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April 2006

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# Winter Olympics, Turin

For readers who weren't among the over two billion TV viewers able to follow the 20th Winter Olympic Games' opening and closing ceremonies in Turin, produced and staged by the K2006-FilmMaster team led by creative director Marco Balich, it was not only a great example of Italian passion and fantasy, but also a perfect opportunity for the Italian production world to show what it was capable of.

Even choosing highlights from the opening ceremony alone would be a hard task. With a production that included Pavarotti, Yoko Ono, Peter Gabriel, Roberto Bolle, Sophia Loren and a cast of thousands - apart from the hundred of performers on the show, the audience was provided a show package with white ponchos and torches, enabling them to play their own part.

However the 'Sparks of Passion' (speed skaters with flame-throwing helmets by Vittorio Comi) who flew round the stage on several occasions, acrobats forming the dove of peace, a 'shaman' with a flame-throwing anvil, a huge skier formed by over 400 performers, dancers suspended from a huge sun and moon floating over the set and the fireworks display were among my favourites.

In the huge backstage area, K2006-FilmMaster's technical organizational producer Marco Astarita was rightly proud of the company's appointment by the TOROC Organizing Committee, as their tender was up against other organizations with a very high international profile.

K2006-FilmMaster's first job was to prepare a set design integrating the creative team's requirements in the planned upgrade for the Olympic Stadium - where Astarita had already worked as production manager for concerts by Amnesty International, Madonna and the Stones. He explained: "Our starting point was therefore the venue and the set designed by Mark Fisher - an extraordinary guide for any technical team, but also very demanding. The result was a stage with a huge proscenium and a large but very 'fluid' apron platform, for which we started working on the ceremonies' four key technical components - the lighting, designed by Durham Marengi, sound reinforcement, special effects and communications."

At this point, the action plan took two directions, with the formation of an in-house technical direction team for K2006 (the company founded by FilmMaster to coordinate the development of a project



(© Thierry Nava - Groupe F)

**Above Left - Top - Sparks of Passion.  
Middle - The dove of peace formed by the acrobats (Photo by LaPresse).  
Bottom - Just some of the many dancers.  
Above: The Groupe F designed pyro show.**

Words by Mike Clark

that enabled vendors to be contacted for their tenders) and a production team, responsible for smooth operation from a logistics point of view.

Astarita said: "The technical management team was led by some really great personalities, such as technical supervisor Richard Hartman and our technical director Mario Ruffa. Their technicians ensured the constant presence of a person able to take human and technical decisions in each area - Willy Gubellini and Angelo Camporese (audio), Eneas MacKintosh (lighting), Gino Lazzaroni (fx), Andrea Taglia (communications), etc. Apart from some key players from abroad, this group was made up of the folk who've written the last 15 years of Italian show production history."

A production group led by operations director Maurizio De Lazzari, supported by show production manager Bicio Marchi, interacted with the people responsible for organizing and moving the huge number of performers involved.

Structural work was entrusted to Stageco, who've worked with Mark Fisher for many years, while the stage itself was by Italy's LimeLite. Main lighting contractor was Space Cannon, supported by Agorà of L'Aquila (one of Italy's largest rental firms) who provided the

equipment not manufactured by Space Cannon as well as technicians. "This solution enabled us to remain within our budget without Durham having to renounce any of the hardware in the plot," said Astarita, "which wouldn't have been possible with the foreign companies we contacted, whose estimates were all considerably higher."

For the audio, Astarita brought together Panasonic, score composer/director Michele Centonze, top Italian sound designer Daniele Tramontani and Agorà. "The result was Panasonic as main contractor, supported by Agorà, with specific audio hardware, rigging and technicians - and the rig sounded really great!"

#### Audio

As an Olympic Partner (TOP) for the Turin 2006 Olympic Winter Games, this year Panasonic's sponsorship extended beyond audio and video, to include car navigation systems and related multi-media equipment, as well as supply of security equipment.

2006 was also a first for an all-digital broadcast set-up, but, as well as bringing true-to-life sights and sounds to billions of spectators around the globe, Panasonic also ensured this for audiences on-site in Turin, with 25 Astrovision giant outdoor video screens at



Left: The Olympic rings of fire (Photo by LaPresse).

various Olympic venues, including the Olympic Stadium. Panasonic also provided 75 Ramsa audio systems, featuring line-array speakers developed to cope with extreme conditions and minimize sound leakage.

