

**HDCAM** **Q21**



**HD for Producers**  
*(What are we waiting for?)*  
 29 March 05

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**Speakers**

Barry Bassett                      Managing Director, VMI

Direct: 0870 850 1441  
 Email: [barry.bassett@vmi.tv](mailto:barry.bassett@vmi.tv)

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**HD – All you need to know**

- Introduction to HD
- The Business Argument - Why will HD make me more money?
- The various looks of HD
- HD and the film look
- HD and slow motion ramping
- Competing HD formats
- Practical HD – make up, sets 'n stuff
- HD Post Production
- Routes of international delivery

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## 1. Introduction to HD

- Brief History of HD
  - Why is the UK so slow to adopt
- Who is using HD
- Advantages of HD over Digi Beta



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## HDTV in the U.S.

- Currently Eleven U.S. based HD networks:
  - Comcast Sports Net
  - Discovery HD Theater
  - ESPN HD
  - HBO
  - Hdnet
  - InDemand
  - Madison Square Garden Network
  - A&E
  - Bravo
  - Cinemax
- In addition the following networks partially broadcast HD:
  - ABC
  - CBS
  - PBS



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## HDTV in the U.S.

- 2.5 million HDTV sets will be sold this year (Consumer Electronics Association)
- 10.5 million sets predicted per year by 2006
- 20 million will shift to HDTV within five years (Discovery Channel)
- 70% of American houses will have HDTV capability in 10 years
- NBC cable claims that the desire for HD programming is so hot that the network is considering offering HD programmes on a Pay Per View (PPV) basis!



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## Global Market position

CBS Choose HDCAM SR as Distribution Format in States  
FOX Choose HDCAM SR as Distribution Format in States  
ABC 16 Prime Time Shows on HD  
CBS 22 Prime Time Shows on HD  
NBC 21 Prime Time Shows on HD  
SKY HD launches Korea  
Euro 1080 spring 2004  
NHK, FUJI in Japan  
China Commit to HD for broadcast  
Denmark has advanced plans for HD broadcast



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60% of US  
Prime-time TV  
mastered on HDCAM



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## UK

- Adopted Digi Beta as standard delivery format.
- Produced trad. dramas and features in 35mm
- Then adopted S-16 for drama production for TV
- Also produce much drama on Digi Beta
  - Dr Who and Deed are produced on Digi Beta
- The quality differential 16:9 PAL and HDCAM not as pronounced as NTSC.
- Switch to HD is expensive and will take time.



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## Asleep at the wheel?

*"If broadcasters think European viewers will be content with 625-like digital video, they are wrong. Once TV viewers see HD images, they want it. It's time the DVB community recognize and embrace the importance of delivering HD to home viewers. Otherwise, consumers and governments alike are going to wonder who was "asleep at the wheel" when it came to implementing HDTV."*

Brad Dick, Editorial Director  
Broadcast Engineering, August 2003



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## Who is using HDCAM

- Feature Films



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- Ali -- Columbia Pictures
- Bowling for Columbine -- United Artists
- The Company -- Sony Pictures Classics
- Ghosts of the Abyss (IMAX) -- Disney
- How High -- Universal
- Lovely and Amazing - Lions Gate
- The Matrix 2 -- Warner Brothers
- The Matrix 3 -- Warner Brothers
- Masked and Anonymous -- Sony Pictures Classics
- Once Upon a Time in Mexico -- Sony Pictures
- Starship Troopers 2 -- Screen Gems (2004)
- Star Wars Episode 2 -- 20th Century Fox
- Star Wars Episode 3 -- 20th Century Fox (2005)
- Simone -- United Artists
- Spy Kids 2 -- Miramax
- Spy Kids 3 -- Miramax



