

Reflex System Firearm Design Guidelines

Step 1: Dimensions

Weight: The *unloaded* weight of the gun in kilograms. Round to one decimal place.

Examples:

Beretta 92: unloaded weight is 950g, rounded to 1.0 kg.

Colt M4A1: unloaded weight is 2.52 kg, rounded to 2.5 kg.

Generic pump-action .410 shotgun: we'll choose the Mossberg 500 as our prototype for this. Unloaded weight is 3.3 kg.

Bulk: Assign as per the following table:

<u>Bulk Value</u>	<u>Weapon</u>
1	Standard handgun (including machine pistol)
2	Submachine gun Carbine with a total length under 2'6" (76cm) Handgun with a barrel length greater than 8" (20cm). Holdout shotgun (short barrel <i>and</i> no stock)
3	Assault rifle Carbine with a total length greater than 2'6" (76cm) Assault shotgun (short barrel <i>or</i> no stock) Stand-alone grenade launcher
4	Light machine gun/SAW Sniper or hunting rifle Hunting shotgun
5	Medium machine gun/GPMG Anti-material rifle

Examples:

Beretta 92: standard handgun; Bulk 1.

Colt M4A1: carbine, length 84cm with stock extended; Bulk 3.

Generic .410 pump shotgun: standard hunting shotgun, Bulk 4.

Caliber: As per real-world fact.

Capacity: As per real-world fact. If the weapon does not feed from a detachable magazine, tag capacity with one of the following notations, as appropriate:

- (in) internal magazine
- (cy) revolver-style cylinder
- (bt) belt

(si) single rounds held directly in firing position (e.g. break-action shotgun)

Examples:

Beretta 92: standard magazine-fed; Capacity 15.

Colt M4A1: standard magazine-fed; Capacity 30.

Generic .410 pump shotgun: internal magazine; Capacity 5(in).

Step 2: Ballistics

Damage and Penetration: Calculate using the JavaScript tool.

For handguns and SMGs, use muzzle velocity/energy. For rifles and machine guns, use velocity/energy at 100m. Whenever possible, use mil-spec full metal jacket (ball) ammo for these calculations. If it's unavailable, use the closest equivalent.

For shotguns, use standard lead slugs at muzzle velocity/energy. Don't calculate shot; it'll be based on slugs, with effects depending on range. After doing your crunching, use the JHP/Soft/Expanding values, as slugs aren't jacketed and will deform more.

Save your muzzle energy values (even for rifles); you'll need them later.

Examples:

Beretta 92: 9mm 124gr ball. Federal Cartridge says this has muzzle energy of 364 foot-pounds and muzzle velocity of 1,150 fps. Calculator gives us Damage 4, Penetration x2/x3.

Colt M4A1: 5.56mm 62gr ball. Federal gives this one 1,030 foot-pounds and 2,713 feet per second at 100 yards (close enough to 100m; remember, we aren't using muzzle figures for rifles). Calculator says... Damage 6, Penetration x1/x2. For future reference, save the muzzle energy: 1,255 foot-pounds.

Generic .410 pump shotgun: The only load available on Federal's site is a hollowpoint, so we'll reluctantly take that. .410" diameter, muzzle energy 762 foot-pounds, muzzle velocity 1,775 fps. Calculator gives us Damage 6, Penetration x2/x3 for ball-type ammo. This becomes Damage 7 and Penetration x3/x4 for slug.

Range: Unless you have a weird outlying weapon with odd ballistics, assign range ratings as per the following table. Remember that Range is written is a double rating: "Optimum/Maximum".

<u>Weapon Type</u>	<u>Optimum Range</u>	<u>Maximum Range</u>
Handgun (tiny hold-out)	Personal	CQB
Handgun (standard)	Gunfighting	CQB
Handgun (ridiculously large hunting)	Gunfighting	Tight
SMG	CQB	Tight
Shotgun (cut-down barrel)	Gunfighting	CQB
Shotgun (standard barrel)	CQB	Tight
Carbine	Tight	Open
Assault rifle	Medium	Sniping
Sniper rifle	Open	Extreme
Anti-material rifle	Sniping	Extreme
Light machine gun (SAW)	Medium	Sniping
Medium machine gun (GPMG)	Open	Extreme

Heavy machine gun

Sniping

Extreme

Examples:

Beretta 92: Standard handgun. Gunfighting/CQB.