Sound system designer for the ceremonies was Los Angeles-based Gary Hardesty, who began work as a systems engineer in 1968, before forming his own company. With several successful commercial products and three patents, he sold the company in 1991 to Harman/JBL Professional and went to work for them for five years. He explained: "I then moved to EAW for a few years and made some very interesting experiments there, working closely with Kenton Forsythe and Dave Gunness. In 1999, I was appointed vice-president for worldwide events and technologies for the PRG Audio Group, which I eventually left and went back to doing my own work."

Hardesty has worked with Panasonic since 2001 and has 3,000 shows to his credit, including major events such as the Atlanta Olympics, the 1994 World Cup opening and closing ceremonies, several NFL Super Bowls and the Pope's visit to Toronto in 2002. He began work on the Turin system a year before the Games and, as well as deciding which speakers to use and where to place the equipment for the system, also designed the Ramsa WS-LA1 and WS-LA2 line arrays used to cover the stand seating in Turin (and major competition venues). These were used for the first time at the Athens Olympics, and in Turin, a third system - the WS-LA3 - currently at prototype stage, was also used and will be integrated more extensively in the Beijing 2008 summer Olympics.

Hardesty explained the arrays' distinguishing features: "The 3-way bass-reflex systems use planar magnetic rather than ribbon technology - they have conventional low frequency drivers and proprietary large flat - leaf-type - mid-range and HF drivers. This has resulted in the first really high definition products - sound quality is extremely high, phase response is very flat, and frequency response very smooth and extended. WS-LA2 is basically a smaller version of the WS-LA1 and both have extremely low distortion and extended high frequency range. The WS-LA3 is intended to compete more with normal compression driver products, so has more conventional technology, but sounds extremely good - the intention was in fact to create a 'family sound' for the range."

Although Panasonic also manufactures a WS-LASUB, Hardesty didn't have enough, so it was decided to use L-Acoustic SB 218 subs along with the Ramsa arrays at Turin. 12 clusters, each with eight WS-LA1 systems and two subs, were flown from the stadium roof, deployed six along either side of the stadium, and another WS-LA1 cluster (six systems and two subs) flown either side at the beginning of the curve at the main stage and more or less level with the stage-front.

Two WS-LA2 clusters (four systems and two subs) were flown above and behind the stage and two more external WS-LA2 clusters (six systems) level with the side of the set. The impressive roof-flown Panasonic rig was completed by two more WS-LA2 clusters (10 systems and two subs) on the curve at the opposite end of the stadium.

Spot and ground coverage was ensured by a combination of systems by Ramsa, Meyer Sound, L-Acoustics and Outline. Four WS-LA3s were ground-stacked at the base of the rear Olympic ring towers.

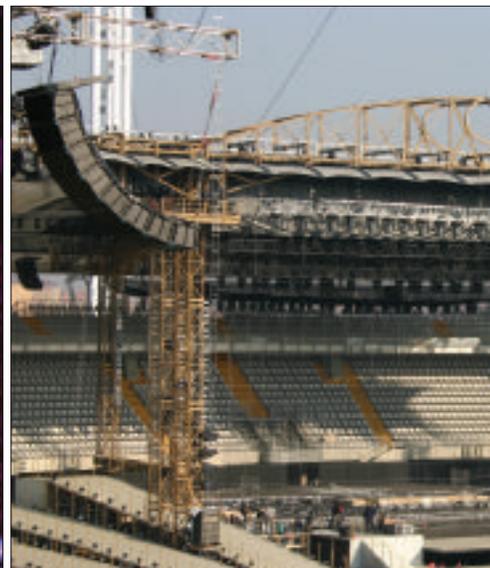
Round the perimeter of the stage, there was a series of four Meyer MICA and eight Meyer MILO systems, plus four L-Acoustics Kudo and four Meyer 700HP subs on either side of the stairs leading up from the track on to the stage. Five MILO were stacked on stage at the grid legs and three 700HP subs ground-stacked on either side of the stage, along with six Kudo. A pair of MILO were positioned at the Olympic ring platforms and monitor speakers positioned on stage and at the flagpoles.

Six separate Outline Butterfly CDH 483 Hi-Packs were used as fill speakers for the mosh pit - a cluster of six flown from each of the two light towers furthest from the main stage and a cluster of four cantilevered from each of the front ring towers. A cluster of six more was flown from either side of the stage grid as side-fills, each with three subs.

