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A VISIT TO THE SCENE OF A FIRE AT THE AMALGAMATED DENTAL ENGINEERING CO., HAMM MOOR LANE, CHERTSEY, SURREY.

bу

H. L. Malhotra

February, 1957.

Fire Research Station, Station Road, Boreham Wood, Herts. A VISIT TO THE SCENE OF A FIRE AT THE AMALGAMATED DENTAL ENGINEERING CO., HAMM MOOR LANE, CHERTSEY, SURREY.

by

H. L. Malhotra

General

The scene of a fire was visited on the 5th November, 1956, in the company of Mr. S. C. C. Bate of the Building Research Station. The visit was arranged by John Laing's Research Laboratories at Boreham Wood. The factory building had been recently constructed by John Laing and was partly occupied at the time of the occurrence. The occupiers, as the name implies, are manufacturers of goods for the dental trade and store a fair amount of combustible material such as cardboard boxes and acrylic powder on the premises.

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The fire, which occurred on the 31st October at 12.49 p.m., was attended by the Surrey Fire Brigade, Reigate, and was under control in half-an-hour.

Description of the building

The part of the building involved in the fire was a single storey structure, consisting of post-tensioned prestressed concrete primary beams of I section approximately. 40 ft long. On the lower flanges of the beams were carried prestressed concrete secondary beams, of rectangular section 4 in. x 12 in. deep, pretensioned with ten 0.276 in. diameter high tensile wires. The minimum cover to the wires at the soffit was 1 in. of concrete. The secondary beams had a span of 22 ft 6 in. and were located at 6 ft $9\frac{5}{8}$ in. centres. Prestressed concrete planks 2 in. x 6 in. wide, were placed on top of the secondary beams, closely butting together and overlaid with cork and bitumen insulation and a topping of granite chippings. The planks were pretensioned with 12 S.W.G. wires having a cover of approximately 1 in. Both the secondary beams and the planks were stated to have been manufactured with High Alumina Cement and limestone aggregate, having a mix ratio of 1: 4 and were manufactured by Charlton Concrete Co. Bristol.

Figure 1 shows the layout of the bay which was affected by the fire, and Figure 2 shows from below the construction of the roof for an undamaged part of the building, clearly illustrating the prestressed concrete planks supported by secondary beams. The skylights which are visible in Figure 2 consisted of wired glass domes in aluminium alloy framing. The underside of the roof was painted with distemper.

Details of the fire

The fire appeared to have started in a stack of corrugated carboard boxes (Figure 3 shows the type of fire load involved) and was not noticed until it was blazing at the top. The cause of the fire is unknown to date. The fire was confined to one bay only and was brought under control by the Fire Brigade within half-an-hour using one Mater Tender and one Pump.

Damage by fire

The timber-studded hardboard and glass corridor screen was severely damaged and the skylight frames just above the fire had melted and deformed. Considerable spalling of the planks had taken place in the area shown in Figure 1. Figures 5, 6 and 7 clearly show the complete disintegration of the concrete in the planks in the severely affected areas, with the prestressing wires hanging loose. In the areas of light spalling only small amounts of concrete had fallen away from the soffit of the planks. No evidence could be gathered whether the spalling was of an explosive nature or not.

In the affected area the arrises of the secondary beams had also spalled exposing lengths of prestressing wires. The primary beams did not show any cracks or sagging and appeared not to have suffered any damage by the fire.

Slight damage was also noticed on the exterior at the end of the bay as shown in Figure 4.

Discussion

This was the first fire reported involving prestressed concrete units made from High Alumina Cement. The damage to the planks may appear to be excessive but it is not surprising in view of the results obtained in a fire resistance test on prestressed concrete planks made with normal Portland cement. It is difficult to judge the behaviour of High Alumina Cement Concrete from this solitary fire; future incidents may throw more light on this subject.

Acknowledgement

Mr. S. C. C. Bate of the Building Research Station kindly supplied the photographs.

