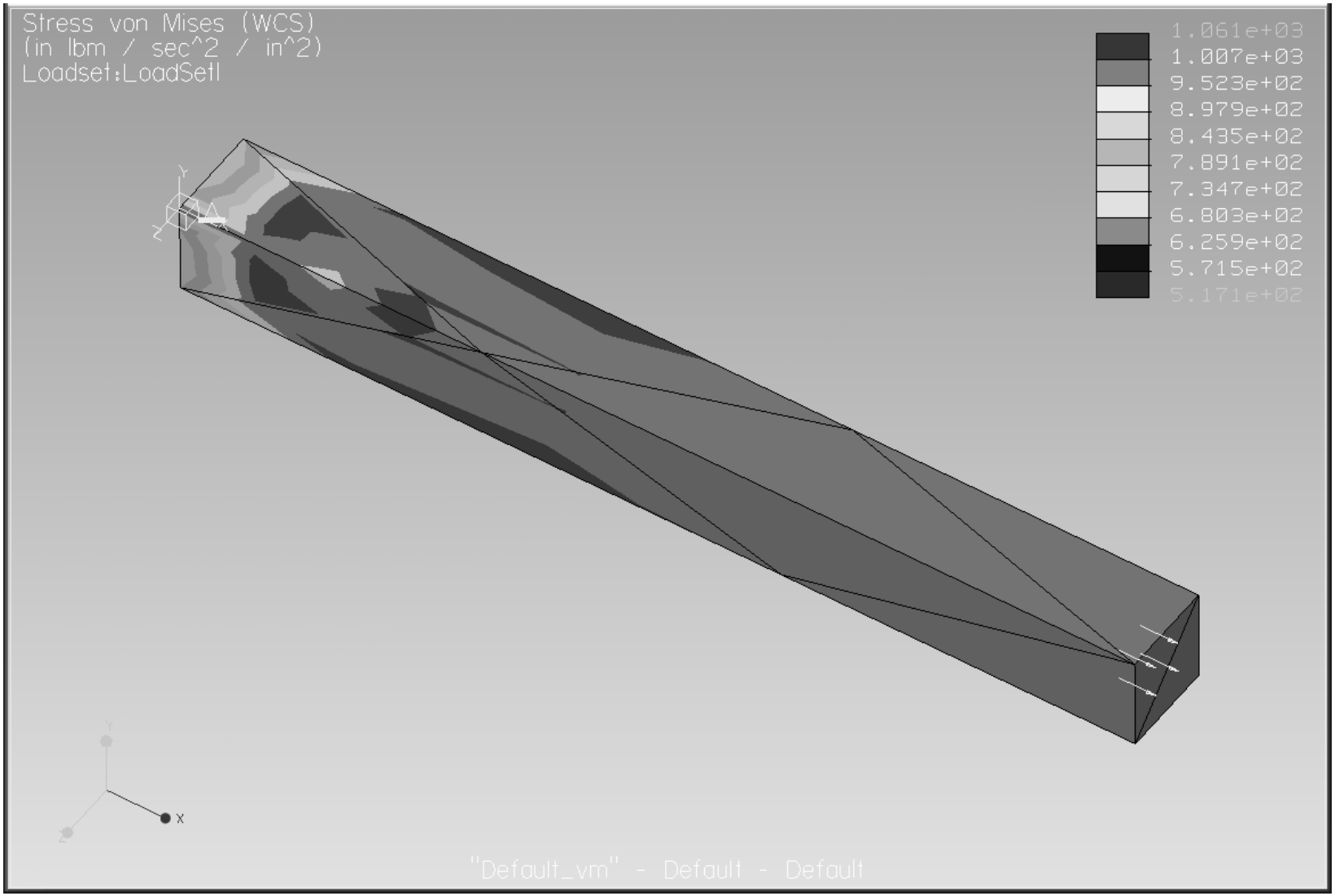
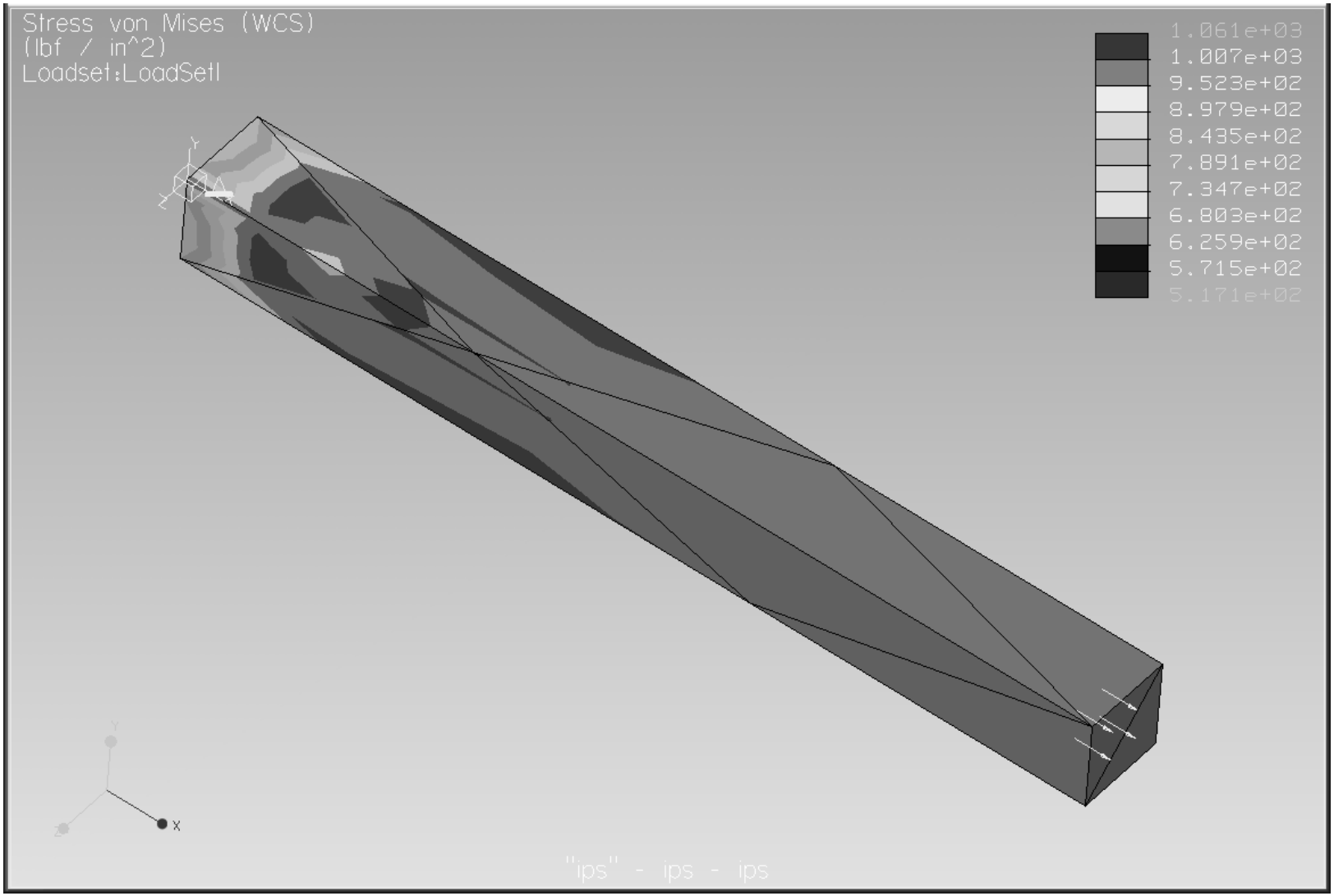
Units

