

Proceedings of the Ninth

**INTERNATIONAL SYMPOSIUM ON FIREWORKS**  
**Internationales Feuerwerkssymposium**

*April 3 – 7*  
**April 3 – 7**

**Berlin, Germany**  
**Berlin, Deutschland**

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## PREFACE

The International Symposium on Fireworks Society (ISFS), a non-profit organization, was established to deliver the International Symposium on Fireworks (ISF). Its structuring continues in order to achieve international representation to reflect the intent of the ISFS to better encompass the pyrotechnic-related activities worldwide.

After a very well attended Symposium in Shiga, Japan, the ISF returns to Europe, in part, to coincide with the dissemination of some of the vast amount of data generated in the Quantification and Control of the Hazards Associated with the Transport and Bulk Storage of Fireworks (CHAF) Project. As a result, a large number of presentations relate to this very important work. Monitoring their web site over the last few years one cannot help but be truly impressed, first that the European Community supported this type of research and secondly with the breadth of the program. Equally, I had the opportunity to witness a few of the large-scale tests and I was impressed with the professionalism of the CHAF partners, teams from the HSL, TNO and BAM. The information gathered from this project will no doubt provide guidance for years to come for regulators charged with writing storage and transportation requirements.

The Berlin ISF program was organized to stage a CHAF Open Session where the ISF attendees would have the opportunity to ask questions and discuss the CHAF results directly to and with the CHAF Partners.

A large portion of the organization of this Symposium fell on the shoulders of Alexander von Oertzen, supported by the BAM staff. Besides being the editor of the European papers, he was also involved with many other logistics including planning the BAM excursion and the evening events. His efforts are greatly appreciated.

It is a privilege that Rev. Ronald Lancaster, having just completed his fourth book, has graciously accepted the role of Symposium Honorary Chairman. Rev. Ronald Lancaster has supported the International Symposium on Fireworks through his attendance and lively and energetic presentations. Thank you Rev. Ronald Lancaster!

Again, these Proceedings reflect research and points of view from various parts of the world. It requires great effort on the part of the presenters to perform the research, assemble the manuscript and then prepare the presentation. The authors must be congratulated for their efforts. As usual, the papers were lightly edited by at least two editors, with a few papers requiring major rewriting. The effort and knowledge of the editors is reflected in the papers and they also must be given credit for their diligence and the many hours that they invested in assembling these Proceedings.

As in previous Symposia, Moderated Sessions (Round Table discussions) were also held. The topics are listed herein. This mode of interaction is appreciated by the attendees and provides a forum for more intimate and in depth discussions. The moderators are all well qualified in their topic and generously share their expertise. I encourage others to consider their participation as moderators at future Symposia.

As usual, it takes a great effort to deliver the Symposium, requiring dedication from many volunteers. This Symposium had logistic support from the Symposium Committee in Berlin, BAM, the CHAF Partners, and ..... We are indebted to them for their support.

Once again we would like to thank all the sponsors and encourage others to promote the Symposium and their business through sponsorship.

We bind these Proceedings and look forward to completing a decade of Symposia in our continuing journey to Discover the Fire (ΕΞΕΥΠΙΣΚΕΤΕ ΤΟ ΠΥΡ)

Ettore Contestabile  
Chairman

**The International Symposium on Fireworks Society extends its utmost appreciation to the Canadian Explosives Research Laboratory (CERL), Natural Resources Canada, and the Bundesanstalt für Materialforschung und -prüfung (BAM) for their financial contributions towards offsetting the cost of producing these Proceedings.**

## **The 9<sup>th</sup> International Symposium on Fireworks opening Remarks:**

### **Honorary Chairman, Ron Lancaster**

It is a great pleasure and honour to welcome you all to this 9th International meeting. I have been looking forward to being able to meet with you all once again and to meet new people, but alas, I can only be with you in spirit since domestic problems have dictated that my duty is at home.

Our interests in pyrotechnics are many and varied. For some it is a particular application of chemistry and physics, for others it concerns details which affect the nature of their employment, while for me it is about fireworks which is a mixture of chemistry and cooking.

Some weeks ago a man reminded me that as a boy of seven or eight he was inspired in school chapel by a man who burnt some NC fountains in the pulpit! I was inspired at that age by a display for the King's coronation. My wife has always said that I speak, eat fireworks and speak about them in bed, and the interest has lasted for sixty years.

