

Is Your Laser Show Safe?

A Conversation With

**Roberta McHatton
Laser Safety Systems**

With Tim Bennett

Of ArgonTV

Is Your Laser Show Safe?

The following is a transcript of an interview between Tim Bennett ([ArgonTV](#)) and Roberta McHatton (Laser Safety Systems)



Is your Laser Show Safe?

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Laser Safety Guidelines and Laser Safety Standards

Tim Bennett: Laser safety guidelines and laser safety standards.

That's our topic for today's discussion, or in other words, is your laser show safe.

Well, today I have someone very special. We have our very own laser safety officer with us to discuss laser safety and that's gonna be the topic of our conversation.

I have got my black shirt on – my interview shirt.

I've got my notes.

I've got my coffee. I'm ready to go. And the most important question of today is...

Roberta McHatton... How are you today?

Roberta McHatton: I'm good Tim.

Thank you so much for inviting me to do this interview that looking forward to it.

Tim Bennett: It's excellent. And thank you for coming here...

You know, we're going to be talking about laser safety which, in, in my opinion. is one of the most important topics that is so much overlooked by so many people...

...Because they literally either don't know the safety regulations in place and that laser offers some potential hazard or they don't care!

And one of the things that you mentioned to me in the pre-amble of all of this was how many lighting designers, you're working with.

I found that to be really, really interesting!

So laser safety is going to be our topic...

I'm really grateful to having you here.

And for those people who don't know you...

And how don't they know... you've been in the industry for 25 years?

Roberta McHatton: Yep about 25 years

Tim Bennett: Let's just talk about you for a little while.

You have been working with some incredible people over 25 years and you send me a list of some of the people that you have been working with...

Such as the Federal Aviation Authorities (FAA), such as....

Let me just check my notes.

The Pet Shop Boys...

Roberta McHatton: Yes, right.

Tim Bennett: Such as the iHeart Music Awards and America's Got Talent...

Roberta McHatton: Yes.

Tim Bennett: Did you get to meet Simon Cowell?

Roberta McHatton: No, I haven't actually been there in person.

Tim Bennett: Okay, because you know Simon's British and so am I!

And then you've worked with two of my favourite bands Metallica, and Queen!

Roberta McHatton: Yes.

Tim Bennett: Which is awesome.

So why don't you just give us a little bit of intro into you what you've been involved in and what you've been doing.

Roberta McHatton – Laser Safety Officer



Roberta McHatton: Well, I got started in this business, many years ago for a company called Laser Fantasy International...

They did basically planetarium shows, so it was graphics with some beam ballets and then we made lasers as well...

When I went to work for them they hired me and put the safety hat on me and I learned everything literally in the two weeks, it took for the predecessor to leave the company.

And it was a little intimidating, because I really didn't have a background in physics, nor did I have a background...

...I was by then a little bit familiar with lasers, but I, too, hadn't realised when I first saw lasers that they were a hazard or what the risks would be involved...

...and fortunately that company sponsored me to go and participate in the standards such as American National Standards Institute ([ANSI – Z136](#)) that's safe use lasers.

Use of lasers is different than of course projectors.

That's a different topic...

But anyway...

And then as you mentioned, the FAA, Federal Aviation Authority, where they also had me participate with Society of Automotive engineer.

What I do on those committees and have been involved with for 25 years is help create the standards that we have to live by, in practice.

And I never thought I'd find it interesting.

I don't have a background in physics, but here I'm working side by side and now, most of these people are from NASA, military medical professionals and they have doctorates in physics.

I was very intimidated.

When I first started, but they were all very kind and gracious and I've had some wonderful mentors over the years.

And we're still very actively involved in that aspect, through that and then of course through working for the company, I got to know the other side of laser safety, as far as the standards being applied and regulatory format, such as the regulations that were they become laws, you have to live by.

In the United States we there's certain things you have to do here and other places in the world.

It's more a harmonised with the standards.

Anyway, been doing this for about 25 years and then Laser Fantasy, and when the change happened in lasers and we all remember that...

...when it went from gas lasers to the diodes and the DPSS ([Diode Pumped Solid State](#)) and the OPAL ([Optically Pumped Semiconductor Lasers](#))...

...the owner of the company I was working for decided he was done, and he retired and moved to Maui...

...can't say as I blame him.

And in that I thought I was actually done with the industry at that point.

Because where are you going to go?

I was basically working for the largest laser company in the United States at the time, not the only one, but definitely one of the largest ones, and I didn't really think there was a need.

Fortunately, I had a friend. in the standard business who said, you know, *"you should put it out... your web... your shingle... your website... because what you do is so specialised there may be a need for it."*

And about five years after that, I started being wooed by several companies around the world.

Ever since then, I've been doing consultation.

Fortunately, I'm working really primarily with a company out of England, ER Productions.

But I have also, I'm still doing variances, which you have to get in this country, to operate lasers, for laser safety, for laser shows, in the United States.

I do laser safety officer training and then I do you know outside some consultation as well.

