

Vcodes

Automated Content Preparation System

DATA SHEET v.1.7

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Description

Automation

Vcodes is a software based platform for creating and managing automated workflows for video content preparation. The Vcodes concept eliminates the need for expensive manual processes and expert knowledge needed in preparing and repurposing content for broadcasters, OTT applications and post production houses.

The heart of the Vcodes platform is a Vcodes developed software, which intelligently manages the transformation of any video source to any format.

Once a workflow has been designed by the Vcodes experts (or by the customer), the entire process is automated:

1. Automated source files ingest, supporting latest industry standards, as 4K, HDR, Dolby.
2. Complex source analysis, error detection and metadata retrieval
3. Rules based workflow engine
4. Video and audio advanced pre-processing
5. Video and audio transcoding
6. Multiple audio track dubbing
7. Subtitles insertion
8. Logo, watermarking graphics and ad insertion
9. Content verification
10. Secure network delivery
11. Reports & statistics

Integration

The Vcodes concept is unique: a customized workflow engine that integrates and controls all of the video/audio processes required, controlling licensed 3rd party tools, both software and hardware. Those tools are carefully selected and go through extensive testing by the Vcodes engineers, for quality and compliance. This approach provides Vcodes the advantage to deliver the highest quality results while conforming to the strictest industry standards.

On top of the already proven tools that Vcodes is integrated with, the modular approach allows for future integration with newly required 3rd party tools, to enable quick adaptation to changing scenarios.

Vcodes is open for external integration to CMS, storage and other systems. This allows Vcodes to either serve as a stand-alone unit, or serve as the transcoding engine as part of a full-scale content workflow. Vcodes has proven integrations with industry leaders as Dalet Media Life and DIVArchive.

Customization

The Vcodes modular architecture allows for full customization of specific required workflows, by quickly adding or replacing required modules.

In the first steps of building a video preparation workflow, the Vcodes expert team of engineers offers the customer a complete professional services package.

Our engineers study the specific content preparation environment including STBs and VoD servers, then build, test and fine-tune the required Vcodes workflows while ensuring maximum quality and conformance with end devices.

A software based solution means quick and flexible customization and protecting your investment. The Vcodes system is future-proof and will grow with your needs. The software's scalable architecture provides seamless multi machine support for high volume throughputs.

Customization doesn't end at the Vcodes software.

Architecture

The Vcodes software architecture operates in Windows .NET environment and is built out of the following modules:

Server

The Vcodes Server is the engine which controls, manages and coordinates the different Vcodes modules. The Server reads and writes to an SQL database to manage complex, high volume workflows.

Rules based workflow engine

The rules engine allows setting custom rules for processing content, based on source video and audio attributes. A workflow may apply simple or complex transcoding and processing – from video resizing and cropping through subtitling and complex multi-channel audio mapping rules.

System scalability

Vcodes supports adding additional machine resources to existing resource pool without any downtime or server-side configuration. The scalable architecture supports installing a Vcodes Encoder module on an available machine and configuring the path for the database server. The new Encoder will then automatically take pending jobs from the database queue.

Subtitles

Vcodes supports 3 modes of subtitles insertion: Open, DVB subtitles and OTT subtitles.

Overlaid subtitles (also referred to as Open Subtitles or Burnt-in Subtitles) are superimposed and encoded with the video. The advantage: subtitles can be added to any video format. Cons: the process is irreversible and no support for multiple subtitle tracks.

With DVB subtitles, the subtitles are inserted as subtitle tracks, completely separate from the video data. This means that subtitles can be switched on and off by the end user and multiple subtitle tracks are supported. Cons: DVB subtitles are supported only in MPEG Transport Streams. DVB subtitling also requires support within the STB in IPTV and Cable environments.

OTT (as TTML and WebVTT) subtitles are supported by the common OTT formats, like DASH, HLS and SmoothStreaming. The major advantage here is that, similar to DVB subtitles, one video can include multiple language subtitles.

Vcodes uses its Watch Folder module to receive subtitle files (STL, PAC, 890 and more) and automatically assign them (via naming conventions) for processing with the relevant video. The subtitle module verifies that timecodes written in the subtitle files are in sync with the video timecode.

User has full control over timecode synchronization, languages and appearance.

Vcodes can also generate low resolution proxy videos, with timecode printed, to be used by external subtitling studios for reference.

Video/Audio Processing

Vcodes uses an intelligent video/audio processing engine to cover all needs: from simple video crop and scale operations to advanced motion compensated frame rate conversion (see complete table below).

