

## TECH NOTE : QuantumX Data Recorder and Video Cameras

Version: 2016-07-29

Author: Christof Salcher, Product Manager Test & Measurement, HBM Germany

Status: **public**

### Abstract

This Tech Note describes the use of video in general and its value in mobile or stationary data acquisition jobs. It describes different types of cameras and recording of its video stream with the **QuantumX Data Recorder CX22B-W**. It also describes video based data analysis in **catman** from HBM.

### Intro

For a deep dive analysis of an overall moving vehicle and its performance, behavior during maneuver, braking or influences of bad roads to chassis and components the trend in state-of-the art data recording is towards sensor and data fusion using as many as necessary locally integrated sensors and status information via vehicle busses, apply additional sensors to parts under investigation, plus video cameras and satellite based information.

The acquired data in return is used to verify the design of the overall vehicle, to improve simulation models with focus on dynamics (multi body), for functional control development and testing but also or life-time calculation (fatigue). In addition to that the data is extracted for lab based testing of parts or full-scale vehicles supporting durability engineering.

**QuantumX Data Recorder** is the perfect tool for mobile and stationary data acquisition collecting all type of inputs. The ability of reading in position by use of GPS/GNS sensors or an Inertial Measurement Unit (IMU, comes with extra sensors inside, like gyro or acceleration) alongside with analog frontends acquiring local sensor information like strain, pressure, acceleration, torque, force, temperature, displacement, voltage, current and many more in addition to bus signals for example from CAN bus is a perfect overall fit. This enables engineers to easily correlate all measured data to vehicle position and behavior in the time or frequency domains. It also makes it simple to extract data and geographically map it to a certain position of the test track or course.

Acquisition of analog and video data coming from web-, thermo- and high speed cameras helps engineers understanding acquired data in a better way and is also a good way presenting tests.

Cameras are used in mobile but also in bench and lab testing in many applications:

#### Vehicle testing

- focus on the ground (front, rear, drivers view)
- focus on parts under investigation like steering or axles

#### Lab or bench testing of system parts and material (coupon)

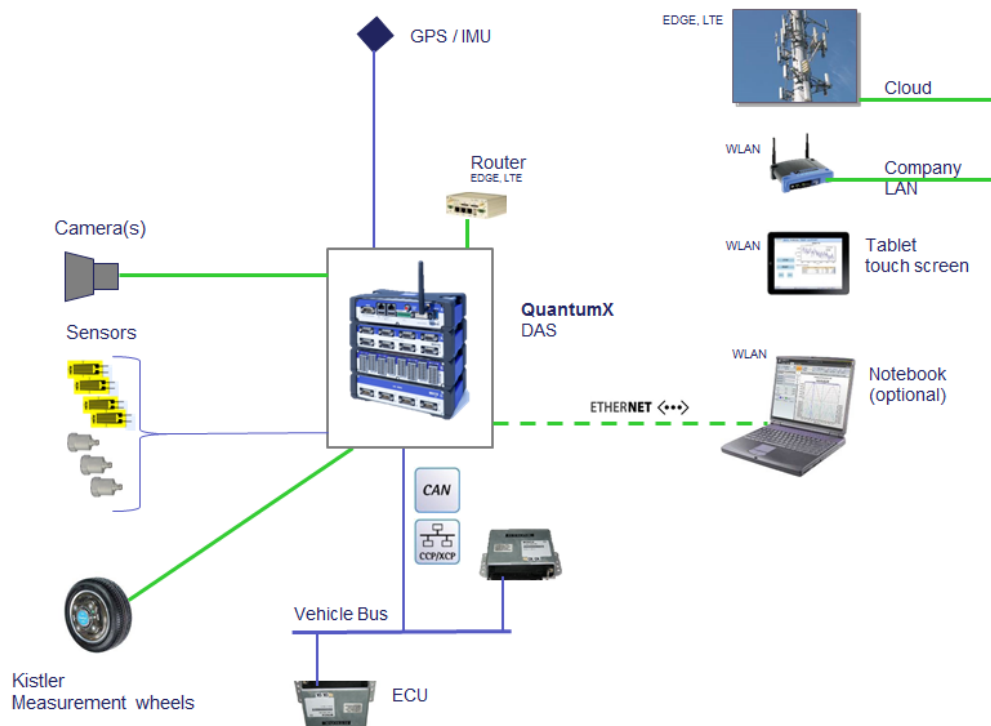
- System testing of moving elements (engine, gearbox, driveline, ...)
- Mechanical durability testing: material testing / coupon testing (fatigue, crack propagation, etc.)
- Mechanical impact testing (fall, shock, break, shot) time sync'd with high speed cameras
- Thermal durability testing with thermal cameras