#### Audio distribution

The audio system was one of the most complex ever employed for the ceremonies: in addition to the huge main system, divided into individually controllable zones with different requirements, there were also areas used by the athletes and performers, a special VIP zone and broadcast feeds, all requiring specific attention. With so many sound sources spread over such a wide area, a sturdy and reliable distribution network was of fundamental importance.

Hardesty specified EtherSound for its low latency, superior audio quality and flexible functionality. The design used a 1 Gigabit fibre-optic backbone, with eight distribution zones supported by 1 Gigabit and 100 Megabit Cat 5e cable. Data traffic and network redundancy were managed by DLink Ethernet switches and transceivers using Spanning Tree Protocol. PCM digital audio data was transmitted across the network via EtherSound-enabled devices from Digigram: 15 ES881 8-channel AES/EBU digital-input interfaces were used to transmit the source material onto the network and extract it as needed for broadcast or live sound reinforcement, along with six 8-channel ES8in and eight ES8out Audio Bridges. A pair of two-channel ES220-L network interfaces were also used. Agorà supplied all the equipment in conjunction with Panasonic and Hardesty's Italian partner Daniele Tramontani



© Filmaster

did the detailed design and management for the network, with the technical support of Prase Engineering.

Rob Hunt, Hardesty's Panasonic partner, acted as senior Panasonic project manager for the stadium (and all competition venues). Hardesty explained: "I'm also responsible for the 2008 Beijing Olympics sound design and was in Beijing during some of the Turin set-up, but I had several really good partners to rely on, including the incredible support of Agorà."

Tramontani explained: "I was the executive with Agorà for Gary Hardesty and my job was to set the entire system, including EQ and delay. 22 sends were fed out from the Midas Heritage 3000 desk, manned by Maurizio Maggi, to a rack of BSS Soundwebs, which took care of equalization, delay and volume. From there, the 48 signals, already divided for each cluster, were fed out to the Digigram units for transport to the various clusters. Some went to the XTA DP 226 electronic crossovers and then to the amps - a total of over 170 Lab Gruppen 6400s - while others went directly from the Soundwebs to the amps. This was reportedly the largest XTA network ever assembled."

Hardesty, Hunt and Tramontani began their installation work in December, measuring the individual enclosures with SIM, starting with the Ramsa systems and setting a crossover on the XTAs, which took about a day for each box. After this, the team flew a pair of clusters to see how they interacted as far as coverage was concerned. After seeing that was OK, they set the angles, did some tweaking and started setting up the rest, based on Hardesty's design and vision for the system.

The fibre network was a 3-node ring with a large 'T', and about two kilometres of cable were installed. The audio crew put it to the test during the run-up to the event, deliberately disconnecting a cable in the ring. Tramontani said: "It had virtually no effect on the system, not even a click!"

Tramontani explained jokingly that even he had a back-up: "Orlando Ghini followed all the preparation work and was the man on the spot on the night, as I also worked on sound reinforcement at Medals Plaza, where 55 of the medal award ceremonies were staged, followed by concerts by international level artists. The Digigram system is very interesting and this is definitely the future as far as audio is concerned - networks play an increasingly important role."

### Video Projection

At his 5th Olympics, Rob Hunt was contracted by Panasonic as main technology consultant. He was the main technology contact and liaison between TOROC and the sporting federations and responsible for all Panasonic categories. Following a feasibility study, he worked with venue planners and teams to rationalize

requirements and detail how to deliver, install and operate all the equipment. He then designed all audio systems for competition venues and worked with Hardesty and the stadium engineers on the ceremonies' audio design and video screen installations. "I was also responsible for all designs, logistics, installations and operations of all Panasonic equipment for the Olympic Villages and Main Media Centre," he says.

At the stadium, there were four 44sq.m Astrovison AZ-LE12OZ 12/24 pixel screens, comprising 5 x 5 stacked modules. Since there were over 18.5 tons of audio plus lighting hanging from the venue roof, four Layer structures were supplied by Stageco for the screens, which were suspended/stabilized from the top of the structure on chain motors and braced from the rear.