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## Who is using HDCAM

- US Television



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- |   |  |
|---|--|
| <p><b>ABC</b></p> <ul style="list-style-type: none"> <li>• 8 Simple Rules for Dating my Teenage Daughter</li> <li>• According to Jim</li> <li>• The George Lopez Show</li> <li>• Hope &amp; Faith</li> </ul> <p><b>FOX</b></p> <ul style="list-style-type: none"> <li>• A Minute with Stan Hooper</li> <li>• Bernie Mac</li> <li>• Cracking Up</li> <li>• Luis</li> <li>• Oliver Beene</li> <li>• The Ortegass</li> <li>• Wanda at Large</li> </ul> | <ul style="list-style-type: none"> <li>• I'm with Her</li> <li>• It's all Relative</li> <li>• Less than Perfect</li> <li>• Life with Bonnie</li> <li>• Married to the Kellys</li> <li>• My Wife and Kids</li> <li>• That was Then</li> </ul> <p><b>CBS</b></p> <ul style="list-style-type: none"> <li>• Becker with Ted Danson</li> <li>• Hack</li> <li>• Joan of Arcadia</li> <li>• Still Standing</li> <li>• Yes Dear</li> </ul> |
|---|--|



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## Warner

- All About the Andersons
- **Angel**
- Grounded for Life
- Like Family
- Reba
- What I Like About You

## NBC

- American Dreams
- Coupling
- Happy Family
- Whoopi

## UPN

- All of Us
- Enterprise
- Girlfriends
- Half & Half
- One on One
- Rock Me Baby
- The Mullets
- The Parkers



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## Who is using HDCAM

- UK Television



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## UK HD Programmes

- Blue Planet – BBC
- BBC Super Volcano
- Galapagos – BBC NHU
- BBC Blue Orange - drama
- Northern Exposure, BBC
- E=MC2, Darlow Smithson;
- Guns, Germs and Steel, Singapore, Great Wall of China - Lion TV
- Genghis Khan, BBC History
- Even Neighbours is produced on HD!



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## HD (High Definition) Vs SD (Standard Definition)

6 basic advantages

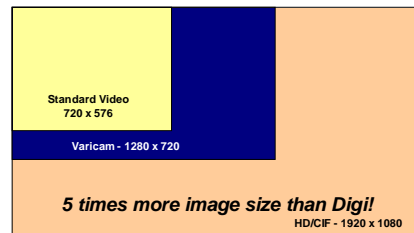
1. Image resolution



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## Just How Good Is HDCAM?



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## HD (High Definition) Vs SD (Standard Definition)

6 basic advantages

1. Image resolution
2. 35mm Production Values
3. Better contrast capability (Latitude)



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## Tonal Range/Dynamic Contrast/Latitude

- DV Cameras have approx 5 stops of latitude
- Digi Beta DVW 790 has 7 stops of latitude
- Only 1 type of 35mm film stock has more than 11 stops of latitude.
- The HDW-750P HDCAM Camcorder can achieve 12 stops of latitude



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## HD (High Definition) Vs SD (Standard Definition)

6 basic advantages

1. Image resolution
2. 35mm Production Values
3. Better contrast capability
4. Film Gamma – (colours look like film)

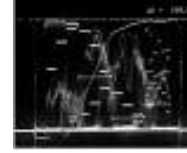


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## Video Gamma

This mode is designed for the conventional TV Video Gamma look. As you can see the high lights are lifted more than the mid to low tones. If lighting and exposure aren't controlled, clipping of the high-lights will occur. This has the effect of reducing the overall latitude of the captured image.

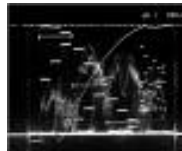


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## Cine Gamma

With Cine mode gamma switched selected, you can see that the graduation from low to high tone are lifted. This gives the scene a more pleasant, lower contrast look compared to the raw data but does not clip the high tones as normal video gamma would.



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## HD (High Definition) Vs SD (Standard Definition)

6 basic advantages

1. Image resolution
2. 35mm Production Values
3. Better contrast capability
4. Film Gamma – (colours look like film)
5. Progressive Scan Mode – (movement looks like film)
6. Easy route to International Sales.



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## Why HD instead of Digi Beta?



- Broadcast quality (720 x 576 pixels)
- No film look - 50i or 60i only
- Cheap acquisition costs **but**
- Local markets for TV programmes only.



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## Why HD instead of Digi Beta?



- Cinema Quality – 35mm quality
- 1920 x 1080 pixels (CIF standard)
- 25P progressive scan mode with 'film look'
- More expensive production cost but increased production values and better quality **therefore**
- Increased International Marketability
- Future proof programmes.