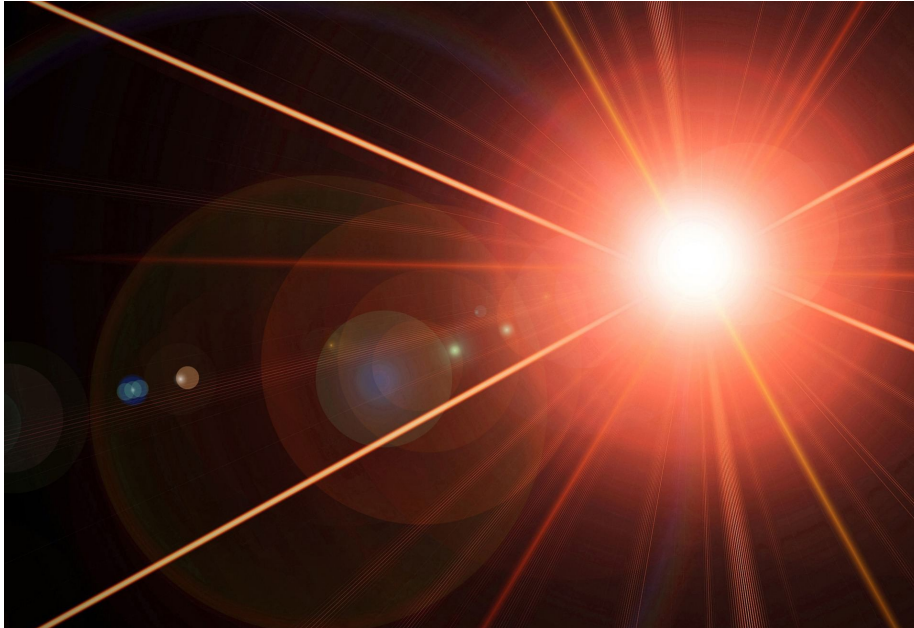
Tim Bennett: Alright, that's amazing. That's, that's, that's quite a journey in five minutes.

Roberta McHatton: He has been... it has been...

Tim Bennett: And you are based in the US? Correct?

Yes, I happened to be out of Seattle, but the wonder of the world these days, you can do almost anything internationally. Yeah.

Let's Talk Laser Laws



Tim Bennett: Okay. Sorry to interrupt. Sorry.

So how does the, the laws or regulations in the US, differ from UK and Europe? Is there much difference or are they pretty similar?

Roberta McHatton: Laser safety is going to be pretty much the same worldwide.

The law aspect of it, can be very different from country to country.

As, as in the in UK, for instance, there was a law that was, I can't remember the name of it, that was just recently dropped because the laser show industry in the UK has done such a good job.

There haven't been many reported accidents or incidences.

There's self monitoring that they now are just trusting the industry to handle itself, but they also implemented inspections.

In the United States, we're such a large country that is very hard to monitor the safety in practice.

So over here we have to get a variance from the federal code ([CFR1040.10.11](#))

And we have to ask permission to use lasers in an open beam pass setting, which is otherwise not allowed, because we're always using very powerful lasers.

We're using class 3b and class 4 lasers.

You have to have high power lasers or you can't see it.

What's the point?

Laser Show wise...

So in this country, you have to do that process.

And I'm very familiar with that process.

I've done it so many times over the years.

So it's kind of a unique skill and of course it's not easy.

I don't know how much you want me to go into detail, but you know, you go to the federal government...

...they have two branches, you have to submit paperwork to each one.

They have to talk to each other.

You hope they come out at the other end and you actually get the variance.

A lot of things get lost in the middle and have been over the years.

So it's been a learning curve for them.

Then in, say as far as I know, in China or I think Australia, is the only other one that has regulatory expectations in general, when you do a laser show...

Laser Safety And The Airlines



A lot of countries are very concerned about laser safety when you're in airspace.

So there's definite expectation that you will at least let them know.

And a lot of them will have a form that you fill out.

That we're you are telling them how powerful it is... that so many at such a distance from the laser, what kind of impact and they either, you know, they either object or not object.

They never approve, and that can vary from country to country...

Some countries really that don't care that much unless you happen to, you know, be near an airport and then then, only maybe it... it varies.

There's no real standardisation, but in practice, everybody should be aware that lasers can be hazardous and what they need to do to mitigate the hazards.

Tim Bennett: Yes, and you, you just raised a very interesting comment about aviation and we'll talk more in a little bit about laser safety.

However, when Coldplay came out to Manila, we were working with Strictly FX, who were supplying the lasers and we were asked to [liaise with our local Aviation Authority and Strictly FX to make sure that the lasers were okay](#) and the aviation authority here, were actually very disturbed about how much affects...

...not just lasers, but sky-trackers and all sorts of lights... were going into the cockpits and how so many airlines, were now starting to complain about this as an issue.

Is I think it's something we really need to take into consideration

Roberta McHatton: Yes, in the beginning, it depends on the country and if they had an incident or not.

And unfortunately, in the United States, for instance, we had a horrible incident, the very first time they became aware that lasers and aerospace might be an issue, and that was in Las Vegas, and flash blinded a pilot to such a degree, that he wasn't he couldn't see the runway to touch down and so...

...and so his co-pilot could see

And it was, it was very unfortunate because I put a very bad taste in the mouth of the FAA, as far as dealing with lasers, and / or the search lights, bright search lights.

You know, interestingly enough, there hasn't been reported incidents since then, done by a laser show company.

There are strikes, all the time by laser pointers or handheld lasers, but laser show companies have too much to lose.

So they tend to be fairly responsible about it and in truth, you're not going to get biological injury, but if you if you ever seen a laser on glass, you'll see how it blooms.

And that's the problem, and causes such a glare.

You want to be careful about that whenever, you're shooting like onto a bridge or over traffic and you don't ever want to drop into windshields...

But anyway, then in England, for instance, they've never had a bad incident and they're really pretty good to work with over there and they tend to be a very safety oriented culture and and you know it's I'm surprised at how I won't say '*lackadaisical*' that wouldn't be appropriate, but how '*comfortable*', they are with having laser activity with (companies) they know, the companies they trust them.

There is that degree of trust, even in this country now.

There are some companies that have a greater degree of... the authorities have more of, they're comfortable with them.

They feel like okay we these guys are not going to be a problem.

