



Food Manufacturers

Greggs Bakeries

The Challenge

Baking trays, as with other plastic stowages, can be readily ignited, and once alight, become molten liquid. The quantities of trays stored in and around bakeries have been instrumental in several catastrophic bakery fire losses.

Tyco Fire and Integrated Solutions has been working with one of the country's largest Bakery Companies to determine what means, if any, could extinguish a fully involved fire involving stacks of plastic trays.

The trays are of open lattice construction and stacked 2m high on wheeled bases with a 100mm ground clearance. At the end of a working day the trays are returned and stacked in areas that can be 5 m wide and 25m long against the external wall(s) of a bakery. Here they stay ready to be brought inside for cleaning and reuse.

In this day and age, when arson accounts for over 50% of all primary fires, a malicious ignition of these trays creates a fire, which cannot be extinguished with water – in fact the burning molten plastic has been found to float on the water enabling the fire to spread.

The ignited trays produce rapid fire growth and high heat intensity, which can quickly breach adjacent building structures to involve the rest of the structure – often resulting in the total loss of the Bakery.

Fire suppression was considered by the Bakeries' Group Engineering Director to be an unsafe option - as it meant that the fire would continue to burn and burning molten plastic could flow and endanger the structure itself.

The burning of large quantities of plastic also results in the release to air, and to ground water, of large amounts of hazardous and harmful chemicals and combustion by-products which can create a significant health hazard. BS 7982:2001 *Guidance on environmental impact of large scale fires involving plastic materials* serve as reference.

Preliminary trials:

Preliminary trials were carried out in a 7m x 7m x 7m high enclosure using sprinklers and watermist against a fire involving four stacks of trays in a square configuration, with two of the stacks 'open nested' and the other two stacks 'close nested' – reflecting the two conditions in which they can be stowed.

In each test the centre of the four stacks was ignited and allowed to burn until flames extended over 1 metre above the top of the stacks before the fire system was activated.

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CASE STUDY

Two different watermist systems were tested –both of which produced fire knockdown and suppression but without extinguishment as the fire continued to burn.

A conventional sprinkler system was also tested but had negligible impact upon the fire.

TF&IS investigations:

From work done previously fighting fires in plastic commodities, TF&IS set up a scoping trial using half height stacks of bread trays with sprinklers mounted 1m above the top of the stacks in an open enclosure.

Test 1: Two adjacent stacks were ignited in the narrow air gap between them, and allowed to burn until flames were in excess of 1 m above the top of the trays. The sprinkler system was then turned on and a special foam proportioned into the water supply. Total extinguishment was achieved in two minutes from commencement of discharge.

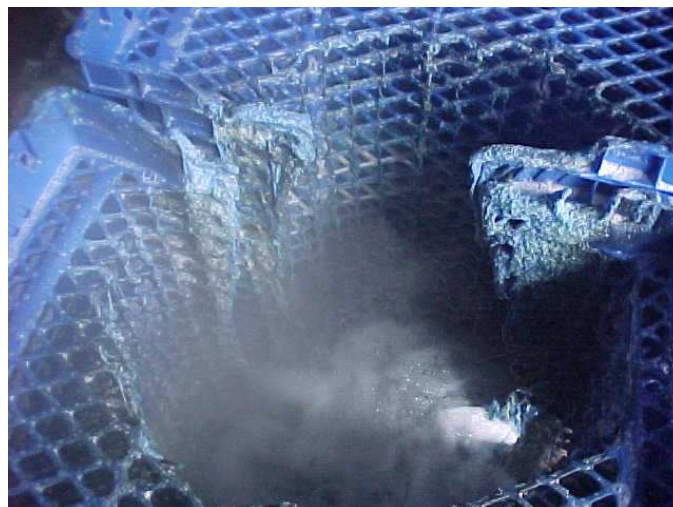
Test 2: A repeat of test 1 to verify the performance.



Test 3: Four half height stacks were formed into a square, ignited at their centre, and allowed to burn until flames were over 1 m above the top of the stacks. The foam water supply was initiated and extinguishment was again achieved after two minutes.

After a further one minute of discharge for cooling purposes the foam enhanced sprinkler system was shut down and the stacks pulled apart. Although the centres of the trays had burnt through the outer edges remained intact so the stacks remained upright and stable.

Re-solidified plastic was in evidence around the base of each stack showing that burning molten plastic had been extinguished. No re-ignition occurred.



Re-solidified plastic was in evidence

Full scale trials:

The final full scale trials were conducted in the 7m x 7m x 7m facility with 4 open sprinklers on 3m centres mounted 4.7m above the floor –simulating the clearance in a typical Bakery loading dock and connected to a foam / water supply. The square array of four 2m high stacks of trays were set with a 100mm air gap beneath and ignited at their centre.

Two tests were conducted –the first using the original special foam achieved total extinguishment in 2 minutes and no re-ignition after a further 1 minute cooling discharge.

The second test used one of the leading Fluorine Free foams newly introduced to the market. The foam struggled to gain control and suppression, and failed to extinguish the burning plastic when the test was terminated after 20 minutes when residual small flames still remained.

Summary and conclusions:

Plastic commodities, once ignited, become burning flammable liquids and pose a severe fire hazard where large quantities of plastic trays are in daily use. Water only systems can provide suppression but TF&IS testing has shown that carefully engineered foam systems are needed to provide the fire extinguishment, which will safeguard bakeries and other properties from fires involving plastic stowage's.

For further information contact your local Tyco Fire & Integrated Solutions office on: tfis.food.uk@tycoint.com or visit our website at www.tycofis.co.uk