

BUILDING AND RESTORATION SITES FIRE: STATISTICAL DATA FROM A 6 YEARS EXPERIENCE IN VENICE

Stefano Zanut

National Fire Brigade - Italy
stefano.zanut@vigilfuoco.it

ABSTRACT

The problem of restoration sites fire and their consequent great damages to the historic-artistic heritage in our country, does not receive the just attention yet.

That is probably because of lack of adequate information, which would allow such a reality emerge and enable to establish the necessary landmark upon which the consequent initiatives are to be organized.

The present contribution, which represents a part of a research work still in progress Venice University Institute of Architecture (I.U.A.V. – Istituto Universitario di Architettura di Venezia), aims to begin filling up that gap through the data analysis provided by the Firemen operating in Venice, where, because of building fabric typology existing there, every of its building sites can be identified as “restoration site”.

Keywords: Restoration sites fire, fire risk indicators, safety operational plan

INTRODUCTION

The big fires occurred in our country in the last years, have awoken the public opinion's interest in the artistic and cultural heritage vulnerability to such events.

Their outcomes have, on the other hand, resulted being greatly enlarged by the conditions of the urban context in which they occurred, which have contributed to increase their magnitude because of the way fires themselves have been able to easily spread throughout an urban building fabric mainly realized of combustible materials.

In many of those circumstances, the presence of a building site had not at all been taken into due consideration, even though it had “contributed in a

significant way to magnify the consequences, as it had involved the reduction of the safety level” [1].

Fire, as well as other aspects of safety at a building site, is specifically dealt with in an extensive and articulate framework, which in our country refers to Legislative Decree 494/94 enforcement of Council Directive 92/57/EEC of 24 June 1992 on the implementation of minimum safety and health requirements at temporary or mobile work sites.

When enforcing that regulation, it is often interpreted only in the light of the more frequent accidents occurred at building sites, whilst fire itself is almost never taken into consideration except in very particular cases or by Supervising Authorities' specific imposition.

Purpose of the present contribution is to allow this problem emerge through the data analysis extrapolated from Venice Firemen's reports in a 6-year period, from 1997 to 2002, while trying to extrapolate from it any useful information upon which starting to structure operating suggestions for the management of this building process phase.



Photo n. 1 - In the night between 12 and 13 December 1996 a fire destroyed great part of the Great Theatre "The Fenice", in Venice. In this case a temporary alteration caused by the construction site has contributed to spread fire and hindered the operations of firemen teams'.

The case analysis

The Firemen's intervention report forms are structured so that a wide typology of interventions associated to as many specific numerical codes is taken into consideration; data containing many and complex information concerning tasks which often exceed "simple" fire extinguishing.

From these reports have been extracted and elaborated more significant information which are important for this contribution.

A first information can be obtained by comparing the quantity of building sites fire interventions with the total amount of general kind ones and the number of "potential" building sites extrapolated from the "authorisation acts" adopted in Venice at the time (table 1).

Table 1: Comparison between fire intervention and "authorisation acts" adopted

Year	Tot. Fire	Tot. Fire in Construction site	Tot. Authorization Acts
1997	133	20	1.857
1998	116	31	2.276
1999	137	19	1.972
2000	146	7	2.094
2001	138	18	2.176
2002	193	11	2.574

The data about the possible fire starting sources, codified under the heading "alleged causes", and those about the materials having contributed to the combustion process, available under "substances and materials involved" (Figure 1 and 2).