Hunt explained: "The screens were controlled from a sky box on the south-west side of the stadium and most of the content was purpose-produced by K2006-FilmMaster for the ceremonies with short Turin 2006 cuts and crowd participation prompts. Graphics also translated speeches and introduced participating teams as they entered. Live camera feeds and close-ups were sent by TOBO (Torino Olympic Broadcasting Organization) to the video production room and then to the screens. Euphon was responsible for supplying and operating video production equipment under the direction of the K2006 video/broadcast manager."

### Lighting

Lighting designer Durham Marengi, whose previous designs include The Queen's Golden Jubilee, the event lighting for Roger Waters' The Wall, the Ceremony of Annexation of Hong Kong to China, had a team that included lighting coordinators Eneas MacKintosh, Nicola-Manuel Tallino, Nick Jones and Dave Bartlett, plus programmers Ross Williams, Mark Payne, Pryderi Baskerville and Emiliano Morgia. He explained: "Ross worked on the control system design, alongside High End Systems, who provided the system, which consisted of four Wholehog 3 lighting consoles, plus four more on backup duty."

Marengi explained: "Initially, Mark Fisher and myself met Marco Astarita and administrative producer Christel Strohn in the UK. They'd a good idea of what they wanted to achieve in the first instance and, after discussing the artistic content, we specified the type of lanterns we wanted and carried out numerous photometric tests to ascertain the brightest, most reliable fixtures available."

The design included more than 900 moving heads, almost 1,000 LED fixtures, and 400-odd dimmers - or, to put it another way, 24,500 DMX channels. This required no fewer than 21 DP2000s (data processors) with the Wholehog 3s to distribute each console's data to the required areas.



Far Left: Ex-Olympic athlete Jury Cechi, the Shaman with the flame throwing anvil.  
 Middle: During set-up.  
 Left: The Wholehog 3.

Although this was his largest project to date, Marengi kept everything simple in terms of theatrical effect in Turin: "Whereas in theatre, each channel might be two kilowatts, in stadia, each can be 20 kilowatts - so we kept the 'building blocks' the same and just worked on a larger scale. We tried to use a sort of theatrical integrity in the design and expand that into television, making sure artists were well lit for TV requirements, but the backgrounds were all very theatrically produced with an eye to contrast and colour."

Another aspect that distinguished Turin from other events Marengi had designed for in the past was weather. "Working outdoors, we could only achieve our lighting at night, when temperatures were very low. Control systems prefer condensation-free, warm

temperatures, so it had its own challenges in that respect. Another factor was that at this time of the year, soccer matches are often cancelled because the players can't see the ball, due to the fog.

"The design therefore took that into consideration from the outset, and a lot of equipment was installed in technical troughs close to the stage, working on the theory that the closer the light was to artists, the less problems there would be with fog obscuring beams.

"On the technical side, since the stadium had been developed and modernized over the last few years, the roof didn't exist when we established the designs and nobody could tell us what sort of load could be put on the roof, so Mark Fisher and myself had the idea of

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Right: Back (standing) left to right: Jason Potterf, Emiliano Morgia, Nicola Manuel Tallino, Eneas MacKintosh, Chris Agius Ferrante, Nick Jones, Ross Williams, Pryderi Baskerville, Mark Payne. Front (seated): Durham Marenghi (left), Christopher C. Bretnall (right).



Maurizio Maggi at the Midas Heritage 3000 desk.



L-R: Operations director Maurizio De Lazzari and technical supervisor Richard Hartman.



L-R: Sound designer Daniele Tramontani and sound system designer Gary Hardesty.

lighting support structures that were absolutely separate from the roof structure - apart from some fixtures we have spread around the stadium.

"TV coverage conditions plots' colours, particularly when it's high definition, which is unique in terms of the precision and detail that can be seen on the screen. Whereas in the past, if you had an artist with a crowd behind him, the crowd was really an indistinct blur, so you could colour it and use it as a background, with HDTV you're more aware of people's faces. Even if not broadcast as such, a lot of the productions we do nowadays get HD television coverage because of future content use, such as DVDs. So alongside our programmers, production lighting managers, spot-callers and spot-ops, our team also had HDTV consultant - Christopher Bretnall - who's now become integral to our work, as we try to understand and follow the developments in technology."

Because of the scale of the lighting system and the short time the team could use it - overnight - they also used WYSIWYG and were supported by Cast in Canada, who supplied three systems. So when the rig was off-line, they weren't!