Other times, they'll say no, just because they don't know who they are and it shouldn't really be that way.

You know, it should be even handed.

Australia, for instance, didn't become concerned about until similar to Manila.

Where the very first time they ever had lasers and airspace, where they realised they should be concerned with for the Olympics in 2000...

And I happen to be the with the company that was doing the lasers and so their aviation authorities contacted me.

I gave them the form, I would fill out for the FAA and told them, *“look, I’m a proponent, you know, you don’t necessarily want to take my word for it. So why don’t I recommend you talk to somebody on the FAA,”*

They did...

And that guy on the FAA said *“Oh if Roberta says it’s safe, It’s fine.”*

And it was fine!

In my opinion, it should be a little... there’s unfortunately there’s a big learning curve between with aviation and lasers.

They’re two separate languages, you know!

We had to learn to speak aviation language...

They had to learn to speak laser language and together we had to come up with, what we call aerospace recommended practices, that would give us guidelines, so that everybody would feel comfortable.

Tim Bennett: Awesome.

And you know this is I find this really interesting and I think the audience will as well.

And we could literally talk for hours and hours about this topic, but obviously we can’t do that right now.

We’ll save that for another day.

I am joined by Roberta McHatton right now we’re talking about laser safety guidelines and laser safety standards or in other words, is your laser show safe?

...and we’ll be right back in just a moment.

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Is Your Laser Show Safe?

Welcome back. I am joined by our very own laser safety officer Roberta McHatton, we are talking about laser safety guidelines and laser safety standards....

In other words, is your laser show safe?

So let's start talking more about what an operator can actually do.

But let's go back a little bit further than that...

Laser is... I've seen it spelt so many different ways.

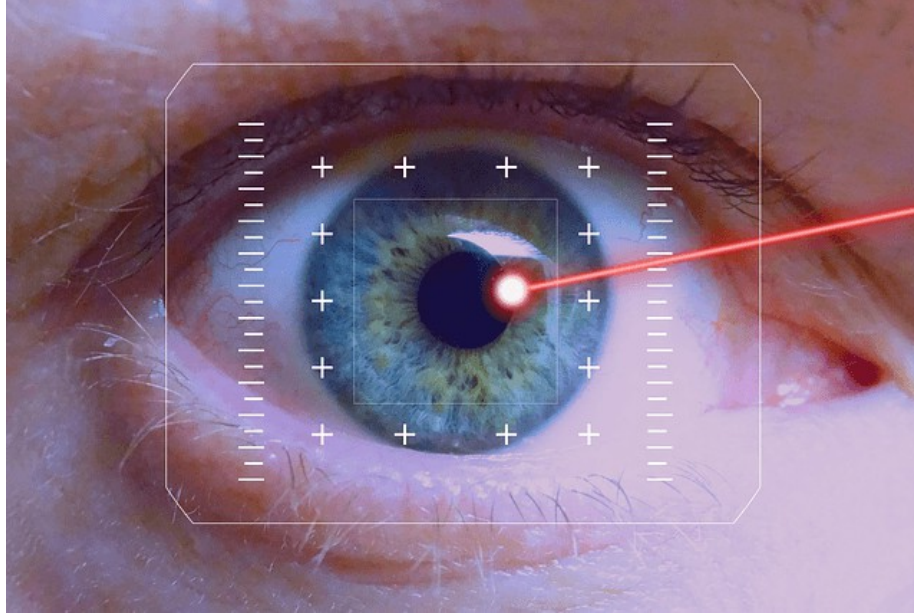
What does it actually stand for? The word laser...

Roberta McHatton: It's an acronym. I will, I will say a little bit. It is, historically speaking, it was thought of by our favourite Einstein in terms of it being on the electromagnetic spectrum.

He conceived the idea of a laser, but it wasn't actually built until many, many years later.

So that was 1916...

The word laser stands for Light Amplification by the Stimulated Emission of Radiation...
...not zimulated... stimulated.



Tim Bennett: And what does that actually mean? It sounds fantastic, but what does it mean?

Roberta McHatton: Oh boy. You want me to describe the physics?

In brief...

Okay there's electrons, they get excited... they met photons.

Photons will come back to rest and if they encounter another photon, they go in phase.

So basically, laser light is monochromatic, directional and coherent...

They are **monochromatic**, believe it or not, even though you see rainbows of laser, you know, in bit laser beams.

There are distinct sources for each wavelength you see, that are combined.

So there has to be RGB (Red, Green, Blue) combined, you get white light, but it's monochromatic so there's always inside the laser either red, blue, or green, and if you're seeing a rainbow, it's because it has those three colours and they're combined in order to make white light.

The more white your laser light is the better the colour balance and the better you will be able to spread it out into the peacock of colours.

So that's monochromatic...

Coherent means it's all going in the same phase, light waves go up and down, the colour is measured in nanometers.

And if that's the measurement from crest to crest or trough to trough in in the electromagnetic spectrum.

It's a tiny portion of the electromagnetic spectrum that is visible light.

And that's basically 400 nanometers to 700 nanometers.

400 being the shorter wavelengths on the blue end, 700 being the red wavelengths on the long end and I'll ask you a question...

Which colour do you think is the most visible to the human eye?

Red, Green or blue?

Tim Bennett: Green...

Roberta McHatton: Green. You're right.

Tim Bennett: I know

Roberta McHatton: Most times people want to say red and that's mainly because how are we introduced to lasers...

Entertainment movies always had red lasers in the early days, you know, that's what they, you know, like "*Goldfinger*" was one of the very first times we actually saw a laser in a movie.

And it was a red laser and they are the most the least easy to see by human eyes, the red wavelengths are the hardest for the human eye to see.