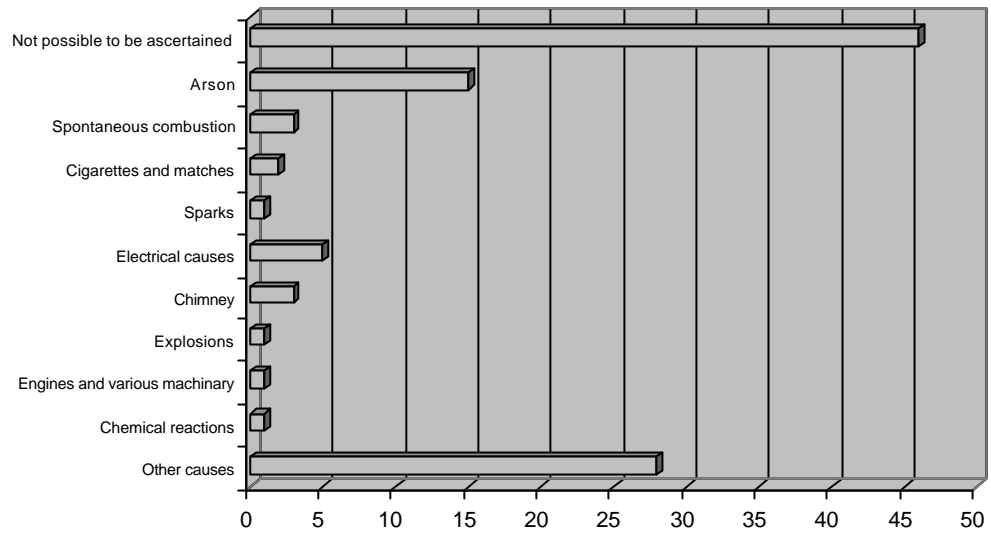


Figure 1. "Alleged causes" and consequent intervention frequency.

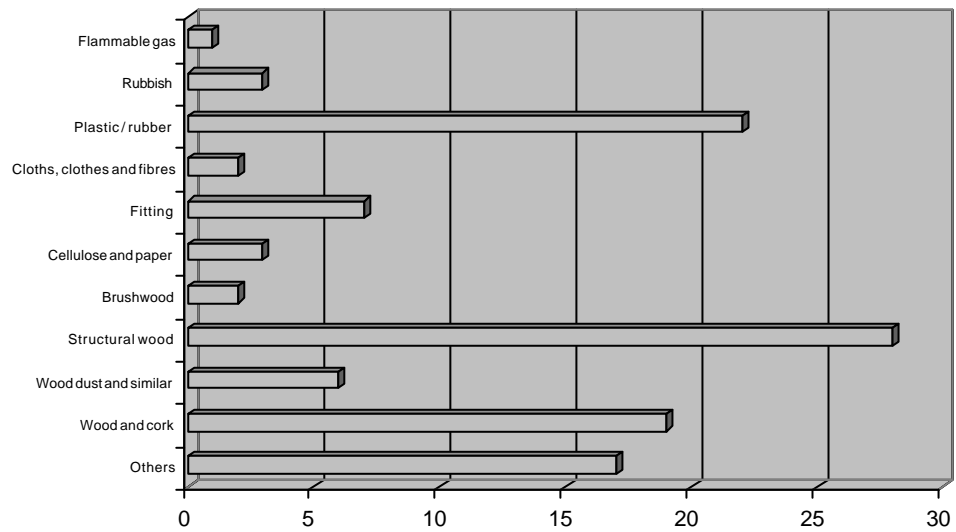


Figure 2. "Substances and materials involved" and consequent intervention frequency (Under the category "plastic/rubber" are included the protection covers made of combustible materials and the building site enclosures).



Photo n. 2 - Venice, 27 June 1998: fire in the outside of Santi Geremia e Lucia's church. In this case the scaffolding contributed to accelerate the fire spread .

The intervention lengths of time allow to trace the events gravity (Figure 3).

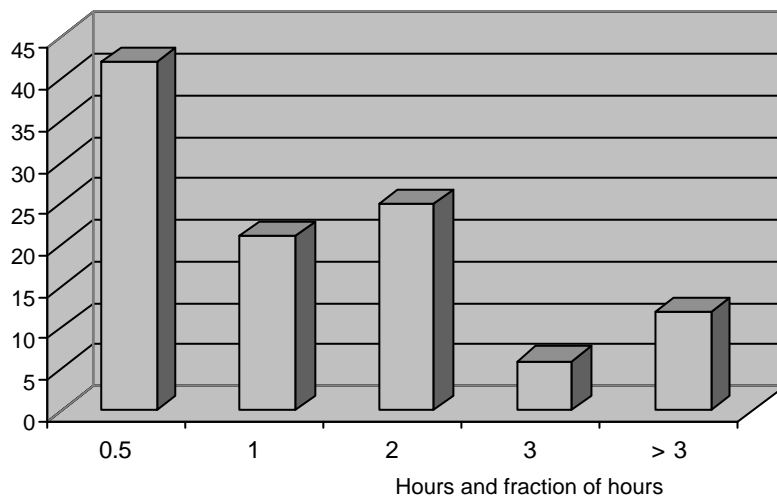


Figure 3. Intervention frequency and their duration (in hours and fraction of hour)

The following graph illustrates the data concerning the Firemen teams' lead-times taken to get to the fire-site.

In a particularly sensitive context such as the one taken into consideration, the guarantee of short travelling times becomes of significant relevance in order to contain the possible outcomes of a fire and, more generally speaking, to guarantee an efficient public rescue service (Figure 4).

