grass valley
A BELDEN BRAND

Dorna Sports Dorna Sports' Use of the Grass Valley K2 Dyno Replay System and K2 Dyno Production Assistant (PA) for Coverage of the FIM MotoGP World Championship

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APPLICATION NOTE

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Background

Dorna Sports was established in 1988. Their headquarters are in Madrid, with offices in Barcelona, London and Tokyo. Dorna has around 150 full-time employees working for the company, with a further 200 part-time contracted professionals operational during racing peaks.

Dorna is the exclusive holder of all commercial and TV rights of the MotoGP World Championship since 1992. MotoGP is the oldest motorsport world championship in the world, with more than 60 years of history to its name. There are currently 18 races per season.

Dorna provides a wide range of products: advertising, promotions, merchandising, commercial rights, corporate hospitality, TV rights, TV production, live feeds, post-produced programs, onboard technology, timing systems, data processing, graphics for live broadcast, internet webcasts, online results and video streaming.

Changing Needs

Dorna Sports was required in their license agreement with MotoGP to upgrade their system to HD in 2010. This caused the technical management to re-evaluate what new capabilities would be desired in how they produce content. A key element for examination was the process of replay. They realized that replay is no longer a simple manner of playing back specific clips, but the starting point for capturing highlight clips with crucial metadata, and transferring these clips with metadata for valuable re-use during and after events.

Dorna already used Grass Valley Kayak production switchers, and Trinix routers, but for several years had been using another company's products for replay.

Dorna is known as a progressive technology integrator and they desired an engaged technology partner for their future vision. Grass Valley, a Belden Brand. demonstrated forward thinking and a willingness to make the changes that met Dorna's requirements, yet still deliver an economical solution for them.

Solutions

The Grass Valley implementation was designed to offer improvements over the system they had used previously, as well as grow with Dorna's changing and increasing requirements.

The K2 Dyno Replay System is made up of two components: a server (the K2 Summit production client or the K2 Solo media server) and a replay controller (the K2 Dyno Replay Controller). All of Dorna's K2 Dyno Replay Systems utilize the four-channel K2 Summit.

The K2 Dyno Replay Controller was easy for Dorna's operators to learn, and they adjusted quickly.

In particular, benefits are achieved with the flow of metadata from fast and easy entry by the operators directly with the K2 Dyno Replay Controller touch panel, to be used by the primary replay and playlist operator, to storage on the existing Apple based Xsan with Final Cut Pro 7 Server, to access and searching by multiple Final Cut Pro 7-based edit stations.