FIG. I. LAYOUT OF THE BAY EFFECTED BY FIRE

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FIG. 2. INTERIOR VIEW OF BUILDING SHOWING CONSTRUCTION



FIG. 3 SHOWING TYPE OF PACKING MATERIAL INVOLVED IN FIRE



FIG.4a. EXTERIOR VIEW SHOWING DAMAGE TO ALLOY GLAZING BARS

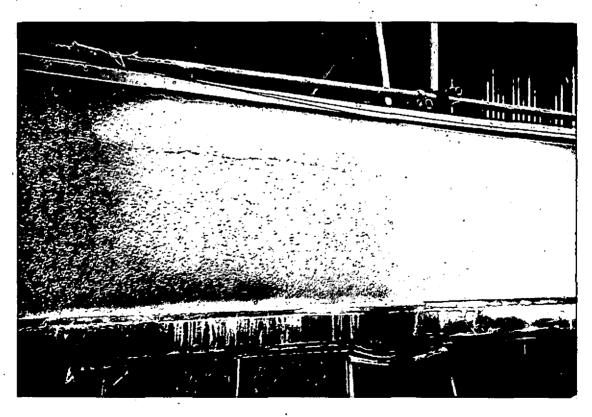


FIG.46 EXTERIOR VIEW SHOWING SHRINKAGE CRACK
IN RENDERING TO WALL BEAM ADJACENT
TO FIRE

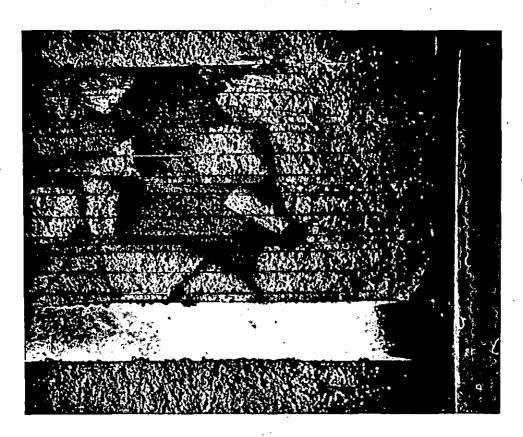


FIG.5. SPALLING OF PRESTRESSED CONCRETE PLANKS
SEEN FROM BELOW WITH THE CORK
INSULATION SLABS VISIBLE

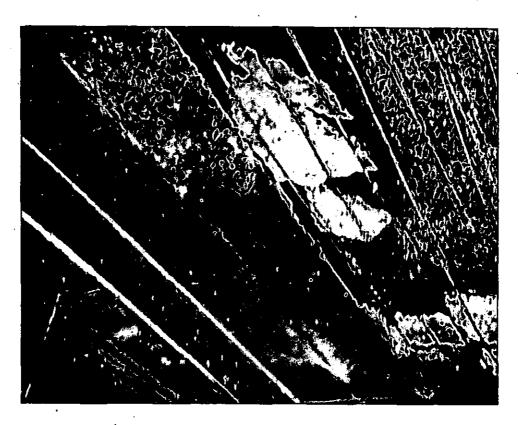


FIG. 6. SHOWING SPALLED CONCRETE PLANKS AND BLACKENED PRIMARY BEAM

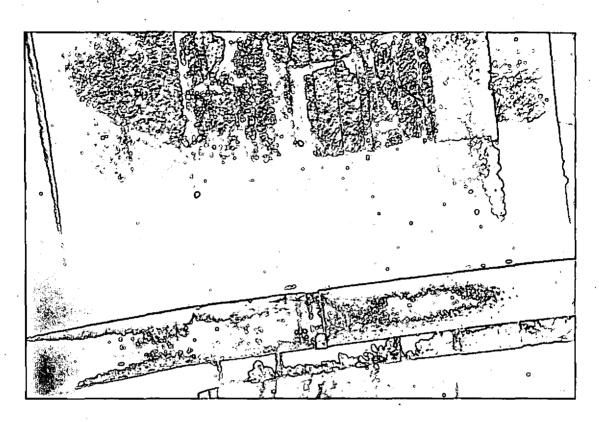


FIG.7a. SHOWING SPALLED CONCRETE PLANKS AND A SLIGHTLY DAMAGED SECONDARY BEAM

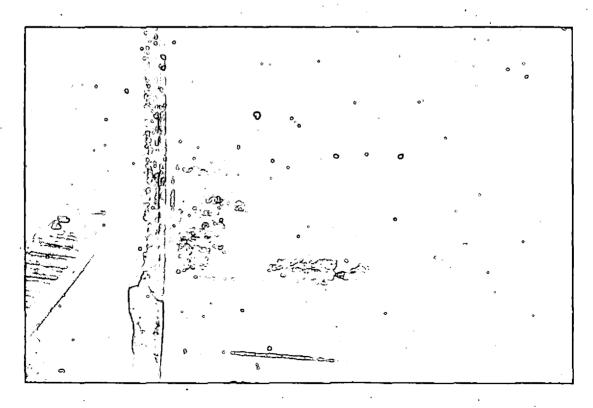


FIG.76. SHOWING A BADLY SPALLED SECONDARY BEAM