#### Monitoring tasks

- Automatic long term surveillance of infrastructure (bridge, railway wayside, tunnel, building, etc.)
  - o Example: heavy truck crossing a bridge takes on single picture as JPG with time stamp and log book entry

### QuantumX Data Recorder Topology

QuantumX Data Recorder CX22B-W runs catmanEasy and for video it requires the add-on software module EasyVideocam or EasyRoadload which allow an integration of up to 4 video cameras. The video can be seen online during measurement and also in post process mode for data analysis of recorded data.



Picture: QuantumX Data Recorder acquires analog and digital data

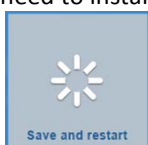
### Supported Video Cameras

Basically, all cameras are supported which support Windows DirectShow or for which there are appropriate drivers, i.e. drivers which are compatible to WDM (Windows Driver Model) or VfW (Video for Windows).

Vendor	Type	Technology	Tested cameras	Comment
Web cams	all	DirectShow	many	Need to work as webcam under Microsoft Windows
Allied Vision	Prosilica BigEye Goldeye Mako G Manta Pearleye	Ethernet	GT1290C	Driver installation necessary
Allied Vision	Stingray Guppo Pro Pike	FireWire	F-033B/C	Driver installation necessary
Allied Vision	Mako U	USB		
Axis		Ethernet		Installation of Axis Streaming Assistant necessary
Basler	Ace series	Ethernet	acA1300-30gc	Driver installation necessary
Logitech	C series	USB	C910, C920	

Recommended codec: Microsoft Windows Media Video 9

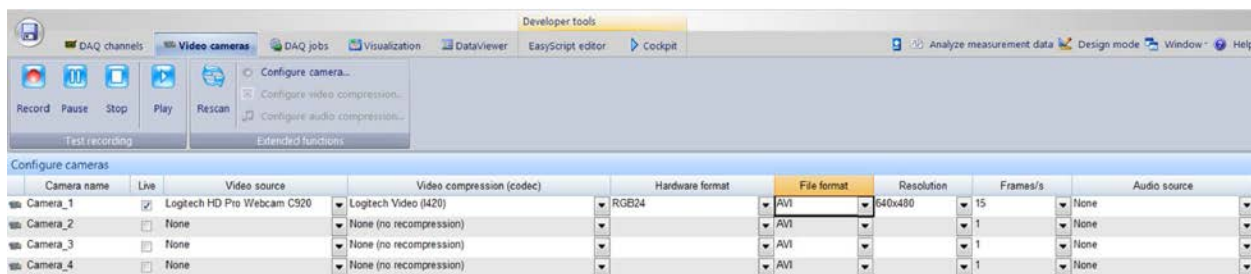
Attention: In case you need to install a driver, please make sure that you store it permanently:



Start CX22B-W shell ->

### Configuration

Configure your video camera and play around with parameters and size per acquisition time.