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HDCAM vs Digi Beta




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### Shooting HD vs. Film

- Film has more latitude at the top end
  - You can overexpose ‘with dignity’!
- Video has more latitude at the bottom
  - Underexposed images can be ‘pulled up’
- Shooting HD is similar to shooting positive film than shooting negative film
- It is very important not to overexpose HD.




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### Why HD Instead of Film?

- HDCAM quality is better than 16mm
- The quality is comparable with 35mm
- “Comparable to 70mm” James Cameron
- The film ‘look’ is achievable with HDCAM
- Film Cameramen and DOPs are stunned with the results of HDCAM when viewed in a theatre.



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Lucky Star



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## 2. The Business Argument

Why will HD make me more money?

- New delivery standard - CIF format
- International Marketability
- Future-proofing HD
- HD for Archive
- Acquire on HD – otherwise quality is gone!!
- Cost Comparisons: HD vs. film



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### New TV prog. delivery standard

- A new world-wide delivery standard for TV programmes has been agreed
- Common International Format (CIF)
  - 1920 x 1080 lines
- Speed adopted is often 24P
  - Can be easily converted from 25P
- Will take over from PAL, NTSC and Film for TV.



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## New CIF standard means

- That if you want to sell your programme to the international community in the future, you must have acquired your programme on HDCAM.



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## Future-proof your Programme

- New Broadcasting Bill means that you retain some rights to your programmes.
- However, only by shooting your programme on HDCAM now you safeguard the value of your programme in the future.



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## HD for archive

- Very little HD archive material exists at present
- Your material may have a very long archive shelf-life
  - e.g. Michael Jackson HD material.



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## Robbie Williams in Concert

Done and Dusted Production for Robbie Williams/IE Music

Clip Courtesy of Done & Dusted and IE Music



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## Conclusion

- The small additional cost of producing programmes on HD can be more than compensated for by increasing the market for your programmes
- Shooting on Digi Beta means that you are limited to the home market only in the medium term.



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## No Problem

- I have shot my production on film, so the quality of the originated material is future-proof anyway – right?



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### Film for TV Production Process

1. Shoot 35mm
  2. TK to Digi Beta
  3. Grade
  4. Post
  5. Conform
  6. Graphics
  7. Audio
  8. Follies
  9. Master Digi
- All this and you are stuck with Digi (1/5 HD quality).  
Better to shoot HD at the beginning and you can re-conform later easily.



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### Cost savings HDCAM vs Film

- Each film print costs £16,000 to make
- It costs even more to distribute
- Once an infrastructure is in place, distribution becomes free.
- 8c per cinema ticket in US has been estimated to pay for conversion of all cinemas to digital in 1 year!



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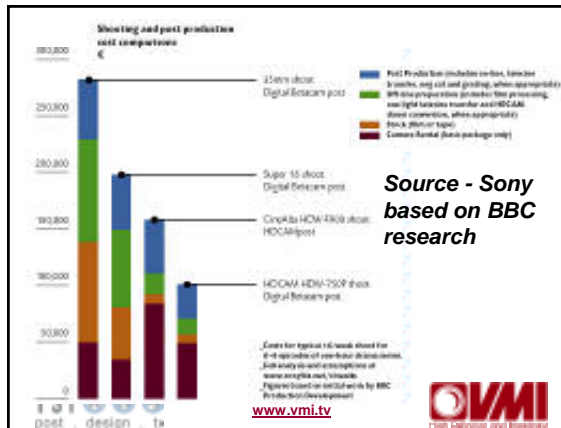


### Why HD Instead of Film?

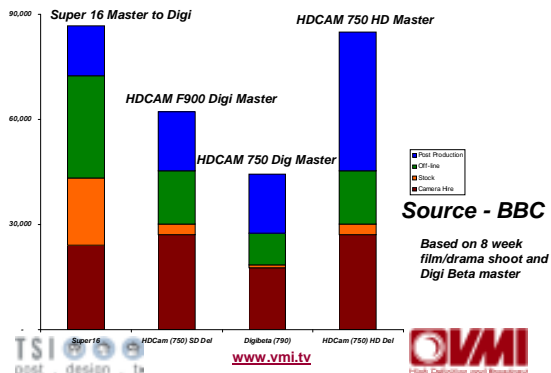
- Cost savings translate as more budget in front of lens
- HDCAM shooting is very versatile and shooting is faster than film.
- Cine Alta HDCAM is some 25% cheaper production costs than Super 16
- HDW 750P HDCAM is some 20% cheaper still.