So you need to bring down all the ambient light and if you're going to have red beams, which production people wanted back then they really wanted red beams...

"No, no, no. You want green trust us. You want green."

Green is so visible that when the company, I was working with was approached to do a line for football, you know, the first down line.

The green line.

Well, it wasn't green, but anyway...

...they wanted.

And we thought, "*oh no, no way. This is like, think flashlight, light, sunlight, Texas and football stadiums. No way! Is it going to show up?*"

But believe it or not, a laser light, the green laser light, on the green of the turf, was highly visible even a full sunlight.

Tim Bennett: Wow.

Roberta McHatton: Yeah, right.

Tim Bennett: So what is it about laser that actually makes it hazardous? Why should people be cautious?

Roberta McHatton: That term **radiation** means there's a lot of energy focused into a very small space in time.

So it delivers a great deal of energy.

Versus light bulb, where you have photons just scattered everywhere, laser light has them all concentrated, so you can burn holes through things, you can cut steel, it's



And unfortunately, you're right.

There's a misunderstanding, because people see pretty laser light and they think, pretty light and they don't really realise a lot of times just how hazardous – It is!

Tim Bennett: Yeah, well I think films like James Bond probably didn't help because it promotes it as as a weapon.

And I think, over the last 30 years that, almost 30 years that we've been involved in lasers, the understanding of laser has changed as well.

I remember in the very, very early days. No one cared. We all just stood in laser and did our thing.

But as lasers have become more more powerful.

And more available.

Then you know, there can be a concern.

And it's interesting, I guess a 30 watt light bulb is in fact more powerful than a 10 milli-watt laser...

But which one has the more potential to do more danger or more hazard...?

Roberta McHatton: The laser does, because again it's concentrated, also it depends on what you're hitting, if you're hitting the eye...

For instance, you not only do you have a very highly concentrated amount of energy, that's entering the eyeball, you're entering a lens which concentrates it even more, just like magnifying glass.

So a one milliwatt laser entering an eyeball and it hits the lens just right, in other words, it's within the diameter of the lens itself, the gain has at 100,000 optical gain, it will be 100 Watts on the back of the retina!

Oh yeah, right, it can, it can cause this very severe damage and unfortunately the human eye was never meant to have anything go to that part of the eye.

The eye is extremely regenerative, the cornea, cataracts can be replaced, but nothing in nature, usually affects the retina, or the optical nerve and that's the danger.

So it's eye-exposure is considered the biggest hazard – biohazard in our industry.

Amazing. I never realised that such a small amount of power could be so hazardous to the eye... 1 milli-watt!

And do you have any kinda, we talked about this a little bit earlier, do you have any kind of statistics or figures of the dangers, or the hazards?

Roberta McHatton: Um, yeah, sure. The biggest hazard is more as, I don't know what is in terms of what...

Okay, we'll talk professions...

Technicians are at the highest risk, because they're usually dealing with lasers, in an open beam pass setting, there's a high chance that they could... and wearing an eye protection?



No... It's never meant to be... lasers never meant to be directly viewed!

And then, of course, you've got to deal with time, as well as the amount of energy being deposited.

Now a laser beam, it looks like a pencil. Right? And it's the same diameter. No!

It actually does diverge and it does and as it widens out the laser becomes, you know, there's more more energy and a bit less energy and a bigger area.

So, it spreads out the energy so as to speak...

That's, you know, that's very important concept to grasp.

That's why, you can even do [audience scanning](#) with a laser, in this laser show industry, but you really have to be careful about how much power and how fast it's moving, or an amount of exposure time you're involved in, but it does diverge.

A good example is, they did shine a laser to the moon.

And I suspect it... and they call divergence.

They measure in milli-rads (small m, capital RAD -mRAD)

And it's a how fast does it diverge and how much and by the time it got to the moon at point final, a very very tight beam, it was two miles spot on the moon, which is 260,000 miles away.

So yeah, it diverges.

But it doesn't lose its intensity that much, for that long.

If you've ever played with the laser, and terminated across the arena or the home or wherever you are, you will see that it makes a dot.

And that gets bigger, the, you know, the further away you are, the bigger the dot gets so it's a little bit safer, but you gotta be careful.

Tim Bennett: Okay, so don't play with the cat!

Roberta McHatton: No...

Don't hit it in the eye...

One of the problems they're finding now is actually laser pointers.

We know better in our industry, but unfortunately laser pointers, which are available to anybody.

And it has a little sign on it, usually that says, "*Do not point directly in your eyes.*"



So what do kids do? They hold their eye open and they are getting retinal damage from that, kids doing that...

Now the laser light show industry, I'm very happy to report hasn't had any reported accidents or incidences in about 20 years there was about 40...

All right, in the last 10 years, I think there's been 40 reported injuries.

30 of them were in Russia where somebody had a pulse laser...

It started, the story I heard, is it started raining and they pointed it down into the audience and there was definite eye injury as a result.

And then there's been a smattering of others.

Now, honestly, between you and I and the rest of the world, I'm sure there are unreported incidences.

It's sort of like hearing damage.

Would you know if you've got injured by laser?

You might have a floater in your eye that you didn't before but would you associate that with what you saw when that happened?

A hit can actually cause a [Scotoma](#), which is a burn on your retina, however, you usually know it happened and actually they're now worried more about people having heart attacks or a stress reaction, than the eye injury.

There's not much you can do about the eye injury, but evidently injuring the eye is so scary, that that people will actually have more of a reaction, heart reaction, stress reaction.

Tim Bennett: Wow, that's, that's amazing. I never knew that

With regard to production companies, what kind of issues should they be alert to when setting up lasers.

