

By Doug Taylor



What burns at less than 1/10 of a mile per hour or at more than 40 miles per hour?

When standard pyrotechnic fuse is encased in paper, it burns at a rate of 60 to 70 feet per second which translates into more than 40 miles per hour. If that same fuse is not encased in paper, it will burn at a rate of about one foot every ten seconds or less than a tenth of a mile per hour.

With a typical fuse for an aerial shell being between two and four feet long, the fuse that we light to send that shell up into the air burns in about three one-hundredths of a second. Dr. John Conkling, one of the foremost authorities on pyrotechnics explains the fast burn rate as follows, "The flame and hot gas produced by the burning black powder coating on the match can't escape, so the flame front/hot gas shoots ahead at high velocity."

If a shell is being ignited manually with a road flare, we unwrap about four inches so that we have a bare portion that will burn slowly, giving our technicians plenty of time to move onto another area of the display to fire another shell.

Aerial shells and many other pyrotechnic products contain two fuses – one as described above that ignites the lift charge – the explosive material that sends the shell up into the air. That fuse also lights a time fuse that will burn slowly and ignites the burst charge that blows the shell apart once it has reached its maximum height.

The time fuse must burn exactly the right amount of time to ensure the shell does not explode too soon or too late.

All this gives you a better sense of what it means when a person is described as having a short fuse – you do not have time to get away before they explode! Fireworks are dangerous but with the right technical knowledge and experience they produce awesome displays. Stay tuned for our next A to Zambelli of Fireworks Displays column as we will discuss yet another aspect of the science and art of fireworks.

If you have fireworks questions you would like us to address in our column, please email me, Doug Taylor, President/CEO Zambelli Fireworks at doug.taylor@zambellifireworks.com.

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The magic of **Zambelli** pyrotechnics has been televised around the world, on "MSNBC Investigates", the Odyssey Network, the Discovery Channel, The Learning Channel and the British Broadcasting Company.

Blending tradition with innovation, **Zambelli Fireworks** can convert any concept or theme into an unforgettable fireworks extravaganza that leaves a memorable impression on everyone who sees it.