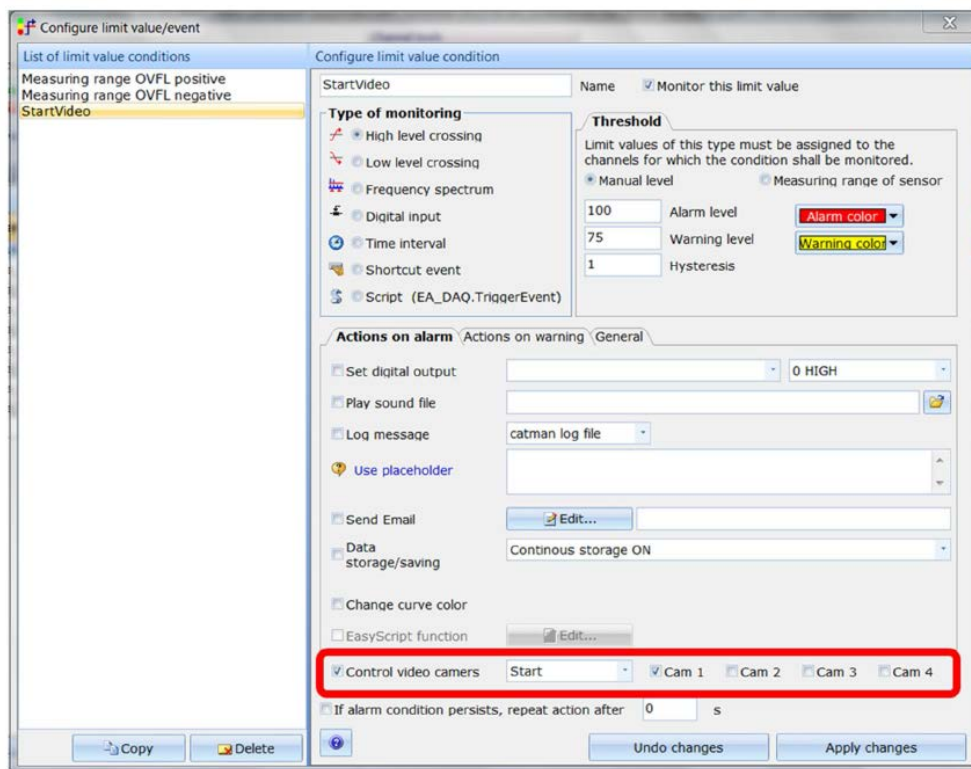
Please calculate the amount of data upfront. Here are some examples:

width	height	Pixel	Data per Pixel	Frames per second	Data per second	Recording time	Raw data	Compressed by Codec	Net data	Net data per second
[Pixel]	[Pixel]		[Byte]	[fps]	[MByte / sec]	[minutes]	[GByte]	[Factor]	[GByte]	[Mbyte/sec]
640	480	307.200	2	15	8,79	10	5,150	5	1,030	1,758
1024	768	786.432	1	24	18,00	10	10,547	20	0,527	0,900
320	240	76.800	1	25	1,83	10	1,073	2	0,536	0,916