Examining the units used in Mechanica

Default Pro/E Units



IPS – inches, lbf, seconds



Results

	Elements	Passes	Displacement	VM Stress
Default units	12	5	**2.433×10^{-6}**	1060
IPS units	12	5	**9.39×10^{-4}**	1060

What is the Difference?

$$\frac{9.39\times10^{-4}}{2.43\times10^{-6}} = 386.4$$

$$32.2\times12 = 386.4$$

g * in/ft = ft/sec^2 * in/ft = in/sec^2

How Units are Selected

- Choose units for time, length, and either force or mass
- Derive other units from these
  - Use F = MA to relate force and mass
  - Use gravity for the acceleration – its units are expressed in units of time and length that you selected

Default System

- Units Selected
  - Length in
  - Mass lbm
  - Time seconds
- Derived Units F=MA
  - Gravity 386.4 in / sec^2
  - 1 lbm = 1 lbf / 386.4 force = lbf/386.4
  - Pressure = psi/386.4

IPS System

- Fixed Units
  - Length in
  - Force lbf
  - Time seconds
- Derived Units F=MA
  - Gravity 386.4 in / sec^2
  - 1 lbf = 386.4 lbm force = lbf
  - Pressure = psi

Common Mechanica Units

	SI MNS	mmNs	FPS	IPS	Default
Length	m	mm	ft	in	in
Time	sec	sec	sec	sec	sec
Gravity	9.81 m/sec^2	9810 mm/sec^2	32.2 ft/sec^2	386.4 in/sec^2	386.4 in/sec^2
Mass	kg	1000kg	slug	$lbf\text{-}s^2/in$	lbm
Force	N	N	lbf	lbf	lbf/386.4
Press	Pa	MPa	psf	psi	psi/386.4