ASSESS YOUR **RISK**

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The point of this exercise is not to get precise numbers, but to get a sense of the range of potential impacts you may encounter in the kind of turning you do.

1. Choose an unturned blank that is typical of what you turn. Weigh it and a finished object of similar size, using kilograms as your unit. Divide the weights—half, a third, a quarter, a fifth—to estimate the weight of typical fragments.

2. Convert the diameter of your blank and object to meters and multiply by π (3.14) to get their circumference.

3. Choose a few lathe speeds typical of what you would use for a blank of your chosen size. Divide each lathe speed by 60 to convert it to revolutions per second.

4. Multiply the circumference by the converted lathe speeds to get the velocities in meters per second.

My riot helmet and half-mask respirator

Photo: Karen Barber

5. Find the kinetic energy (the energy of an object in motion) of the potential projectiles by multiplying mass times velocity² times ½, or ½mv^2. In other words, plug the velocities and the estimated weights of various fragments into the following formula:
   0.5 × kg × m/sec² = joules

   (Notice that, in contrast to mass, velocity affects kinetic energy exponentially.)

6. Compare the numbers you get with the following figures:
   - 4.4 joules: the impact standard for American faceshields
   - 15.5 joules: the impact standard for European ("high energy resistant") and Australian and New Zealand ("extra high impact resistant") faceshields
   - 111.1 joules: the impact standard for American riot helmets

Is your faceshield adequate?

Comparison of kinetic energy values

Regulatory test or example	Condition	KE (joules)
Z87.1 non-impact test	1" steel ball dropped from 50"	0.8
Z87.1 high-velocity impact test: glasses	¼" steel ball traveling 150 ft/sec	1.1
Z87.1 high-velocity impact test: faceshield	¼" steel ball traveling 300 ft/sec	4.4
Z87.1 penetration test	500-g pointed projectile dropped from 50"	6.2
AS/NZS 1337.1 high impact resistance test EN 166 medium energy impact test	6-mm 0.86-g steel ball traveling 120 m/sec	6.2
AS/NZS 1337.1 extra high impact resistance test EN 166 high energy impact test	6-mm 0.86-g steel ball traveling 190 m/sec	15.5
0104.02 impact test	5.1-kg assembly traveling 6.6 m/sec	111.1
0104.02 penetration test	3-kg pointed striker dropped from 3.00 m	88.2
My accident	1-kg fragment of 10"-dia. vessel turning at 1200 rpm	127.2
Bowl fragment 1	0.05-kg fragment of 7"-dia. bowl turning at 1200 rpm	3.1
Bowl fragment 2	0.05-kg fragment of 7"-dia. bowl turning at 2200 rpm	10.5
Platter fragment 1	0.05-kg fragment of 12"-dia. platter turning at 1200 rpm	9.2
Platter fragment 2	0.2-kg fragment of 12"-dia. platter turning at 1200 rpm	36.6