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### Production Budget calculation



### 3. The various looks of HD

- Interlaced vs progressive
- The Documentary look
- The drama/features look



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## Progressive scan mode

- Similar to film, HD can also shoot in 25P progressive scan mode which means that only 25 changing images per second are recorded.
- This gives images a more 'shuttered' feel to closely resemble film.
- Good for slow pans and a filmic look.



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## Shutter Speeds

- Changing the shutter speed is important in changing the look of Progressive
- 1/50<sup>th</sup> shutter analogous to 180-degree film shutter, and giving identical motion portrayal to a film camera
- Programmable shutter speed for adjustable blur.



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## Interlaced mode 50i

- Fast moving images (sports) are better suited to a higher image rate (interlaced mode aka 50i).
- Slow motion sequences look better if shot in 50i
- For a 'TV' look, shoot in 50i
- HDCAM can shoot in both 50i or 25P.



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## Interlaced vs. Progressive



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'Video' look  
Oil Rig,

courtesy of Pioneer Productions

'Drama' look  
Blue Orange,  
BBC Wales for BBC4



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## Progressive/Interlaced summary

- For a 'film look'
  - Shoot 25P with 1/50 shutter
- For a TV look
  - Shoot 50i



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## 4. HD - achieving the 'film look'

- Format for features, dramas, docs
- HDCAM vs. Super 16
- HDCAM vs. 35mm



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## HDCAM and the film look

"Due to the extraordinary flexibility of the controls, it is possible to make it mimic negative or positive film, and resolution can be tailored to 35mm or 16mm, to taste. Assuming that a grading operation will be used in post-production, the settings give the colourist the same range of options as with film."

*Alan Roberts, BBC R&D on the HDW 750P*



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"Black Gamma and Knee allow about 2.5 stops of over-exposure and one of under-exposure relative to normal operation. The "film" gamma mode has a built-in knee, combining this with the main knee function gives smooth reproduction of highlights. This set-up approaches a film-look, enhanced by the separated Detail and Aperture controls"

*Alan Roberts, BBC R&D on the HDW 750P*



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## HD kit, Cine-style



- ARRI MB19 Matte Box
- ARRI FF4 Follow Focus
- Abekas Viewfinder ext.
- ARRI bridge plate
- 19mm and 15mm bars
- Microforce zoom control with external servo
- 'Cine style' lenses
- Lens support system



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## SNAP, Gangster Films

Clip courtesy of Gangster Films

## Super-16/HD Test, Intrepid Films

Clip courtesy of Intrepid Films



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## HD Lenses

- HD lenses are superior to SD lenses designed for higher resolution and better performance
- HD lenses contain more glass to avoid lens 'breathing' (zooming effect when focussing)
- HD lenses have better coatings - 'faster'
- But both types of lenses will fit HD Camcorders, not just HD lenses **but**
- SD lenses - trade-off between cost and quality.





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HD Optics Demo

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### HD for slow motion

- Shoot in either Interlaced 50i for slow motion in HDCAM
- Shoot in 60P on Varicam for excellent slow motion capability

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### 5. Practical HD

- Make up
- Prosthetics
- Sets
- Speed of shooting
- Lighting
- Crew
- 25P Production

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### HD In Production

- Lessons learned from Holby City HD Test
  - Make-up for standard def OK in HD though apply make-up with a blower brush
  - Prosthetics for standard def OK in HD
  - Sets for standard def OK in HD though be wary of set seams.

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### HD In Production

- Larger monitor to be used in production
- Shoots can take longer than on Digi
  - This depends on the crew though!
- Treat shoots more like film than Digi Beta
- Light the same as for film
  - Can light 'more bravely' on HD than on film.
- Do not compromise on Crew.
  - No clapper loading but need to regularly check back focus.

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### HD in Production

- Decide what look to use and what speed and then stick to it!
- Plan your Post Production route before you begin shooting.

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## Other 'Flavours' of HD

- 24P,
- 25P, 50i,
- 29.98P, 30P, 59.94i, 60i,
- 23.98P
- Shoot HDCAM & Varicam (DVC Pro 100)
- to bore you there are some 17 combinations on 1920x1080 and 1280x720...
- Plus mastering on HDCAM SR or HD D5!