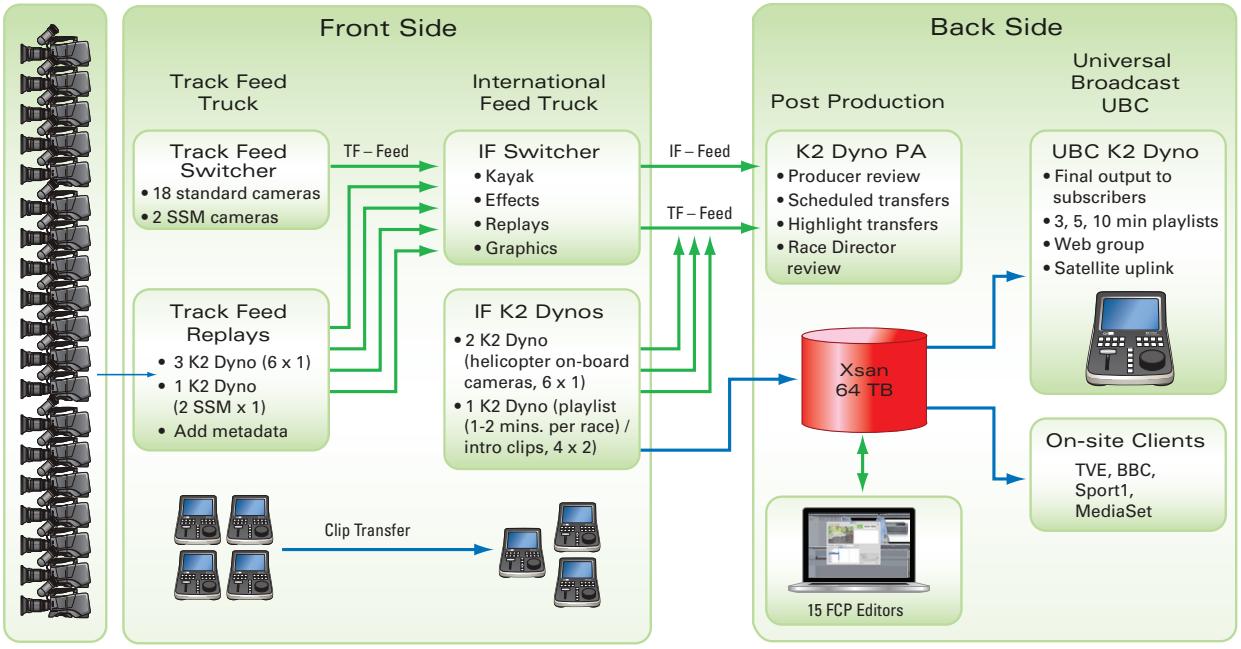
The architecture of the K2 Summit, together with K2 Dyno Replay Controller and K2 Dyno Production Assistant (PA) user interfaces are all designed to deliver an extensible and flexible solution to adapt to future workflow needs, and provide true file-based live production.

Parameters

Dorna typically creates almost 30 hours of production per race location:

- Friday: 6 hours (qualifying and practice)
- Saturday: 10 hours (qualifying and practice)
- Sunday: 10 hours (race day)
- Three classes of races: 125, Moto2, MotoGP
- Total of 35-36 camera inputs
- Production is a combination of AVC-Intra 50 and AVC-Intra 100
- 30 to 50 Replay Clips created per controller per race
- 1,500 to 2,000 Highlight Clips created per day
- 1,000 to 1,500 Highlight Clips transferred to Xsan per day
- 1,000 to 1,500 Highlight Clips transferred to primary replay controller per day

Dorna Replay Management



Track Feed

Equipment in this Truck:

- Four K2 Summit Production Clients and four K2 Dyno Replay Systems
- The clients record 18 cameras plus one super slow-motion camera with two more camera inputs, or two super slow-motion cameras for replay
- There is one output per client, which is off-speed capable, with mix-effects
- 600 GB drives in the K2 Summits provide 15 hours of recording on 6x1 systems

This truck is built for HD production, and is subcontracted from SBP in Italy, built according to Dorna's specifications. It is used in almost all the races, except the United States, where the same system is available from NEP.

The record session is about 10 hours long on event days. At the end of the day, the unused material is deleted.

Each K2 Dyno Replay System (except the super slow-motion unit) records six cameras, distributed in a way that tries to ensure different client units record different angles from the same spot on the track.

The signals are ingested with camera and program audio.

Two jobs are performed in this truck:

1. Live production. The live production provides a continuous signal, called TRACK FEED, to the INTERNATIONAL FEED (IF) truck. This signal is created by switching the cameras placed along the track.
2. Replay. The K2 Dyno Replay Systems each provide a replay output to the IF truck, which can then be used to produce the international feed. The operators prepare the replays and wait for instructions from the IF truck to launch the replays.

Highlights

The replay operators in this truck create highlights that are subsequently used in the following operations:

- IF truck
- Xsan

Highlights are tagged with keywords, name of the rider, nature of event, super slow-motion rating, and other relevant data.

Up to 1,500 highlights are created per day, with an average highlight duration of 10 seconds plus guard bands.

Once created, the highlights can be reviewed by an operator in the IF truck to decide which are suitable to go to the Xsan.