The wonderful thing about this Conference, which is to the greatest credit of our Canadian friends, is that it has been very much a feature of the modern phenomenon of globalization. From that first meeting in Montreal it has toured the world and was last time in Japan. In each of these venues we have enjoyed great fellowship, increased our knowledge and understanding and seen some wonderful firework displays.

The changes in the firework industry have been great, not so much about the way in which fireworks are made but rather where they are made, how they are used and how they are controlled. We have not had any real advances since the availability of titanium and high temperature coloured flames, but the changes in the industry are considerable. The older hands in the industry were saying years ago that they could see no secure future for manufacture and it was a bit of a joke, but there is no secure future now in the west, there is very little of the industry left. As we get older we often marvel at where life has taken us as we left those wonderful young ideals behind; for me it was medicine or the church and I have ended up with the last factory making display fireworks. All those years ago a man called Luke thought he would go to Bythinia but ended up somewhere else and writing a gospel.

As most of the manufacture is leaving the west and moving to east, we have to accept that this is to do with economics and globalization; we know that nothing is for ever, but there are serious consequences. The first of these is the gradual loss of experience as factories disappear. This is quite serious because this experience will be lost forever and the stability of the world cannot be guaranteed. As a part of this change we also see new people importing explosives and not having that experience in their blood and maybe treating explosives in the way that they might treat any inert substance.

The second problem is the escalation of health and safety, the time it consumes and the expense which it creates. Everyone accepts that clearer standards of health and safety were needed, but it does not know where to stop. A display in London today might need risk assessments with as many as six or seven interested parties and I am sure that everyone has concerns about this. We have all lived with risk since we were born. Each time we say those famous words 'lead us not into temptation' we know it is about risk! But I have reached the stage that when I hear the word risk now I want to scream out loud. So I want to appeal to all of you to think very carefully about what we need as a common sense approach to modern legislation before it destroys us in the west completely.

The new ways of setting up displays with electronics can produce some wonderful effects which our ancestors would never have dreamed of, but small fireworks also give a lot of pleasure, even an indoor fountain seen by a small boy. Lasers may be great additions to the enjoyment, but fireworks have a life of their own and many of you here give an enormous amount of pleasure with your skills to people all over the world.

Thank you for taking part in the Conference and finally thanks to the Light which creates our skill and possibly enables some to earn a living. It was never my intention to earn a living making fireworks, but our Company motto somewhat facetiously reflects this: Ex luce lucellum - Out of light, a little profit.

Thank you,

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**MODERATED SESSIONS**

**List of Topics and Moderators**

1. *The American Pyrotechnics Association and U.S. regulations* - Julie Heckman (APA)
2. *Environmental Impact of Fireworks* - Ben Swegler (DISNEY)
3. *En Masse Explosion, What is it?* - von Rosen (CERL)
4. *The Authorization of Fireworks in Canada* - Jean-Luc Aprin (ERD)
5. *CE Certification of Fireworks* - Ruddy Branka (INERIS)
6. *Fireworks and Pyrotechnics for Display, Manufacture and Storage, and Indoor/Proximate Usage – NFPA Requirements* - Guy Colonna (NFPA)
7. *Phytoremediation of Environmental Perchlorate Contamination* – Roger L. Schneider (Rho Sigma Associates)
8. *Displays in unusual locations: challenges and solutions* – Hans-Georg Kehse (PyroArt)
9. *TBA* - Ed de Jong (TNO)
10. *TBA* - Stewart Myatt (HSL)
11. *Notified Bodies for Pyrotechnics in Europe: a Brainstorming Session* - Lutz Kurth (BAM).
12. *Pyrotechnic Show Design - The Tricks of the Trade. Positioning, Scaling and Perspective Within the Arch of the Show* - Eric Tucker (Performance Pyrotechnic Associates)
13. *Strategies and Techniques for the Decontamination of Inactive Pyrotechnic Manufacturing Sites* - Bjorn Soderberg (Hansson Pyrotech AB)
14. *Fireworks and Pyrotechnics Research: Combining Forces* - Alexander von Oertzen (BAM)
15. *Blast effects on structures* - Kim King (ABS Consulting)
16. *Flash Powders* - John Conkling (APA)

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