### Start and Stop Video Recording

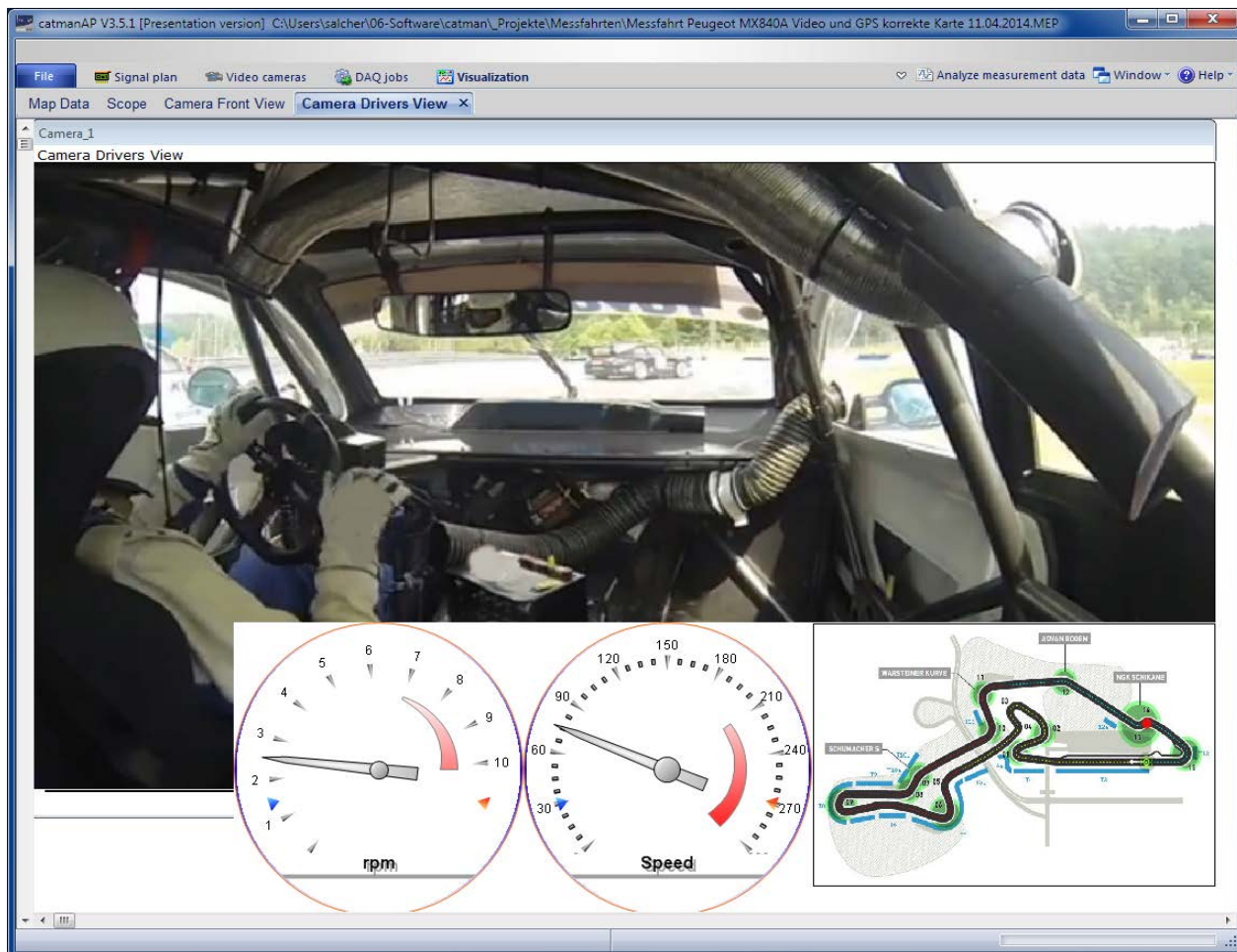
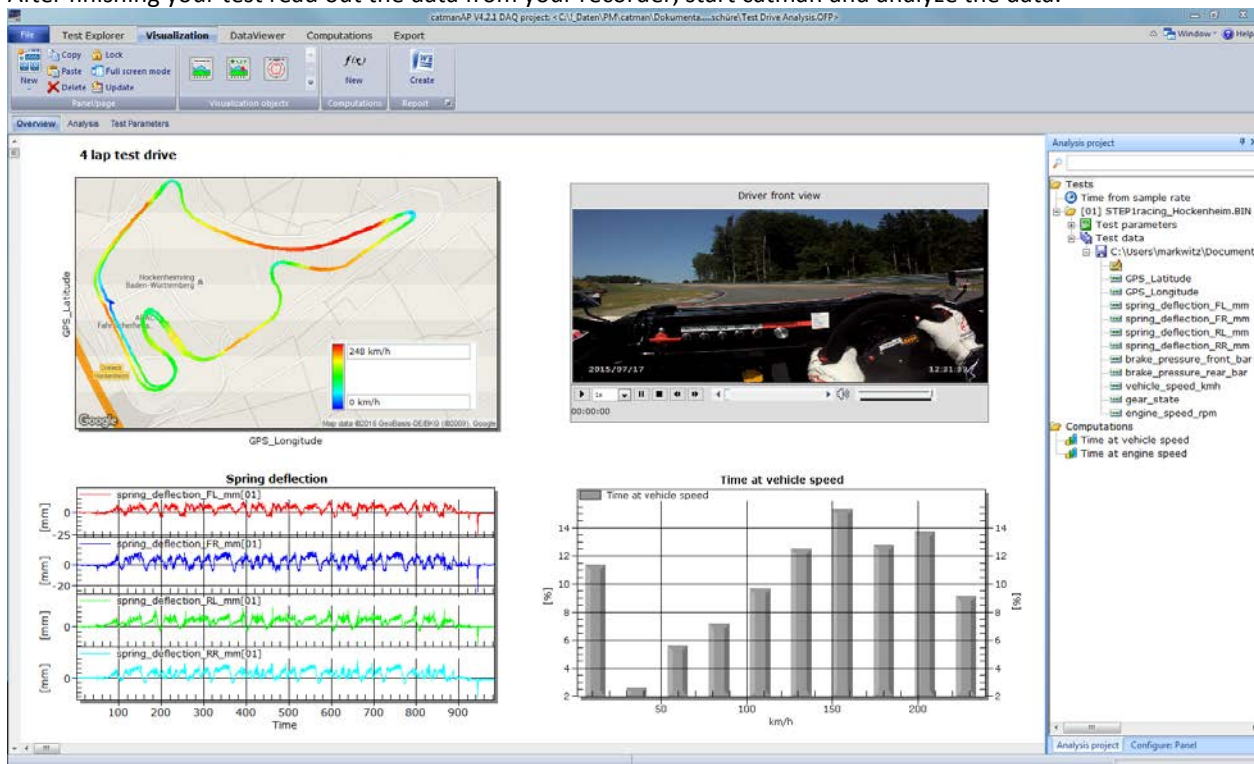
You can select between several start and stop conditions for **video recording**:

