

Electric igniters for firework displays - potential issues

The use of electric igniters in fireworks displays has increased significantly over recent years. Whereas, say 30 years ago, most displays would have been fired by hand, and igniters would be used for limited firings of large “fronts” and 15 years ago where the use of a single igniter (per sequence) and pyrotechnic delays for firing sequences or collections of effects the trend nowadays is to use a single igniter per firework. This in itself means that the risk from accidental functioning has increased significantly – purely because the number of igniters used by a display company has increased significantly.

In addition, and driven by the increasing use, it is our perception that display companies may use lower quality igniters than in the past, to reduce the total cost due to the increased use – if you like a potential safety “double whammy”.

Electric igniters are sensitive to a number of external stimuli. Particular consideration should be given to the following:-

1. To ensure igniters are of reliable and consistent manufacturing quality. Lacquer coverings on igniter beads should be of consistent thickness and not subject to “bubbles” in the manufacturing process which can burst and expose raw pyrotechnic composition.
2. Protective sleeves fitted to some igniters are not normally provided for protection of the bead from friction or impact – instead they are generally there to provide a directional effect to the incandescent particles produced when the igniter functions to maximise the probability of transfer of fire to the recipient explosive. However, if they are fitted then, in general, they should not be removed before use.
3. Friction (especially with poorly manufactured igniters) is the most likely cause of accidental ignition. Particular care should be exercised when inserting an igniter bead into a piped match fuse because of the abrasive nature of the blackpowder within the fuse. It is recommended that igniters used in this way are only fitted where the hazards arising from accidental ignition are minimised – for instance when a shell is loaded into a mortar and premature functioning can cause no harm (as opposed to fitting the igniter to a loose shell resting on top of a mortar alongside other shells awaiting fusing), or ideally by fitting igniters to pre-prepared short lengths of quickmatch fuse which are subsequently attached to the firework in question.
4. Accidental ignition by friction can also occur if an igniter is removed from a firework – perhaps as part of making safe if unfired, especially if the igniter is pulled from within a quickmatch sleeve. In this case the quickmatch should be cut well away from where the igniter is inserted (taking care not to cut the igniter bead in the process) and the firework removed to ensure that any accidental ignition only affects the quickmatch and not the original firework.
5. Impact is another significant cause of accidental ignition. Items fitted with igniters should have the bead protected from accidental ignition by impact (eg dropping) and crush loads. The means of achieving this will depend on the firework type – for instance an igniter placed in the top of a thick walled Roman candle will have significant protection from impact whereas one placed directly in the lift charge of a shell will not.
6. Electrostatic and electrical energy can also cause accidental ignition.
 - a. Long leads from igniters should be shunted (joined) until connected to the firing circuit
 - b. Sources of RF energy must be considered and the risks of accidental ignition assessed. These include:-
 - i. Mobile phones
 - ii. 2-way radios
 - iii. High energy RF sources (eg satellite transmission dishes)
 - c. No electric circuits must be live when igniters are connected to them
 - d. No testing of electrical circuits should be carried out when personnel are in the firing area
 - e. Firing cables should be shielded where possible and not laid parallel to, for instance, mains cables
 - f. Non-static clothing should be worn where possible
 - g. Particular care should be exercised when using igniters (or even transporting them) in areas where a high static charge may be acquired – for instance from the fabrics used to cover stages and arenas
7. Igniters should never be carried in the pockets of personnel using them – burns from igniters alone in close proximity to the skin and in a confined space (eg a pocket) can be severe.

Igniters are a useful tool in a modern display to provide synchronisation and safety. Their use should be subject to proper assessment of the risks inherent with their nature.