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## But

- It actually is very simple!



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## Watching Films on TV

- Feature films are shot at 24fps but we often watch them on TV.
- When we watch programmes on TV how do we fit 24 fps into 25fps?
- Answer, we speed up the film by 4% so that it plays at 25fps! Each frame comprises of 2 fields (odd and even) which interlace to make one complete frame which does not shake if paused.



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## Watching film on TV

- Speeding up 24fps into 25fps changes the pitch of the audio by roughly half a semitone

(but nobody seems to notice or mind!)



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## So do We Need More Than 25P?

- We can actually shoot at all frame rates without real compromise by shooting at 25P
- In doing so, Sony can produce a more cost-effective unit – which is more popular and more ££ can be spent on production values



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## 1. How to shoot at 25P for film

- a. Shoot and master programme at 25P
- b. Slow down recording 4% - converts to 24P
- c. If audio pitch is critical, lay off to HDR, digital pitch change and lay back
- d. Print to film – Wahoo!!



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## 2. Shoot for USA

1. Shoot at 25P
2. Instigate a 3-2 pull-down
3. Record at 30P – Wahoo!

(note - this happens in one pass)



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## Conclusion -25P is Universal

- This means that you can shoot at 25P and master at 24P for film or 30P for USA without real compromise.
- In doing so, you do not need a Cine Alta HDW-F900 Camcorder, have simpler post and save 1/3 on rental/purchase!



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## 6. Competing HD formats

- HDCAM vs. Varicam
- Consumer HD
- Camera Product Range



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## High Definition Formats

The Options



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## 2 Basic Approaches

- Sony HDCAM
  - Sony HDW-F900 and HDW-750P
  - Now HDW-730S (cheap interlaced only version)
- Panasonic Varicam
  - Shooting on DVCPro 100.
- Consumer HDV
  - Shooting on Sony Z1E



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## Sony HDCAM

- Shoot images at very high res. 1920 x 1080
- 5 times better quality than Digi Beta
- Shoot at progressive speeds of 24P, 25P or 30P
  - Various Shutter speed options
- Or Shoot in interlaced mode for a 'TV look'
  - Choose 50i, 60i.



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## Panasonic Varicam

1. Lower resolution (1280 x 720)
2. Shoots 60 fps (60P)
3. Decide when shooting what frame rate to play back (all 60 fps are recorded anyway)
4. Standard post route except for ramped footage

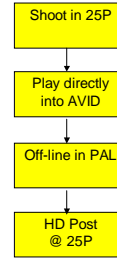


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### Varicam Post Production

Flexible Varicam work flow – Varicam shoot & HD Post

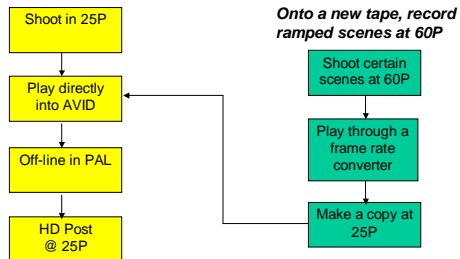


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### Varicam Post Production

Flexible Varicam work flow – Varicam shoot & HD Post



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## Conclusion

- Panasonic Varicam HD offers inferior image quality to HDCAM but pictures still superb.
- Panasonic Varicam slow motion is best but HDCAM slow motion shot at 50i is OK.
- Film is best of all for shooting ultra slow-motion by shooting at much higher speeds than 60P (60fps).



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## HDCAM and Slow Motion

- When filming HDCAM for slow motion
- Film in 50i mode



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## Consumer HD

### When?

- HD Camcorders
- HD Plasma displays
- HD Projectors
- HD Recorders/DVD



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**NOW!**

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## Sony Z1E

- World's first consumer 25P HD Camcorder!
- Shoots HDV native 1440 x 1080
- Shoots progressive
- Or interlaced

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HDV Test footage

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## The Products

- Sony Cine Alta Camcorder HDW-F900H – used in Star Wars I & II
  - Shoots at all frame rates
  - Best HDCAM quality
  - Large and heavy and £££
  - 12 bit processing
  - No built-in down conversion
  - No Digital HD output
  - All shooting speeds
  - incl. 24P, 25P, 30P etc.