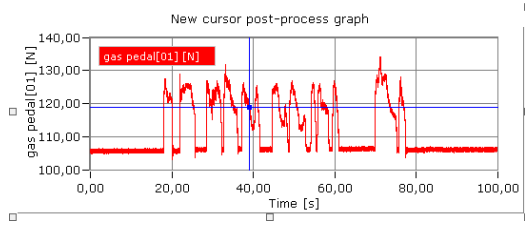
- A) Start and stop manually by pushing the start button
- B) Start and stop on certain trigger or time
- C) Start and stop on event, like an ALARM, for example "load > 100 N"



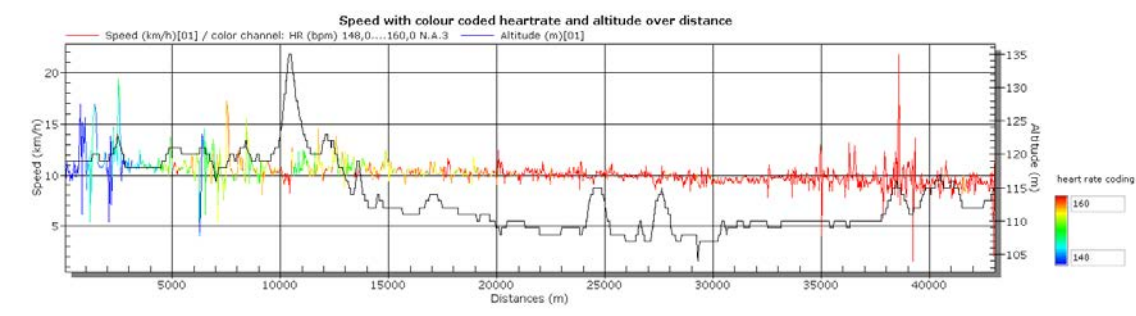
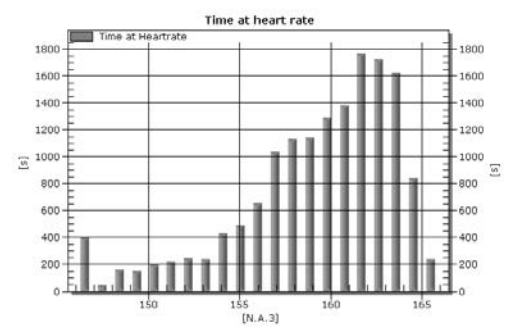
### Data Analysis

After finishing your test read out the data from your recorder, start catman and analyze the data.





Channel	Sample	Unit
GPS_Speed	33,97	km/h
gas pedal	118,9	N



-- end

**Legal Disclaimer:** TECH NOTES are designed to provide a quick overview. TECH NOTES are continuously improved and so change frequently. HBM assumes no liability for the correctness and/or completeness of the descriptions. We reserve the right to make changes to the features and/or the descriptions at any time without prior notice.