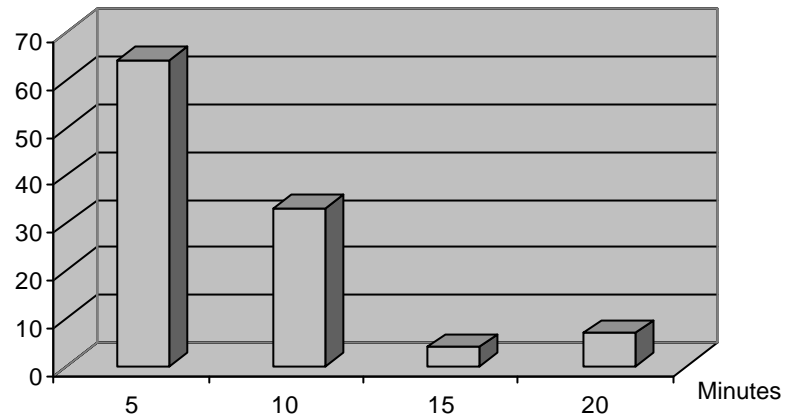


Figure 4. Distribution of the firemen teams' lead-time taken to get to the fire site.

Next survey concerns the intervention frequency in connection with the hour (figure 5) and week-day (figure 6), that shows how such events occur mainly during the building site closing hours.

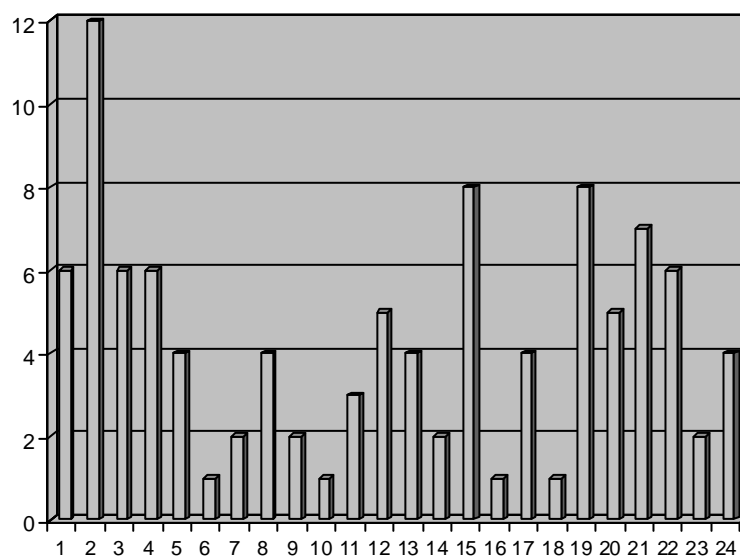


Figure 5. Amount of interventions in the hour of the day

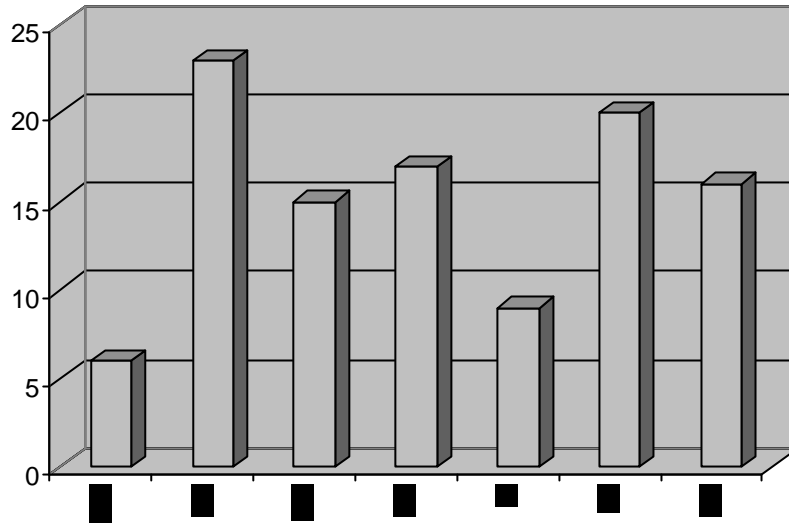


Figure 6. Amount of interventions in the week-day

This last aspect may be considered with particular attention as it highlights, at least according to the available data, a circumstance increasing the building site vulnerability.

Both Fenice's in Venice and Dome's in Turin fires have occurred at night-time; from the investigation acts emerge that in the latter of these two circumstances "... it seems there has been a 40-minutes interval between the first detection of fire and the call for help to the Firemen in Turin. That is not the first case in which a premonitory sign (such as the sighting or detection of smoke) are initially underestimated" [2].