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## Sony HDW-750P Camcorder

- Shoots at 25P (film-look)
- Shoots at 50i (TV look)
- Built-in down-conversion
- Built-in digital HD output
- More sensitive than F900
  - 400 ASA vs. 320ASA
- 1/3 cheaper
- 1/3 smaller & 1/3 lighter than F900 unit.

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## Comparison of 750P and F900

"The quality was amazing and I would like to shoot all future productions on it"

"The first week we used the F900 and then had to swap it for a 750P due to size and weight considerations [Oil Rig shoot] and I could not notice any difference."

**Kirsty Mclure of Pioneer Productions**  
Oil Rigs for Channel 4/Discovery HD

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## Panasonic Varicam



AJ-HDC27 Varicam HD Cinema

- Shoots smaller images than HDCAM
- Shoots at all frame rates
- Better slow-mo with 60P
- Built-in digital HD output
- More sensitive than F900
  - 640 ASA vs. 320ASA
- Same rental price as 750P



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## 6. HD Post Production

- HD for Digi Beta Delivery
- HD for HD Delivery



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## Do I need to post in HD?

Definitely **not** if your delivery contract says you must deliver on Digi Beta.



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## HDCAM work-flow benefits

25P HDCAM integrates directly into the existing PAL world

- Familiarity – “things” are similar to what you are used to now
- Flexibility – shooting on HDCAM doesn't mean you must post-produce in HD

... and you can always make 24P version out of the 25P master (just change the playback speed).

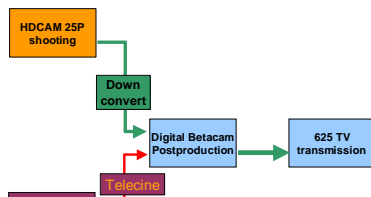


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### HDCAM work-flow benefits

Cost-effective HD alternative – HDCAM shoot & DigiBeta Post

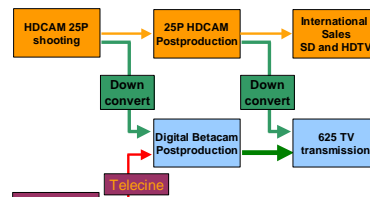


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### HDCAM work-flow benefits

Flexible HDCAM based work flow – HDCAM shoot & HDCAM Post



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## 7. Routes for International Delivery

- Delivery for Europe
- Delivery for US/Japan
- Delivery for Film

## Delivery for Europe

- Easy – shoot and edit at 25P



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## Delivery for US (1)

- Easy, shoot and edit at 25P
- Make 23.98P or 59.94i deliverable from edit master



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## Delivery for US (2)

- If production is **demande**d at native frame rates (23.98P, 29.97P, 59.94i)
- Shoot at these frame rates using
  - HDW-F900
  - Varicam
- Post at these frame rates with an experienced post house



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## Film Production

- Can Shoot in 24P or 25P for film
- You have a choice!
- Do a test and let your DoP and Director be satisfied.



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## Why VMI?

- Established 22 years
- Won 3 major awards
- Largest supplier of HDCAM and Varicam Camcorders in the UK
- More than 20 features and dramas
- First to market with DV, DVCAM, DVC Pro 50, Digital S/D9, AVID AVR 77, consumer HD
- Excellent Support/Backup
  - Investors in People Organisation
  - HD trained team
  - Loads of HD stock!



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## HD Packages

- Shoot and Edit Packages
  - HD Camera kits
  - HD Camera Crews
  - HD Post Production
- HD Training
  - Monthly workshops for Camera Training with Paul Wheeler
  - Monthly seminar series
- Free HD projection facilities for premier showing of your HD production when you rent.



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## HD Project Management

- Formidable HD knowledge base
  - Barry Bassett
  - Paul Wheeler BSC
  - Alan Roberts (ex BBC R&D)
  - Engineering department – 7 x HD trained.



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## HD Production

- Free technical advice
- Free camera test shoots
- Free rushes screening
- Free DoP training
- Post Production supervision
- Free screening of final programme.



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[run VT]

Beautiful HD



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**Thank You!**



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