Roberta McHatton: Very good. That is a most excellent question.

I have several little pieces of advice.

First of all, you need to be aware of what we call reflections.

Are they, there's two types of reflections.

There's spectral and diffuse...

[Spectral reflection](#) is like a mirror and so anything that would reflect like a mirror is something to be concerned about and you need to be very aware if your lasers hitting something like that.

So when you're setting up for, a good example, is I was with... on tour with a company that was started out in an arena.

There wasn't really that much to be concerned about.

There was a few windows they needed to avoid mostly so it wouldn't go outside.

And then there was a few lights, but they were easy enough, and make sure you put a sign on the door.

So the catwalks, the people don't walk in the catwalks...

And then we went from that type of a venue, to a Paramount, where we had crystal chandeliers...

We had a balcony. With the Chrome balcony ran. We had glass everywhere with pictures and framed and glass.

Glass for the lighting booth in the back and the poor operator who was not that familiar with the process at that point.

And he was given all of 10 minutes to set up and zone was out of his element.

I mean, he tried and it's, there's always something, you know, like he did tell the ushers.

"Okay, I'm going to be zoning over the balcony during this timeframe, do not walk into the balcony while I'm zoning."

And this is a really very important.

I recommend this to anybody, when they're setting up lasers have more than just your eyes... because where are your eyes as an operator?

You're looking at your monitor.

You're looking at your computer.

You're going to go back and forth and back and forth, you may miss the usher that didn't pay attention and walks through the balcony right when you're zoning.

So I always recommend having one or two crew members on your shoulder.

Who have full view of the beam path at all times, who are either standing next to you or have ability to communicate with you immediately should something come up and somebody is where they're not supposed to be, or they see a reflection.

Okay, other sources to be aware of when it comes to spectral reflection...

Mylar...

Mylar balloons, mylar confetti, glitter confetti.

All those are highly reflective

Mirror balls.

Should you ever laze a mirror ball, in my opinion, NO!

If you want to just only do it from the waist of the mirrorball up, because then it'll be a reflection will go off and up, but mirror balls wiggle and they rotate and they're just...

It's a potential hazards.

It looks pretty, but...

...in fact, I actually tried to find a picture of a laser on a mirror ball...

I couldn't even find one on Google.

It's like, so nobody knows.

Nobody wants to do that.

Diffuse reflection on the other hand, think of that as brushed aluminum or off of a wall, a white wall, would be diffuse reflection.

It's not as much of a concern.

It can be under the right circumstances, but it's also what makes for beautiful haze.

In particular, we are using that, in show production value, to work for us, because there's nothing better than a beam ballet through a very well hazed or a theatrical thought fogged up room.

In fact, I highly recommend if you can distribute your fog throughout a venue, not just off the stage, because you'll get a more even effect.

Balconies....

Are you terminating on a facade?

Is that technically legal?

You're supposed to always be three meters above the audience or 2.5 meters to the side.

But if you're have balconies, and people are sitting in the first row. Yeah, they could hang their head over, I guess, or put their hands in it.

Or worse yet, put a glittery purse.

We actually had that happen once, where somebody dropped over a very beautiful, you know rhinestone purse.

Suddenly, there were laser beams going everywhere.

It is generally considered a justifiable practice, because we consider the balcony and non-defeat-able barrier.

In other words, a person who... an audience member who engages with the beam, is really engaging and risky behaviour.

And they're generally not supposed to be doing.

There may be times when you're asked by a venue to not do that, to not put it on the facade, but we all know the laser looks the best, the closer it is over the heads of the audience.

Three meters, 10 feet is ideal, but there's still a lot of things, you know, that could happen at the as low as that.

That's when it looks great, but what about crowd surfing or my favourite was the baby...

We were doing outdoor...

40 Watt lasers in the air, gorgeous...

Right at 10 feet...

Beautiful fairground flat.

No problem until and I'm there to watch airplanes.

Out of the corner of my eye, I see a father with a baby on his shoulders and he goes to toss the baby into the pretty laser...

That would have been 40 Watts in a babies eye...

That would have been a terrible, terrible thing.

Fortunately, I had a shutter button in my hand.

So I was able to actually shut the laser, I didn't even have to do the delay to the operator, who then pushes the E-Stop button...

When you're in a concert..

Think about it.

Most concerts, you're operating from FOH (Front Of House), are you able to actually see the full beam path?

No.

So I highly recommend that, In those situations...

We used to always operate from the stage, you, you probably remember that from going back...

But now with the new technology, they're almost always operating at F O H or where the sound people are, so have a couple crew members that are, at this point not doing much else and whenever the lasers come on, that is their job, to watch the full beam path and they should have an E-Stop button...

Ideally on the stage to press, if they don't have that, then at least have really good communication with the operator, in case they need to have them shut it or, you know, push stop!

Tim Bennett: Wow, that's quite a lecture.

And I think, I think a lot of this boils down to the operator being very responsible, because it's very tempting, because it's so beautiful to put laser onto a mirror ball or on to these other... on to mylar...

You know as as knowledge comes in and you start to understand the potential hazards and risks with it. It's really about the laser operator being a very, very responsible person.

And asking do I want to take the risk of some kind of physical problem with the audience or even a potential lawsuit later on.

Roberta McHatton: Yes, exactly. And do I need to? Do I really need to do that to make my the laser be effective in the production values? 9 times out of 10, you don't!

You need to work around the limitations that safety puts, which is just part of using something.

The thing that's special about lasers is they hug the audience.

They reach out and we said no other lighting does that.

But you must use it responsibly.

Tim Bennett: I've got people in the Philippines that I've seen... other companies that, you know, providing lasers...