Regarding LED, the flavour of the moment, Marenghi opined: "Generally speaking, I don't think LEDs are quite there yet in terms of light quality - particularly to put on human faces. In terms of colour mixing, especially when you're trying to get a white out of them, there are many frequencies missing. We therefore stuck to conventional lighting sources for that, as it was considered important but, since Space Cannon manufacture quite a lot of LED products, I was keen to use that development, so we had Space Cannon LED units lighting physical structures, such as the main stage's ramps [284 Helyos R/G/B/A LED Pars], as truss toners [302 Helyos] and on the underside of the balconies for audience backlight [360 Luxor LED Strips]."

The Olympic rings were also outlined by 200 metres of blue, red, green white and yellow LED neon tubes.

Apart from the numerous conventionals, the rig also included 348 Coemar I-wash 575EBs, 50 Coemar ProWash 250s, 124 Coemar I-spot Extremes, 130 Martin Mac 2k Washlights, 232 Robe 1200 Washlights, 36 Space Cannon Ireos 8kW Xenon Pro searchlights and two Space Cannon 3kW Multibeam Flower effects. Followspot ops manned 12 2.5k and eight 4k Lycian spots.

#### Light programming & distribution

Regarding the number of fixtures installed, head programmer Ross Williams said he gave up counting around the two thousand mark: "At that point, a hundred more or less didn't make much difference. Our biggest challenge was the distance and how to control it - because of the size of the stage and the fact that there were lights everywhere - was how to distribute the control of that, which had to be very carefully thought about.



**Dancers flying from the sun and moon.**  
© Filmaster

"The idea was to have a self-healing fibre optics signal transport ring - an entire rig with the control room at the start and end of the ring - which went via a total of 11 locations around the arena, and, from any of these 11 positions, we could both send and receive data, so the programmers could go to any of them and work there."

Williams added: "Redundancy was one of the specifications we needed in the system - with no opportunity for a cut cable to bring down the lighting system. The idea with the ring was that data nominally travelled in one direction, but if there was a break anywhere, it could reverse."

The signals went as far as each of these locations/dimmer areas and then broke down from Ethernet to DMX. All the long distances were run in Ethernet, and data for all 84 DMX streams was split across the four consoles travelling down one cable. Agorà supplied the network to the team's specs, which also allowed them to plug WYSIWYG into the system and have backups ready as well.

Williams concluded: "We also had an Internet connection to the High End Systems technical support team in Austin, Texas and their European arm in Germany and Holland. There was a lot of communication - which was nice, since, as well as physical support, a big amount of their support was also watching what we did from a distance."

High End Systems' Chris Ferrante, Frank Schotman and Jason Potterf were on hand with programming support for the opening and returned for the closing ceremony on 26 February, a production design based on the carnival and circus world, inspired by Federico Fellini. This was not the first time a Wholehog console has performed at the Olympics: a number of Wholehog 2 consoles controlled both ceremonies at the Sydney Olympics in 2000.

### Structures

Richard Hartman of RHA Ltd (London) explained exactly what his work involved: "My job was really that of coordination, exploiting the experience built up in previous projects, such as the Sydney and Athens Olympics. A great deal of my work for Turin was consultancy, coordinating designers, engineers and constructors involved in building the structures. I worked mainly with the foreign firms, whereas my counterpart for Italian firms was Matteo Tagliabue. We worked in the heavy scenographic elements - principally on the main stage and the rings. Stageco supplied the basic stage structure and three UK contractors were involved in the rings - Stage One, Brilliant Stages - responsible for scenographic construction - and Tomcat, who supplied the custom truss systems."

Stageco also provided the lighting portal towers around the arena - and the main grid, so interacted closely with the lighting team on load and fixture deployment matters. Hartman concluded: "This was the case to an even greater extent with the main grid, used by lighting, sound and two acrobatics teams, all of which had to be coordinated to build a structure that met their specific requirements."

Stageco operations manager Tom Bilsen explained the exact composition the 24 40-ton truckloads of structure his firm erected for the ceremonies: "The main stage roof, with an architectural front bridge, was built to support a production load of approximately 20 tonnes and the stage was 53m wide, 22m deep and 28m high. The sheet steel roof was made to withstand winter conditions and the front bridge entirely custom-made, whereas all the rest of the structure used standardised Stageco rental material. The Olympic ring support structure [26m x 9m x 28m] consisted of four towers, each with guide rails for the winch-driven ring trolley, topped off by a production bridge for followspots and lighting. Two 'goalpost' portals [25m x 2m x 27m] were also erected on either side of the stadium and supported by underground concrete blocks engineered on-site.