Encoder

The Vcodes Encoder module controls the most efficient 3rd party video and audio software encoders. Depending on format and customer requirements, Vcodes integrates with best-of-breed components, commercial or open-source.

An available Encoder in the network pulls encoding jobs from the pending jobs queue along with the encoding parameters specified in the predefined transcoding profile. Upon completion, the encoded elementary streams are delivered to the multiplexer for wrapping to the correct container format.

Priorities and Resources Allocation

Via the Administrator panel, the operator has complete control over resource allocation. Certain machines can be allocated to specific projects, to better distribute resources in the network according to priorities. Furthermore, project and job priorities can either be predefined in the workflow, or detected automatically according to deadlines set in metadata XMLs.

Multiplexer

The Vcodes Multiplexer module wraps the elementary streams received by the encoder modules, into the predefined container format. The more advanced container formats support adding multiple audio tracks, multiple subtitle tracks and metadata.

The Transport Stream multiplexer uses the industry's most advanced software to ensure full compliancy to CableLabs standards and robust error detection mechanism.

Multiple audio tracks support

The encoding profile provides an intuitive interface for designing complex multi-channel audio mapping rules. Fully automated Dolby E and Dolby Digital encoding and decoding support is enabled via the optional Dolby E module.

Automatic re-wrapping and TS trimming

Remuxing dramatically cuts down on encoding times. The Vcodes Server detects when source and destination video types are of the same and performs rewrap only, with no re-encoding. For MPEG-TS this also support insertion of DVB subtitles and external audio files (dubbing).

Another feature which is a major time saver is the ability to trim incoming Transport Stream files, without re-encoding.

Trimming

Vcodes enables frame accurate video/audio trimming, regardless of GOP sizes, for single job or batch processing.

Watch Folder

For a completely automatic operation, the Watch Folder module enables Vcodes to monitor a specified directory on the local drive or the network (UNC). Once a media file is dropped into this folder, it will immediately enter the Vcodes predefined workflow.

Distribution

The distribution module ensures the prepared file is transferred completely to its final destination, whether to a local drive, a network UNC location, or a secured FTP.

Monitoring & Control

The administrator GUI (Windows platform) enables the following:

1. Monitoring and control over pending and running jobs
2. Custom workflows and rules design
3. Mapping available resources to specific workflows
4. Generating detailed reports for workflows analysis

Multi-platform web client monitoring is available.

Reports and statistics

The reports engine generates complete reports on transcoding workflows, with data covering workload distribution, failures, priorities and resources, by date/time and projects/profiles.

The reports module enables the generation of graphical charts and export statistical data to Excel or PDF formats.

Tape Capture

The Tape Capture module is in charge of controlling tape decks (Betacam/HDCAM, etc.) via RS-422 serial connection and supports frame accurate VITC timecode.

The module is fully integrated with the Blackmagic Decklink cards (models depending on requirements) to ensure high-quality 10-bit uncompressed video, via SDI or HD-SDI connections. Also available is support for analog Component connections and AES for audio.

The Tape Capture performs real-time encoding to broadcast industry standard formats like XDCAM and DVCPRO.

These captured master files can then be automatically transcoded to end formats, according to the predefined workflows in the Vcodes system.