And what happened when I started here in the Philippines was, originally I was the only one doing lasers.

And then eventually the light and sound companies went out and got lasers and obviously I've had laser training and they haven't...

And they've got these 20 watt lasers in small ballrooms.

Well, when we started our company, I started off with a 500 milliwatt green laser which I used for about five or six years without any issues

And as you said earlier, if you set up the haze correctly in the room, you don't need this massive amounts of power.

Unless you start turning on, you know the video walls and everything else...

And it was really about how we set it up that we didn't need this massive power and quite honestly, if you set it up correctly, you don't!

I've even done outdoor shows with the 500 milli-watt laser, because we set it up correctly.

Now, I'm not going to do the Olympics with a 500 milli-watt...

Roberta McHatton: You bring up a really valid point.

You know, you don't need a great deal of power.

It used to be like more power the better you know...

It was in fact, a lot of the sales pitch seem to be on how much power of lasers, you're going to provide

And I really been advocating, especially with the drop in the cost of lasers, since when we started back in the gas laser days...

You know, you used to pay \$60 to \$100,000 for three watts.

Right.

And now you can get a 3 watt laser for a couple thousand dollars at the most.

And you can get a 25 watt laser, you know, which is the most, in my opinion, that you would ever need for any large venue where there's a lot of ambient light.

And I can see the times when you want to use that.

But don't use more power than you need to it overwhelms...

Isn't necessary and use **MORE** lasers!



Right, instead of one or two like that was a big production, back in the days...

To have three lasers...

Oh my god, that was a huge part of the budget.

Well, now you can have 10 and you can have 20 or you can have 314

Depending on what you want to do.

And that's really quite effective without bringing a lot more power into it.

Yeah, it's more beams to watch during zoning and setup, but...

Tim Bennett: Well, awesome.

And I, and I hope this is really helpful to our audience and thank you for sharing your knowledge...

I'm presently with Roberta McHatton, we are talking about laser safety guidelines and laser safety standards and we'll be right back in just a moment.

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Tim Bennett: So welcome back. I am joined by Roberta McHatton...

Our very own laser safety officer and we are discussing laser safety guidelines and laser safety standards...

Or in other words, is your laser show safe?

Now earlier Roberta, you spoke very briefly about ILDA...

And I just wondered if you could give a little introduction into [ILDA](#), what you do with ILDA and their role when it comes to laser safety.

Roberta McHatton: ILDA is the [International Laser Display Association](#)...



My God, I'm ashamed to say I'm not sure how long they've been in existence.

But I think from the 1980s, probably...

And it's an independent... it's an association, where people from all over the world are obviously, international, welcome to join.

The membership fees are very, very reasonable and I highly recommend, you know, if you're interested in working in the leisure and entertainment industry, this is a great resource.

For one thing, there's all kinds of information, plus you have members, you can reach out to...

Like if you *"okay, I'm going to France. What are the rules in France?"* we have members there who will get back to you right away.

Trust me, it's, it's a very friendly camaraderie. We have a conference every year.

Well, we're hoping we're not even sure about this year, but next year, the conference will be in United Kingdom sponsored by ER Productions and I recommend that you come and attend.

We do awards.

We have several categories... people submit their work.

We actually have like we bring our lasers and do laser shows and we have a laze off...

Where people get to... they don't get to know what the music is and they just, you know, come in and do their best.

So a lot of fun.

It really is and and it's such a unique industry and so specialised, you'll love being able to talk to other people who can speak your language.

I'm a board member of ILDA, I'm in my third year of their two year terms each.

But anyway, I'm still there, and, let's see, they offer a series of courses on laser safety as well...

Even though I do as well.

But there's would be recognised internationally anywhere.

They have a laser safety officer course, they have a laser safety course for operators and they have one for audience scanning, which I personally do not provide.

So if you want to know about audience scanning, you really need to talk to ILDA.

You don't even have to be a member to take the course.

But again, the membership fees are very reasonable and it's a great organisation.

So I recommend you consider it if you are doing laser shows

Tim Bennett: Awesome. So you would certainly recommend that as a laser operator, they join ILDA

Roberta McHatton: Yes, yes.

Tim Bennett: Yes, fantastic.

And we'll have [links in the descriptions](#) beneath this video to show you how to do exactly that.

What else can laser operators do to make sure that, number 1, their equipment is safe. And number 2, that their shows are safe?

Roberta McHatton: Well, they need to communicate well with the production crew.

They need to be able to explain to lighting designers and production people, what they can do and what they cannot do.

We're seeing more and more lighting designers now, step into this...

I can only hope that they have taken the time to get the laser safety training.

I've been having a big uptick in lighting designers....

So obviously they realise there's a need for it and I really encouraged them to, because this is not typical of other kinds of lighting, they really do need to be savvy to what the concerns are.

There was another thing I was going to mention

I'm sorry, I went blank..

Tim Bennett: Okay, no problem. We're actually talking about laser equipment and show...

Roberta McHatton: Yes. Okay. So laser equipment.

You want to be sure your laser itself is in compliance with [IEC 60825](#) I believe...

Anyway, that it has to have certain features.

It has to have remote interlocks, it has to have interlock connectors.

It has to have... might have a beam block which is an attenuator, that is a bolted onto the front of it.

You want to be sure it has its labels.

If it's on a stand, you want to make sure the stand is stable.

You want to make sure the clamps that you clap it on with our solid and good.

I've seen issues where clamps have slipped and the whole you know top row of an audience was getting lazed, because the clamp that slipped...

So let's see what other things.

You want to be aware of...

...You want to be aware and familiar with your programming.

