

# Fire Investigation and Chinese Altars

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*The term Chinese altar might seem to some to be incorrect, since the Chinese people embrace many of the religions of the world. However in many parts of Asia it is common to describe such altars as Chinese altars, and we will use this term throughout this paper. The term Buddhist altar also presents difficulties as a general description, because while most Chinese practice Buddhism, they also emphasize the burning of joss sticks and paper as offerings in their worship. This practice originates from the ancestral religion of Taoism. Practices vary according to the part of China that the ancestors originated from, and the present country of residence. There are also distinct differences between worship in temples, homes and businesses. This paper is confined to the latter, as is our fire investigation experience.*

BY BARRY DILLON AND AINI LING, KUALA LUMPUR, MALAYSIA - As fire investigators based in Asia, we have to keep altars in mind for most investigations. The Buddhist, Hindu, Christian and Islamic religions are all well represented in this part of the world, of which the first three incorporate potential fire initiators in their worship. However the Chinese altars in particular command our attention, for three reasons. First, most of the 55 million overseas Chinese live in the otherwise non-Chinese countries in Asia, such as Malaysia, Indonesia, Philippines and Thailand. The second reason is the business success of this group of people, such that in many of these countries, the majority of the fires that we attend occur in insured businesses with Chinese owners. The third is the practice of the Chinese to have their altars in their businesses. In this last respect they are quite different from other religions where worship is confined to a church, temple or home.

## **Altar location**

Altars can be located inside or out. One reason for an outside altar is the need to pay homage to sky gods. Another is fire safety.

We have never had an instance of a fire starting at an outside altar. However joss stick stocks are generally kept indoors, and a common practice is to light them indoors and offer first to the god in the highest position, usually Buddha or the Goddess of Mercy followed by offering outside (gods of heaven) and then to a less prominent god and/or ancestor placards inside. We have encountered an instance of a fire starting indoors as a result of this practice.

Another experience involved a large factory that was gutted by fire, with everything on the site being destroyed except the outside altar. From a fire investigation perspective this was not strange, as the altar was constructed of concrete. It was noticed during the investigation that there were break-ins along the fence and this raised the thought of deliberate ignition by intruders, until it was realized that the local people had regarded the survival of the altar as divine. They were breaking in at night to pray over containers filled with numbers on pieces of paper, with the intent of using the lucky numbers in gambling.

## **Altars inside premises**

These can be anywhere. The manager's or owner's office, the general office or shop, or even on the factory floor or store, close to a machine or stock. The altars normally have a two-tier design, and can be constructed of wood, concrete or plastic, with the former dominant. Worship material can appear on each level, and can include joss sticks, oil lamps, electric lights and candles. We will discuss each and the hazards they present.

**Joss sticks** - These consist of sawdust bonded to a stem, usually wood, perhaps bamboo, typically 300 mm long, 5 mm thick and able to burn (smoulder) for 1-2 hours. Joss sticks would be lit upon opening the business in the morning, around 4-5pm in the evening, and at any other time. At temples, where the wooden stems of the joss sticks can accumulate in the hundreds before they are removed, they can catch on fire. This is sometimes interpreted as a divine sign, but can scientifically be explained in terms of heat conservation allowing smouldering to erupt into flames.

**Oil lamps** - A container, usually glass, with a centimetre or so of oil floating on water. A piece of cork floats on the oil, with a thin piece of tinplate for stability. The oil can be any flammable oil, but usually palm oil because it is the cheapest. Palm oil has a flash point of about 203°C. Oil lamps might be lit for 24 hours, or only on special occasions such as a new or full moon or during religious festivals.

**Electric lights** - Generally small, low wattage (5W) and coloured red, although in recent years the flickering lights that give the impression of a flame have made an appearance.

**Candles** - In modern times less common than the above. Only distinguished from normal candles by the colour, which is always red.

In terms of fire initiators there is nothing remarkable about any of the above. A lit joss stick is equivalent to a lit insect repellent coil or a cigarette; an oil lamp to a pilot light in a gas heater, and leaving a light on (or a fax machine) is common everywhere. In this respect there is nothing particularly dangerous about Chinese altars, which occupy less than 0.05 per cent of the floor area of a typical business.



However we find that they are a feature of a greater proportion of fires than one would suspect from the facts stated above. Some of these fires are accidental, some deliberate, and the rest of this article describes features of both types of fires.

In the 2001 edition of NFPA 921 Guide for Fire & Explosion Investigations it is implied that the origin of the fire be determined before turning to the cause. This procedure certainly applies to fire investigations where altars might be present, and we studiously avoid asking where the altar was located until we have devoted considerable time to origin determination. If this practice is not followed, there is a natural tendency to 'see' evidence indicating an origin about the altar. In contrast, if the origin is determined in ignorance of the location of the altar, and then upon inquiry it is found that there had been an altar at that location, the investigator can be rewarded with a warm inner glow of success.

is no indication of an altar at all until digging begins and investigators have to be aware of the implements associated with altars. There are ceramic and/or glass pots, cups, vases and steel implements that will survive virtually any fire in recognisable form. The colour red is also a feature of altar construction and will sometimes aid in identification.

A reoccurring feature of genuine altar fires is poor housekeeping with surrounding goods fighting for space around the altar. This is consistent with the previous comment that altars are not in themselves dangerous. It is believed and sometimes proven that an altar fire has started with a combustible item outside the altar falling into the altar area (*see Case 1*). If this material is capable of smouldering, the smoulder of the joss stick can transfer to it, with flaming combustion following. The wrapping paper that accompanies worship material is often discarded close by and this has been involved in some fires.

