

Let's Talk About ...

The SPLAT Factor



John Rosenthal

Many people are unaware of the factors involved in Fall Protection. The mantra for fall protection is: **Eliminate, Prevent, Control.**

Eliminate means do what you can to make sure a fall is impossible, even if it means building a scaffold horizontally on the ground and then having it lifted up into position.

May not be quite as silly as it seems. At least there is NO chance that a worker can fall from a height while building the scaffold.

Prevent means do what you can to avoid the possibility of a fall. Guardrails are the obvious answer. With guardrails in place, the chance of a fall is minimized. California has reduced the chance of falling over the top of the guardrail by raising it to 45 inches. At 36 inch height, the centre of mass of your body is above the top rail. If you lean over, the centre of gravity is then outside the scaffold and a relatively small force, like trying to lift equipment up from below, could cause you to tip over. With California's 45 inch height, there is no way you can get your centre of mass outside the scaffold.

Control: this is where Fall Arrest equipment comes into play. If there is a fall, Fall Arrest equipment is designed to minimize the force on your body. That's why you'll see labels on 6-foot shock-absorbing (energy absorbing)

lanyards stating that they have been designed to limit the force on the body to 900 lb.

But it is important to use the Fall Arrest equipment properly. Harnesses must be properly adjusted to each individual's body. Even more important is the location of the anchor point for the lanyard. If the lanyard is attached, as generally directed, at the height of the D-ring on the harness, nothing happens to protect a worker until the worker has fallen the length of the lanyard, or 6 feet.

That's when the shock absorber starts to deploy (extend). The shock absorber is designed to extend no more than 3½ feet. That means that the final length of the extended lanyard is 9½ feet.

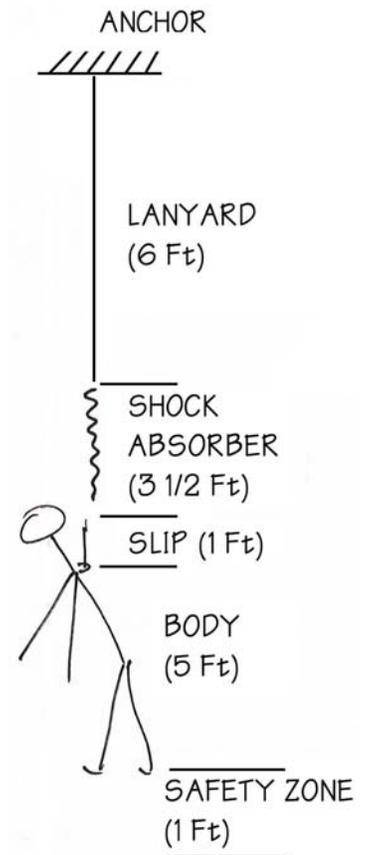
But that's not all that happens. You have to take into account the adjustment of the harness on the body and the potential slip of the D-ring (which might be the same thing). We have to allow another foot for that.

Then you have to remember that the D-ring is located approximately 5 feet above your feet!

And then, to make sure that you don't "bottom out," you need to have at least one more foot of clear space beneath your feet when the fall is finally "arrested."

So that means that you need to have a minimum of 16½ feet of clear space beneath the lanyard attachment point in order to make sure that your feet don't hit the ground.

That doesn't help very much when you're building a scaffold and you're on the second



TOTAL = 16 1/2 Ft

tier, attempting to set the third tier of frames, for example. If you're doing maintenance on a

building, you can probably attach to some point above you. But if you're in the process of constructing the building, you only have the scaffold you're standing on. So how do you protect yourself? That's a very good question and there isn't much of an answer except for Advance Guardrails.

But that's not the point of this presentation. The point here is to make you aware of the requirements of Fall Protection and the consequences of not having it.

When you're watching television and the "bad guy" falls from the top of a 20-storey building and lands on the ground, the picture you get to see is of a guy lying on the ground with a pool of blood beneath him – almost as if he's just fallen asleep on the floor. BUT THAT AIN'T REALITY!

I won't try to describe what the sight really looks like, but consider the force on the body if there is no Fall Arrest equipment on.

So if you're in a situation where you're on that second tier, let's just say that you're using 5x5 frames, you're 10 feet up and you can only attach at your feet. We already said that you need 16½ feet if you're attached at the level of your D-ring, so now you need another 5 feet beneath you. That's 21½ ft and you've only

got 10! So you fall 10 feet with no shock absorber. You hit the ground with the force of a good size pickup truck! OUCH!

I don't have the answer for this situation. Some people say that SRL's may be a solution. Self Retracting Lanyards are good, but they need to be used properly, too.

SRL's are intended to be attached to the anchor point, with the extended lanyard attached to the D-ring. This works out so you have a minimum of free travel before the locking mechanism engages, sort of like the action of a seat belt in an automobile.

Unfortunately, some people think that the SRL gets attached to your D-ring, and the lanyard goes out to the anchor point. If the SRL is used this way, and you fall, that huge hunk of plastic (or whatever it's made of) is going to flip up and smack you in the back of your head, causing hurt and probably even knocking your hard hat off.

There are special units intended for mounting on your back, but they have special connection arrangements to avoid what I just was talking about.

Another consideration is, if you've connected the SRL correctly, you have to make sure that

the line doesn't travel over a ledger, for example, because that slows the deployment of

the lanyard, and it'll let you fall the full length of the line before stopping you. And you might not be slowed down enough to keep that force on your body, at the end, within the prescribed limits.

The next thing you have to consider is – if you have a fall, what then must be done for rescue. Think about if you're hanging from your lanyard, attached to something 11½ feet above your head, how do you get back onto a solid foundation? And how long is it going to take to get you out of that "hanging around" situation. Any length of time more than 15 minutes is going to do you serious harm.

The point of this essay is to make you aware of why Fall Protection is required and to make you think about what's likely to happen to you if you have a fall, and you aren't hooked up correctly.

John Rosenthal, P.Eng. is President of Dunn-Wright Engineering Inc., in Caledon, Ontario. Rosenthal also serves as SIAC International Director. E-mail him at: johnr@Dunn-Wright.ca

This bit is called *Physics of a Fall*:

| ELAPSED TIME | DISTANCE TRAVELLED | VELOCITY FT. PER SEC. | SPEED MPH | FORCE AT IMPACT |
|--------------|--------------------|-----------------------|-----------|-----------------|
| 0.00 | 0 | 0 | 0 | 0 |
| 0.25 | 1 ft | 8 | 5.5 | 400 lb |
| 0.50 | 4 ft | 16 | 11 | 1,600 lb |
| 0.61 | 6 ft | 20 | 14 | 2,400 lb |
| 0.75 | 9 ft | 24 | 16 | 3,600 lb |
| 1.00 | 16 ft | 32 | 22 | 6,400 lb |
| 1.25 | 25 ft | 40 | 27 | 10,000 lb |
| 1.50 | 36 ft | 48 | 33 | 14,000 lb |
| 1.75 | 49 ft | 56 | 38 | 19,600 lb |

These calculations were based on a 180 lb worker carrying 20 pounds of tools.