Equipment in this Truck:

- Three K2 Dyno Replay Systems
- The K2 Summit production clients record 16 cameras
- Two clients have a single output and one has two outputs. All outputs are off-speed capable, with mix-effects

This truck provides the INTERNATIONAL FEED and the CLEAN FEED.

Highlight Packages

One of the K2 Summit production clients records four video streams (4x2), and the other two K2 Summits record six streams each (6x1). The four-stream K2 Summit records the outputs of the switchers, a helicopter camera and an ancillary feed. The six-stream K2 Summit records the on-board cameras, RF cameras and two ancillary feeds.

Among other functions, the primary replay operator on the 4x2 system creates the highlights packages for use after the race. The packages include highlights received from the TRACK FEED truck and other material transferred into the system, such as the on-board cameras.

Replays

Replays are used in the live production for the INTERNATIONAL FEED.

INTERNATIONAL FEED highlights are tagged with keywords and key frames.

Statistics

Rider Statistics

Dorna has created a special application to read the output of the logging done on the International Feed to generate the rider statistics for the race management and the website.

In the future, this application will be migrated to work directly with the K2 Dyno PA.

Production Statistics

There is a variety of production data that can be gathered during an event. From these statistics the producer knows how much of the INTERNATIONAL FEED was done with track cameras, on-board cameras, the helicopter camera and other inputs. From this, a production can be adjusted to create a predefined optimum combination of these cameras. The information about which source went to air, is read through the UMD serial port of the switcher.

Grass Valley is working with Dorna to integrate this functionality in future product development.

Post Production

Equipment in this Facility:

- One K2 Dyno Production Assistant client (Administrator)
- Apple Xsan
- 15 Final Cut Pro 7 editing workstations

The Final Cut Xsan has a capacity of 64 TB, to allow it to hold all of the material from the current and last season. The legacy format is IMX50, 16:9, and the new format is a mix of AVC-Intra 50 and AVC-Intra 100.

During events, Final Cut Pro 7 editors are creating finished pieces for replay use. Using the K2 Smart Bin service, this finished content is dropped into specific folders on the Xsan, and then the K2 system initiates an automatic transfer to both the Universal Broadcast Center (UBC) K2 Summit as well as the primary replay K2 Summit in the International Feed truck.

Universal Broadcast Center

Equipment in this Facility:

- The system is used to record the INTERNATIONAL FEED and the CLEAN FEED and two other switcher outputs.
- One K2 Dyno Replay System
- The client records four inputs, from the switcher outputs
- The client has two outputs. The outputs are off-speed capable, with mix-effects

This system provides the final output to broadcast channel subscribers. Three-, five- and 10-minute playlists are also created. The video is used by both the MotoGP Web channel and the satellite uplink.

Time Keeping

This position collects all the time keeping information from the race and creates statistics for race management, the website and other uses.

All K2 Summit production clients are fed with a time-of-day LTC generated by the Time Keeping system. This timecode is also kept when exporting clips to Final Cut Pro 7.

Race Direction

Equipment in this Facility:

- One K2 Dyno Production Assistant client

This K2 Dyno Production Assistant is used to access all ISO-recorded material and highlights from the K2 Dyno Replay Systems for review of any incident.

The Race Director also uses the K2 Dyno Production Assistant to create sub-clips of key events during races, and a rule is used to export those clips from whatever source to the Xsan. From this archived material, low-resolution proxies are generated and transferred to DVD for the Race Director to keep.

Deep Archive

Located in Barcelona, Dorna owns another Apple Xsan with Final Cut Server, to which they copy selected material from each event. This system has a low-resolution proxy and is the media asset management system used by Dorna.

K2 Dyno Production Assistant

An essential requirement for Dorna is for complete file-based live production. K2 Dyno Production Assistant is the critical component for performing all of the content management tasks needed for efficient use and re-use of material during and after races.