THE UNDERTAKEN INITIATIVES

The problem sofar analysed has been partly tackled within the Department for the Architecture Construction (Dipartimento per la Costruzione dell'Architettura) of Venice University Institute of Architecture (I.U.A.V. – Istituto Universitario di Arhitektura di Venezia) in prof. Piero Michelotto's course and with this presentation writer's contribution.

The therefrom obtained result is the arrangement of a fire risk analysis route, which is still in progress at present, and which target is to identify the critical phases in the management of a building site starting with the

elements peculiar to the determination of the structure vulnerability and subsequently continuing with the identification of the single phases or building processes which the specific technical directions about the execution modalities.

On the table the “structure + construction site” complex is to be put for evaluation, and not the two situation separately, that is a remark which may seem taken for granted or trite, but it is instead to be considered with due attention.

Many are the conditions that contribute to identify the fire risk indicators peculiar to that complex (iRt): the environment (iRen), the construction site (iRcs), which on the other hand aspects connected with its organizational and management complexity are correlated to, the works (iRwk) and their coordination (iRco).

It is this a route that will allow to acquire useful directions to revise those work procedures connected with fire risk, that are to be included in the Safety Operational Plan.

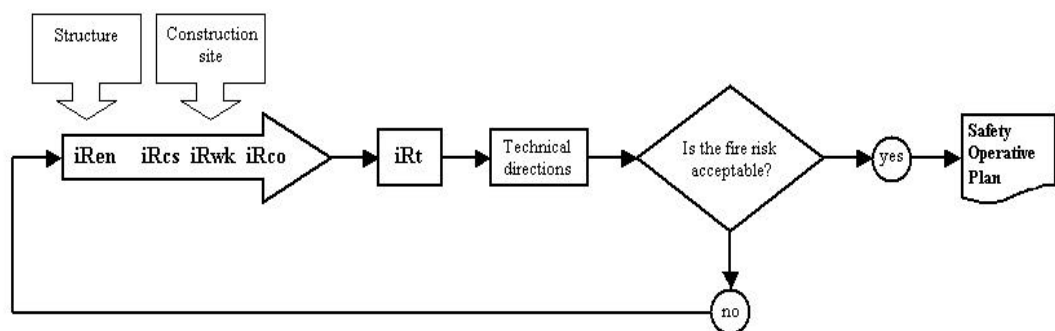


Figure 7. Scheme of procedure for fire risk indicators assessment in “structure + construction site” complex.

CONCLUSION

From what just illustrated in this presentation it clearly emerges how, during the execution of extraordinary works, or however during building site setting up, the fire risk increases considerably in consideration of the changed risk conditions of the places, the use of building sites materials,

which are usually combustible, and the reduction (if not the cancellation) of fire-fighting defences.

It is therefore important to tackle the problem since the planning phases of the building site itself, putting it strictly in connection with the conditions peculiar to the structure and the environment context considering with attention also the possibility of Firemen Teams' intervention.

BIBLIOGRAPHY

- [1] M. Ferraro e M. Battaglia, *L'incendio del duomo e del palazzo reale di Torino*, Antincendio 8/97
- [2] S. Marinelli, *L'incendio del duomo di Torino: cronaca di un evento già visto - I lavori di manutenzione: un rischio sempre in agguato per i "beni" di inestimabile valore*, Antincendio 8/97
- [3] NFPA914, *Code For Fire Protection Of Historic Structures*, 2001 Edition
- [4] NFPA241, *Standard for Safeguarding Construction, Alteration and demolition Operations*, 2000 Edition
- [5] AA.VV., *Construction Fire Safety*, Construction Information Sheet No 51, HSE information sheet, 1997
- [6] M. Marchini, *Quando la sicurezza riguarda il patrimonio culturale nazionale*, Antincendio 5/00
- [7] E. Bertolino e M. Fornaio, *Le misure di lotta agli incendi nella ristrutturazione edilizia*, Antincendio 9/00
- [8] V. Galetta, *Lavori edili ed incendi per cause elettriche - Non è certamente un caso se l'incendio del famoso teatro La Fenice di Venezia ebbe a verificarsi esattamente quando al suo interno operava un cantiere*, Antincendio 9/00
- [9] R. Landolfo e M. M. La Veglia, *Grattacielo in fiamme a Napoli: quando il rischio viene gestito male*, Antincendio 10/00
- [10] S. Marsella e L. Galli, *La prevenzione incendi nei cantieri edili*, Roma 1998
- [11] P. Michieletto e S. Zanut, *"Un approccio valutativo al rischio incendio nei cantieri di restauro: il metodo DARIO"*, in atti del "Convegno nazionale valutazione e gestione del rischio negli insediamenti civili ed industriali", Pisa 2002