So I cannot emphasize enough... practice, practice, before you get out there and do it in front of an audience, set it up at your home or in your warehouse or wherever you are and get your skills down zoning and different circumstances is really helpful and important.

If are you setting up on stands?

Are you going to be on trussing?

If you're on a stand, never have it at eye level always the, you know, you can...

You could have it on a stage floor, but make sure it's not directed up into eyes.

Oh, let's talk about performers... can you laze them?

Hmmm, no technically you're not supposed to, however, if you do have... well in this country, if you have an audience scanning [variance](#), you can, but for limited time...

Never ever in the face.

You're not supposed to.

I have ever seen, some companies where they just told the performers to close their eyes.

A lot of times, there won't be a problem until there's an actual accident...

I say avoid the accident if possible.

In the United States, you can come up to... the three meter rule goes out the window you can do everything you want.

Except touch a performer with the laser.

But where is that performer?

Are they going to drop out of the ceiling on a trapeze?

I had that happen where somebody out in front of a 40 watt laser was coming down on a ribbon.

The production people had said, *"Oh yeah, well, we'll let you know when!"*

Nope.

They forgot to let the laser operator know.

The laser operator could see the full beam path, except on the stage.

He wasn't looking up, he was looking out.

Fortunately, I was standing in the wings.

So I was able to get him to shutter the laser. To close a call!

So communication, communication and communication...

Communicate with the crew, communicate with production people, communicate with everybody around you.

By the time... and all this has to be done before the audience enters the venue.

By all means.

Let's see, I think...

Tim Bennett: Is laser safety training fairly easy to get? Where would someone go to get training?

Roberta McHatton: Actually yes and no.

It is, but you have to know you want it first.

So, ILDA offers it but they don't offer it all the time.

But do look at see what their schedule is.

I offer it.

I only require two people or more in order to do a course.

This is my way of giving back to an industry that has given me an amazing career.

So at this point I offer laser safety training my certificates are recognised just about everywhere in the world with a few minor exceptions, like in the United States, New York...

New York administers his own test.

And if you pass that test you can do surgery, you can do, you know, cut steel.

But it's not just tailored to entertainment.

It's rather overwhelming, but that's New York, you have to have a mobile operators license there in order to actually perform lasers in New York.

So most people just hire somebody who already has that license.

So I offer it...

Another fellow out of UK... James Stewart offers laser safety training and those are about the only people I know have that actually do a course and you can...

Tim Bennett: And your course can be done online? Is that correct?

Roberta McHatton: Yes, I do teach virtually, with the caveat that I really, really want people to set up and do a hands on follow up to my course, because I... when I do it in person, of course, I can do that.

But since this is the day and age of virtual training and I can.

It's so much less expensive if I don't have to physically go there for the client who's now buying a laser for a couple thousand dollars versus \$100,000.

I used to be the budget was there, they have me come and do the training, but now people are buying lasers are much less expensive.

So anyway, I do it virtually

I do have it... and there's a lot of things involved, but not a lot of things, but there are certain things I request that you do, is follow up.

If you have my training and that's setup laser... do a safety checklist, so that you tell...

If I'm doing it, I always put the laser where you're... if you put it right on the stand where I have it, you will get a reflective object.

That's my way of seeing if you're really paying attention or, you know, getting it.

But there's a checklist.

My training also gives you a lifetime access to my laser safety manual, which is in Dropbox, which is a more than you ever want to read about it...

When I have a few handful of things I can recommend for reading...

You can learn later safety from reading, but I don't think it's as effective as getting it from a person.

I really don't.

And then of course administering a test is another part of it.

Tim Bennett: Yes.

And also I seem to remember you told me that when you do a training with you, you can get a free book, which I'll put a of copy here...

Laser Safety for the Light Show & Projection Industry



By Roberta McHatton, CLSO & Ken Barat, CLSO

**A practical & informative guide to what and how
to achieve Laser Safety for members in the Light
Show and Projection Industry**

Tell me about your book.

Roberta McHatton: Well, it came about out of frustration of many years ago, and “I wish there was a book! I wish it was a book for entertainment applications!”

Now, I am happy to say that [ANSI](#), which is America National Standard, safe use of is developing the Dot10, which is safe use of lasers for entertainment display and trade show, but it isn’t published yet.

It’s going to be a Bible that it’s going to be maybe a bit challenging for the average reader to really comprehend it.

So I decided, along with... actually I was approached by the fellow who wrote the regulations for the state of Arizona and he offered to co author this with me.

So he had a lot of credibility on the regulatory side, I certainly had the experience of the entertainment side and so we collaborated and we wrote the book.

It covers all the basic things you need to... in the topics you need to cover in a good laser safety training course. But it's really aimed at entertainment specifically.

Tim Bennett: Well, I'm very grateful to you because I got a free copy yesterday...

Roberta McHatton: It's free with my course and you know I would rather people have it.

If they can't even afford it, I will, I will make it available it is I think it's important. It's really important.

Tim Bennett: Just to give some feedback on the book, I took... like if... I haven't had an in depth look at it just yet.

I spend about 15 minutes looking at it and I must say a couple things.

Number one is easy to read....

Roberta McHatton: Yeah, but that was my goal to...

Tim Bennett: It's packed full of information that we really need...

I really think this is a book that people should get hold of and it comes free with your course? Correct?

Roberta McHatton: Yes, or if you just want to get the book. It's \$15 it's a PDF.

Now I will want to mention it is sort of geared to the USA, there's an appendix out the cover page for the appendix has all these links for you, for the regulatory and other agencies in this country.

But if you join the other, you can find out about the rest of the world.

Tim Bennett: Okay. And again, I will get the links of you later for that and I'll put them beneath this video.