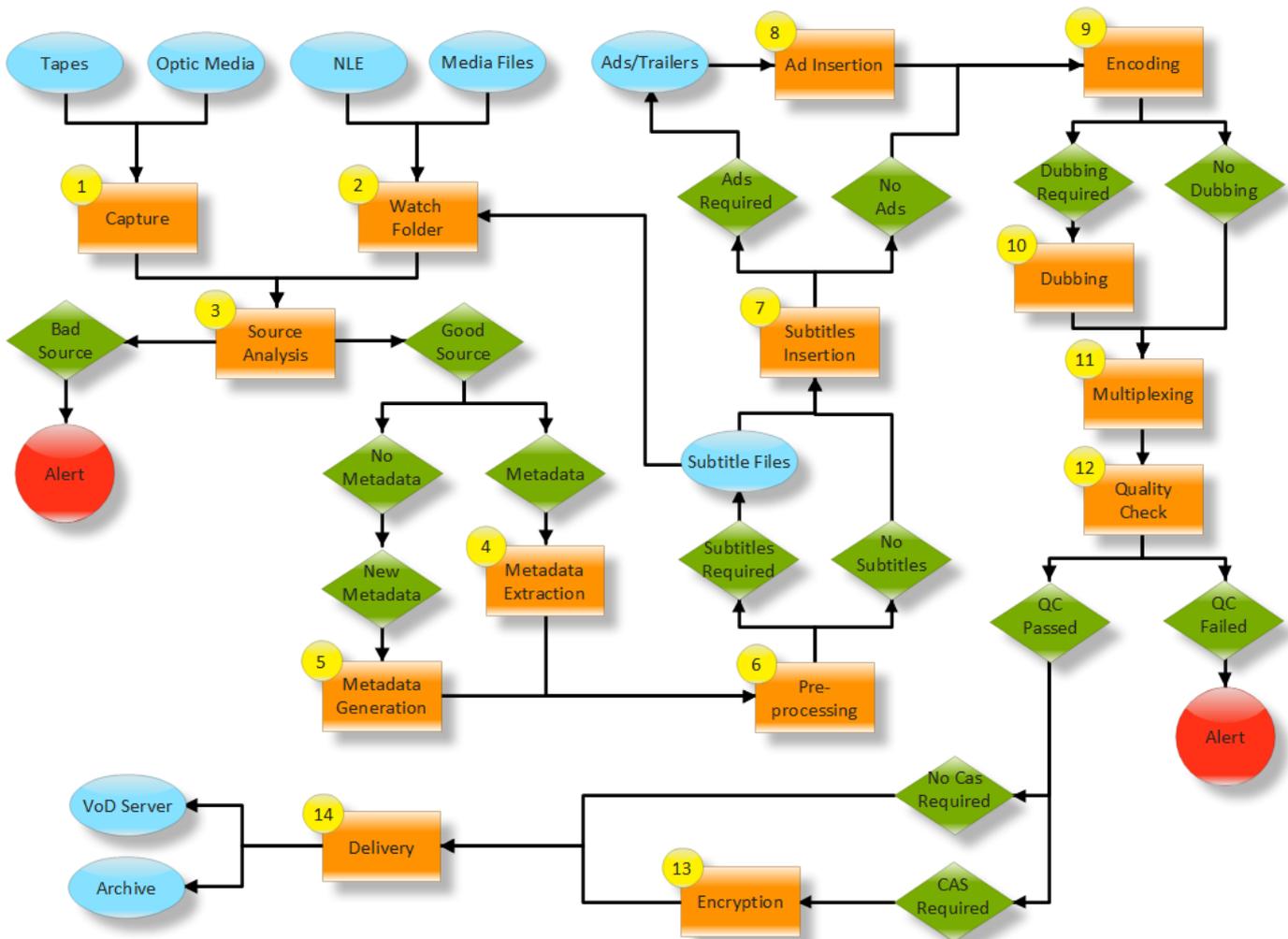


Figure 1: The Vcodes automated workflow

Automation Points Explained

1. Capture from tapes and optic media would require the user to simply insert the media that Vcodes requests. The capture points would be predefined in an Excel/XML job list, or in the case of a single job - within the Vcodes Control Panel.
2. Media files have to be copied to the "Watch Folder" which automatically triggers the rest of the process.
3. Vcodes performs an automated source analysis, to verify whether the source files are compliant for the given workflow. A source which is found to be incompliant will trigger an alert and will not be processed.
4. Vcodes will automatically extract the source technical and descriptive metadata and add it to the project database. When integrated with content management systems, the metadata would automatically be transferred to the CMS in its required format if required.
5. Vcodes ensures imported metadata is compliant to the required workflow and if it isn't, it will be converted to the correct format. If a source does not have any metadata associated with it, Vcodes

will trigger the operator to generate new metadata using the Vcodes metadata generator. The same generator can also be used to manually edit and correct existing metadata. Pre-processing options defined in the workflow are assigned to the video and audio, from basic operations such as scaling, cropping, deinterlacing to complex high quality processing such as graphics/logos overlay, noise removal, spots/scratches cleanup and image stabilization.