Colt M4A1: Carbine. Tight/Open.

Generic .410 pump shotgun: Standard barrel. CQB/Tight.

Rate of Fire: If the weapon fires single shots, "S".

If it has a regulated burst setting, "B#" where "#" is the number of rounds per burst.

If it is capable of fully automatic fire, "B#" where "#" is the cyclic rate in rounds per minute divided by 150.

In the case of a weapon with multiple rates of fire, list them from lowest to highest, with slashes dividing them. For example, "S/B3/B5".

Examples:

Beretta 92: Semi-auto handgun, only capable of single shots. "S".

Colt M4A1: Full-auto capable, no regulated bursts. Various sources report the cyclic rate to be between 750 and 950 rounds/min. We'll go with the low end, which seems to be reported more commonly. $750/150 = 5$. "S/B5".

Generic .410 pump shotgun: Definitely not full-auto capable. "S".

Step 3: Performance

Speed: This is a three-part value, measuring the tick cost for hip, snap, and aimed shots with the weapon. It's written "X/Y/Z":

Hip shot speed	Bulk
Snap shot speed	Bulk x 1.5
Aimed shot speed	Bulk x 2.25

Round decimals normally.

Because carbines and assault rifles are both Bulk 3, carbines need to reflect their lesser size and weight. For a carbine or a bullpup-configuration assault rifle, reduce snap shot speed and aimed shot speed by 1.

Conversely, weapons with manual actions are slower to operate. Increase the effective Bulk of a bolt-action rifle, pump-action shotgun, single-action revolver, or other such beast by 1 when calculating Speed.

Added per Gunstravaganza: Lever-action rifles are +0/+1/+0.

In all cases, including the carbine and bullpup exceptions above, snap shot speed must always be at least 1 greater than hip shot speed, and aimed shot speed must always be at least 2 greater than snap shot speed. In other words:

$$\text{Snap} \geq \text{Hip} + 1$$

$$\text{Aimed} \geq \text{Snap} + 2$$

Examples:

Beretta 92: Bulk 1. Hip shot speed 1. Snap shot speed $1 \times 1.5 = 2$. Aimed shot speed $1 \times 2.25 = 2$. "Speed: 1/2/2". However, we can't have a weapon whose aimed speed is so close to its snap speed. "Speed: 1/2/4" is our final result.

Colt M4A1: Bulk 3. Hip shot speed 3. Snap shot speed $3 \times 1.5 = 5$. Aimed shot speed $3 \times 2.25 = 7$. "Speed: 3/5/7". Because it's a carbine, we reduce snap and aimed speeds by 1 each. "Speed: 3/4/6". This still follows the minimum difference requirement, so that's our final value.

Generic .410 pump shotgun: Bulk 4, but this is considered 1 higher because the weapon uses a manual action. Hip shot speed 5. Snap shot speed $5 \times 1.5 = 8$. Aimed shot speed $5 \times 2.25 = 11$. "Speed: 5/8/11" is the final answer.

Recoil: Divide the weapon's muzzle energy (in Joules) by its weight (in kilograms) x 75. In other words:

$$\text{Recoil} = \text{muzzle energy} / (\text{weight} \times 75)$$

Examples:

Beretta 92: Muzzle energy is 364 foot-pounds, which converts to 494 Joules. Weight is 1 kg. $494 / (1 \times 75) = \text{Recoil } 7$.

Colt M4A1: Muzzle energy (remember, we said to save that!) is 1,255 foot-pounds, which converts to 1,702 Joules. Weight is 2.5 kg. $1,702 / (2.5 \times 75) = \text{Recoil } 9$.

Generic .410 pump shotgun: Muzzle energy is 762 foot-pounds, or 1,033 Joules. Weight is 3.3 kg. $1,033 / (3.3 \times 75) = \text{Recoil } 4$.