### *Determination of origin*

The determination that a fire has started in the vicinity of an altar is dependent upon proven methods of fire scene examination as described in NFPA 921 and elsewhere. Once it has been shown that an altar lies within the fire origin area, the design and condition of the altar have to be considered, together with the circumstances surrounding the closing of the business (all our altar fires have occurred after business hours).

### *Accidental altar fire*

Since most inside altars are made of wood, an expected feature of a fire that starts at an altar is the combustion of a good part of the altar woodwork. Sometimes there

Tests by our company have shown that the small red light bulbs used in altars have a maximum surface temperature of 160°C. This would seem to be insufficient to ignite common materials. However if insulating material such as paper, tissue or cloth falls and envelops a bulb, the temperature rise is sufficient to cause charring of the covering material and the bulb can shatter, with the possibility of ignition.

It is common practice to place food offerings at the front of the altar (*see Case 2*) and these can remain for days, attracting mice and rats. Oil lamps can be tipped over.

### *Deliberate altar fire*

These tend to be distinguished by one or more of the following.

1. The remains of non-altar combustible material like newspaper placed around the altar in an unnatural manner.
2. The detection of flammable liquids such as gasoline and kerosene, with evidence of low level burning, possibly spalling of concrete.
3. Trailers leading away from the altar.
4. Suspicious features of the business, for example unusual range of goods or absence of work in progress. Sometimes an altar forms part of a business established for the express purpose of claiming on insurance. This is described elsewhere<sup>1</sup>. (*Case 3 and Case 4 is an example*)

As with so many deliberate fires, much evidence stems from mistakes on the part of the perpetrators. With *Case 4*, the owner started with the problem of trying to burn a business that was essentially non-combustible. This difficulty was compounded by the attempt to burn the altar, which looked as if it were made of wood but was actually concrete. In *Case 3*, the arsonists were anything but handymen and it is doubtful if they had ever fastened a shelf to a wall before, much less attempted to fake a fallen shelf.

### *Summary*

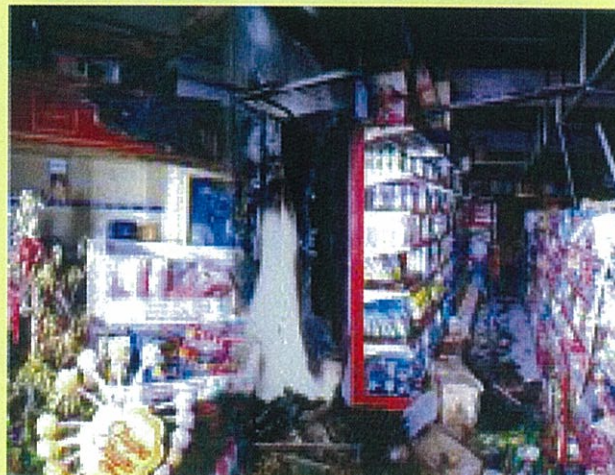
Chinese altars can start fires and a small but consistent proportion of fires that we examine in Asia have such an origin. The methodology of fire investigation remains the same as for other fires, but investigators must be aware of the features of altars and the variety of ignition mechanisms, while keeping in mind the possibility of a fire being set up so as to divert attention to an altar.

1. *Business Set Up to Burn*, Barry Dillon & Aini Ling, Interflam2001, Fire Science & Engineering Conference, Edinburgh, Scotland, September 2001.

### **CASE 1 - MINI MARKET**



1. V-pattern of fire damage indicated the fire origin. Partially burnt remains of goods from the upper shelf of the adjacent rack had fallen on top of the area of low level burning at the base of the V.
2. There was no clear indication of the presence of an altar in the area until the fallen remains had been cleared. Charred remains of a wooden two-tier



- altar were uncovered. The area around the base of the V was systematically excavated, revealing the various implements of an altar. Note the pineapple offering.
3. The ignition source was determined to be one of the oil lamps.



## CASE 2 - MOTORCYCLE SHOP



View down shop, looking past burnt motorcycles to rear of shop where red colour indicates location of altar. Investigation proceeded as follows.

1. Classification of damage to each motorcycle tyre revealed a pattern of damage indicating fire origin at rear of shop where altar was located.
2. Examination of altar remains revealed evidence of absorbent paper on top of joss stick pot.
3. Checking with owner revealed delivery of absorbent paper just before closing. Shipment placed on seat of motorcycle next to altar.

## CASE 3 - GAS FITTINGS



1. Rented area bereft of stock, except for gas fittings in one area. Electricity not connected. Materials present were not capable of sustaining a long-term smoldering fire.
2. Person is shown holding upper altar in supposedly original location. It had been found on the ground amidst the stock. The lower arrow indicates lower altar.
3. Fallen bracket screws came out of wall by rotation rather than force normal to the wall, indicating human agency.

## CASE 4 - ELECTROPLATING BUSINESS



Photograph below shows altar nestling between equipment in an electroplating shop. This in itself was not unusual. A fire had started beside the altar, amongst old Chinese calendars, smelling of kerosene (confirmed by gas chromatography). Hessian (jute) bags had been laid to connect the altar to the electroplating tanks. However the owner had not considered that the altar was concrete (see left).



## ABOUT THE AUTHORS -

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