The K2 Dyno PA is capable of a variety of tasks:

- High-resolution browse and search of media
- Add and modify metadata
- Keyword and keyframe-based logging
- Use rules to automatically move media and metadata between K2 Dyno Replay Systems and file-based storage repositories
- Automatic clip transfers to provide content to locations such as an Xsan
- Create QuickTime-wrapped highlights with XML metadata for export to Xsan
- K2 Summit channel control

What metadata is to be captured is agreed on in advance by the production team. The metadata entries can be created in advance by a K2 Dyno PA administrator. The grid of entries can be published to all the K2 Dyno Replay Systems, or copied using USB memory.

All that the operators in the International Feed and Track Feed trucks have to do is to access the desired metadata tag on the touchscreen of the K2 Dyno Replay Controller and apply it. All other operations occur transparently in the background.

Access to individual K2 Production Assistant features can be restricted by user account-based permissions.

Highlights

An operator can review the highlights from the Track Feed and International Feed trucks to decide if they are is worth sending to the Xsan or deleting them. This is done using metadata tags and the high-resolution browse capabilities of the K2 Dyno PA. Most highlights, however, get sent to the Xsan without editorial review based on metadata tags and pre-configured rules. When the operators add metadata tags, highlights are dynamically updated for possible review.

The K2 Dyno PA's search capability can show a live view of all highlights for review. Administrators can browse clips, trim them if required, and add or change the metadata tag to indicate the clips that should be sent to the Xsan. The rules engine is setup to look for selected tags and automatically export the highlights with its metadata to the Xsan. Conditions, set up with the rules, also using the metadata, also ensures the export arrives in the appropriate sub-folder on the Xsan.

Scheduled Exports

The K2 Dyno PA provides scheduler functionality so that in advance, an administrator can select entire ISO-record and highlight material coming from the K2 Dyno Replay Systems and schedules times for them to transfer/export between K2 Dyno Replay Systems and the Xsan. Other storage locations, such as CIFS/SAMBA mounted drives, could also be used.

Up to 10 ISO-records are transferred at any one time through the production day. They are exported as QuickTime movies and are available on the Xsan immediately after the end of the scheduled event.

The key aspects of the scheduler for K2 Dyno PA are:

- Timeline-based view of connected record trains
- Job based exports/transfers based on timecode
- Metadata preservation
- Flexible naming of destination file
- Real-time status updates of job progress
- Ability to quickly re-schedule any failed or pending job
- Preview capability

Metadata Management

Highlights

The highlights are moved to the Xsan using the rules engine. This engine is configured to create an XML file in Apple FCP XML Interchange Format, ready for loading into a Final Cut Pro 7 project, when exporting media in QuickTime movie format.

Clips are moved to different folders according to the metadata found in the XML file. The access rights to these folders are used by Dorna to allow broadcasters to have their dedicated Final Cut workstations and produce their own material.

The K2 Dyno PA rules engine also renames the resultant QuickTime export on the Xsan based on the metadata tags associated with the clip.

Live Updating

The K2 Dyno PA provides a mechanism that allows the metadata to be updated for a QuickTime clip that is being exported to the Xsan. When live logging is being underway, the associated metadata will be increasing/changing as the export is taking place and the resultant XML on the Xsan will be updated once the export is complete.

Playout

Some of the Final Cut Pro 7 editors are used to produce material for playout. The K2 Dyno PA is used to move these finished pieces back to the UBC K2 Dyno Replay System for playout to the satellite uplink.

Conclusion

Dorna has been using their Grass Valley live production solution for multiple race events. This is a tough and demanding schedule week after week. The Grass Valley equipment has been reliable, and met the extreme rigors of worldwide shipping by truck and by air.

The file-based production Dorna imagined is now being realized in ways never before possible. The efficiencies that have been gained not only permit Dorna to meet their demanding live production schedules with greater creativity, but gives them a much faster and easier means to find and re-use content after race events.

The benefits of the Grass Valley solution for Dorna include:

- Fast capture, transfer and use of metadata
- Highly efficient movement of content with automated rules
- Savings in shipping costs due to reduced size and weight
- Enhanced production creativity
- Optimized content management to quickly find material during and after events