So if people want that they can get ahold of it, and I would thoroughly recommend what I've seen so far and a 15 minute read through it looks excellent.

I wish this in 1990

Roberta McHatton: Yes, that's how I felt in '95 was like... why do two weeks of training and there's no manual? I mean, I, it was, it was really very challenging...

Tim Bennett: And I think it's, it's nice that you said, that you can do laser and safety training by reading books, but there's nothing quite like going to an establishment or going to a venue and your credibility is improved when you say I've had a laser safety training course...

Roberta McHatton: It really doesn't hurt to have a certificate of having successfully completed a course, which is issued upon taking a test and both ILDA and I and James.

We all issue certificates of successful completion and they're recognised throughout the world so...

Tim Bennett: Fantastic, fantastic.

And your cat has just woken up I notice...

Roberta McHatton: You know she shows shy around people, but every time I do anything online.

She's right there.

She loves it

Tim Bennett: Awesome.

Well, Roberta.

I want to thank you so much for spending what an hour with us so far and sharing your knowledge.

I hope this has been a really fantastic education for the audience.

And if people want to know more about laser safety guidelines and laser safety standards and I'm sure they do, how do they get in touch with you?

Roberta McHatton: Well, I have a website, but it's pretty basic. It's my business card that I posted, but you can always get ahold of me at roberta@lasersafetyservices.com and I respond, anytime anybody emails me I'm usually within minutes.

And oh, you may also call me if you want to at 425 7535644...

I have a site [on LinkedIn](#), which has a little bit more information background on me.

And I've done several articles and things I'd be happy to forward to anybody who's interested. So best that is email actually, roberta@lasersafetyservices.com,

And thank you so much Tim, for taking the time, for your interest and for contacting me.

This is a great platform.

And I'm really valuing how much, the world is is... education is so available now to people, thanks to people like you, who take the time to put this kind of thing together.... so well done!

Tim Bennett: Thank you. And this has been something I've been wanting to do for a long time, we spoke about ArgonTV and how it all came about earlier, but I really feel that, in this...

Currently right now, what's happening in the world, we've all got his downtime.... That it's really a great time to like, step back and see where we are and gather information, gathering new knowledge, so that when it all... when we get the green light to go....

I tell you there's gonna be one hell of a party.

Roberta McHatton: Yes.

And it's a great time, take a class, you know, because you've got the time.

If anybody has a financial issue, reach out to me. I'll work with you, but if you if you can make use of this time by getting some laser safety training under your belt and you're going to be using lasers, please do reach out...

Tim Bennett: And of course, if any of you have any questions that you want to send to me for Roberta, because we're such good friends now.... feel free to drop me a line anytime!

We will be having much more contact together Roberta and I, so fantastic.

But before you go, one last question.

And this is one of my favourite parts of the whole interview.

What is Roberta's secret to success?

Roberta McHatton: Honestly, my secret to success... because I was... so I'm my background was so not physics, not lasers not entertainment.

When I suddenly found myself with the safety hat working for one of the biggest companies in the world is don't ever pretend to know what you don't know.

Don't be afraid to ask.

Because you'll find there's a lot of mentors out there who are more than willing to impart information to you.

So I when I stepped into that ring.

I just decided, I'm not going to pretend...

I'm going to ask.

I mean, [I didn't know what MPE was....](#)

I didn't know laser was an acronym.

I didn't know any of that stuff.

But instead of ostracising me, or making me feel stupid, they embraced me and I will do the same for anybody else.

Tim Bennett: Awesome.

And that kind of takes me back to when I first started as well, and in [my call last week with William Benner from Pangolin](#), I said pretty much the same thing.

Like when I left school at 16 I became a window cleaner, because I was so lacking in certificates and things.

I had no career coming to me and I was introduced to lasers and when I first started with lasers, I was the same.

I was saying to me *"Tim, can you get a 25-way?"* and I was like *"what the hell is a 25-way?"*

I also come from a background like you, I wasn't in physics, I wasn't in entertainment. I wasn't in any of this industry and the industry has been amazing to me in, exactly what you just said.

That there were so many people out there, who just didn't say *"you're an idiot"* when I asked stupid questions... because there's no such thing as a stupid question!

Roberta McHatton: Now, there really isn't, there really isn't.

And this is an amazing industry.

I remember walking out of the Beatles concert, which was their last concert at Candlestick Park, and they look terrible, they sounded terrible and I had an idea of how, you know, from my parents taking me to musicals and Opera when I was a kid, that wasn't right.

You know, I didn't know they didn't have the equipment at that point right...

And I walked out going... *“all they want to do is grow up, make them look better and sound better”*

Never in my wildest dreams, would I have dreamed, I'd be doing what I'm doing today and let alone lasers didn't exist.

Who knew?

Tim Bennett: So awesome Roberta...

Thank you very much for being here...

Final words about laser safety before you go... you have the last word.

Roberta McHatton: Last Word...

Is implement your safety... practice it and I know it's not fun, but do record keeping.

Oh, I know very important last word.

I'm glad you gave me this opportunity.

Because what's going to really cost you money if you make a mistake, is lazing a video camera or a projector, because you will fry the lens with the laser...

So people...

Yes, they may or may not ever complain...

But let me tell you... the video company... if you wreck one of their several thousand if not hundred thousand dollar cameras, you will hear about it...

So, there's my piece of advice for today...

Do not laze cameras!

Look for them before you even turn it on, make sure you know where they are.

Tim Bennett: Awesome.

Well, thank you, Roberta McHatton...

Our very own laser safety officer, we have been talking today about laser safety guidance laser safety standards...

Or in other words, is your laser show safe?

This is Tim Bennett from TV look forward to seeing you again soon on another episode...

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