UK-based scenic contractor Stage One supplied and operated two motion control systems. One was for the aerial routine by multiple performance artists on a set of structures that moved on their vertical tracks and then rotated to form the iconic Olympic rings. Stage One's Q-Motion motion control system was responsible for the rings' movements, designed and programmed using Stage One's Next-Q software and Q-Pos positional controllers. The firm built four vertical tracks and provided two hoists for each 1,100kg ring. The upper rings were controlled by six small motors, enabling them to tilt on their own axis, whereas the bottom two rings' tilting was controlled by the main lifting hoists, with one attached to the outside edge and one on the tracking edge. At the opposite end of the venue, for the superbly draped stage, the firm supplied eight more hoists, positioned at the bottom of each mast. The drapes were moved in a pre-programmed sequence, again controlled by Q-Motion. For the closing ceremony, another programmable sequence was used to move the huge drapes.

### Communications

Andrea Taglia, one of Italy's most sought-after RF experts for entertainment events, coordinated the impressive communications system, which included wireless production systems, wireless show systems, wireless mics, in ear monitors (IEM) and hardwired intercom.

His team was made up of Riedel (vendor); Marc Schneider as project manager; Peter Erskine in charge of the hard-wired systems; Benno Sonder, hardwired intercom technician; Simon Korzen, who looked after the wireless systems; and the coordinator of the Riedel group, Chris Reynolds.

Taglia explained: "There were various levels of IEM - top was artists, with about a dozen systems for guests and VIPs, which were handled by the audio team; I only looked after the radio frequencies. The second level had approximately 1010 Sennheiser Evolution 300s, used by the pro and semi-pro performers; the third, basic level was for the volunteer 'performers' with no show experience and had almost 1,200 GNS Tricsy receivers operating in FM at 107.900 MHz, with which they heard music and/or instructions from the choreographers or directors."

Riedel had already supplied its systems to various other Olympic Games and is probably the only company in the world able to offer - over and above the hard-wired systems - such an enormous stock of wireless systems for rental. As well as supplying the systems for the ceremonies, they also supplied them to TOROC for all the Olympic venues - six or seven thousand wireless Motorola Tetra digital systems - like mobile phones, able to send images etc.

Taglia added: "It was the first time I'd used these radio-hard-wired systems - digital hard-wired intercoms with Cat-5 cable. The fibre-optic network had four nodes at the stadium gates, plus a fifth in the control room. These have modular matrices, from which analogue signals can be taken, digital signals sent and intercom systems controlled - all on a fully configurable basis. Although the large number of units complicated things, the main problem was the frequency allocation situation, which in Italy is really absurd, as airwaves are very overcrowded and frequencies were already sold years ago!"

**Pyro effects**

Antonio Parente of Parente Fireworks said: "We produced the pyro effects along with Groupe F and were official suppliers of all the pyro material used during the opening and closing ceremonies. The design of the pyro 'choreography' was by Christophe Berthonneau of Groupe F and our staff coordinated the project with the Groupe F team on-site."

The 30-strong Groupe F team was led by artistic director Christophe Berthonneau, producer Véronique Berthonneau and project manager Jonas Bidault, and included flame and pyro technicians, fireworks manager and riggers. The French firm also supplied and manned the control systems, which Christophe stressed were completely non-digital to ensure greater reliability.

Two discharge zones were used to fire off more than 4,000kg of explosive material: the 40 pylons on the stadium roof, where specially-made effects without explosions or fallout were used, and a barracks about 450 yards from the stadium, chosen to fire off the large calibre effects as it was the largest free area in the vicinity. This was necessary as the fireworks used had a calibre of Ø150mm and Ø200mm of a spherical type, so required a free safety zone of 150 yards from the firing point.

Parente concluded: "Our team was divided between the stadium and the barracks. Our work also consisted in positioning the effects along with Groupe F, who instructed the group of French climbers who installed the effects on the roof."

**Final Word**

Before jetting off to Beijing for the preparation of the 2008 Summer Olympics, Panasonic's Gary Hardesty enthusiastically agreed with Marco Astarita's opinion on the shows' outcome: "The result in Turin in the end was excellent, with many good reviews and many positive comments from the producers and Olympic organizers!"

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