6. Subtitles will be inserted into the video, if required in the workflow definitions. Vcodes will look for subtitle files in its Watch Folder, check them for compliancy and add them to the video according to their timecode information.
7. Timecodes can be predefined in the Vcodes job list, in order to insert predefined ad videos.
8. Vcodes engineers constantly ensure that encoding in Vcodes provides the highest quality possible while maintaining compliancy to the industry standards. Large volume encoding is processed efficiently on multiple CPUs using Vcodes infinitely scalable server/client architecture.
9. If required by the workflow rules, Vcodes will insert multiple external audio tracks and to be dubbed with the video.
10. Multiplexing is a critical step, especially for the Cable/IPTV industries. Vcodes uses the best tools, selected, configured and maintained by the Vcodes engineers to ensure complete compliancy to industry standards and features.
11. Quality check in Vcodes has 2 optional levels: basic and advanced. The basic QC verifies the completed file for full technical compliancy in the broadcast environment and lets the operator perform an audio/visual review to spot for any issues. The advanced QC automatically scans the entire video and audio for quality issues like blocking artifacts, frozen frames, black frames, audio levels and more.
12. If content protection is required as part of the automated workflow, Vcodes integrates with the required DRM/CAS vendor to encrypt the prepared content, according the predefined specifications.
13. At the end of a successful process, the content will be securely delivered by Vcodes to its final destination, whether it is a local archive storage or a remote FTP for automated ingest by the VOD server.

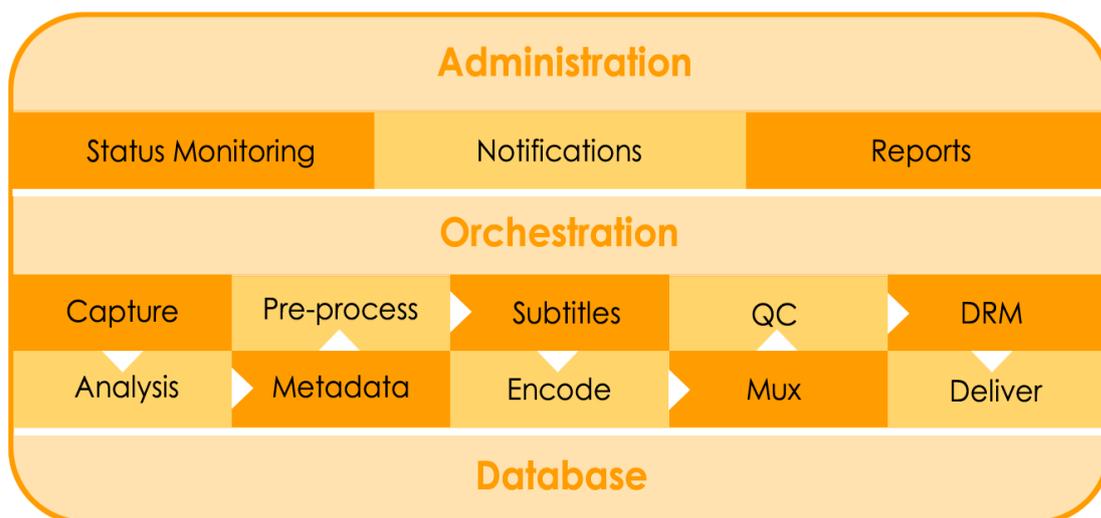


Figure 2: The Vcodes architecture

Specifications and System Requirements

Supported video and audio formats:

Video

HEVC (H.265), H.264, MPEG-2, AVC-Intra, XAVC, ProRes, MXF, XDCAM, IMX, DVCPRO, MOV (Quicktime), Omneon, QT Reference, HLS, DASH, SmoothStreaming, VC-1, MP4, MPEG-2 PS, H.263, AVI, DV, HDV, WMV, FLV, 3GPP

Audio

PCM, MP2, MP3, AAC, AC-3, DTS, Dolby E

Broadcast Standards

4K, UHD, HD, SD, PAL, NTSC. Support for 8-bit, 10-bit or 12-bit encoding in supporting formats.

Video Processing

Crop & Resize
Blur & Sharpen
Motion Compensated Deinterlacing
Color Format conversion (4:2:0, 4:2:2, 4:4:4)
Color Correction (proc amp)
Superimpose logos and graphics (watermarking)
PAL/NTSC motion compensated conversion
Frame rate conversion
Noise removal
Grain removal
Scratches/Spots removal
Image stabilization

Audio Processing

Audio levels
Audio normalization
Dynamic Range Compression
AC3 Delay correction

Data

Excel job lists
XML job lists
XML metadata
Cavena .890 subtitles
Spruce STL subtitles
Screen PAC subtitles
SRT subtitles

Minimum System Requirements*

Intel or AMD based configuration
Quad Core CPU at 2.4 Ghz or better
Windows 2008 Server or newer
8GB RAM or more

**The size of the hardware configuration is dependent on the customer's requirements and scale of the deployment.*

For Tape Capture**

Blackmagic Decklink
Nvidia Geforce or Quadro display card
Dedicated storage

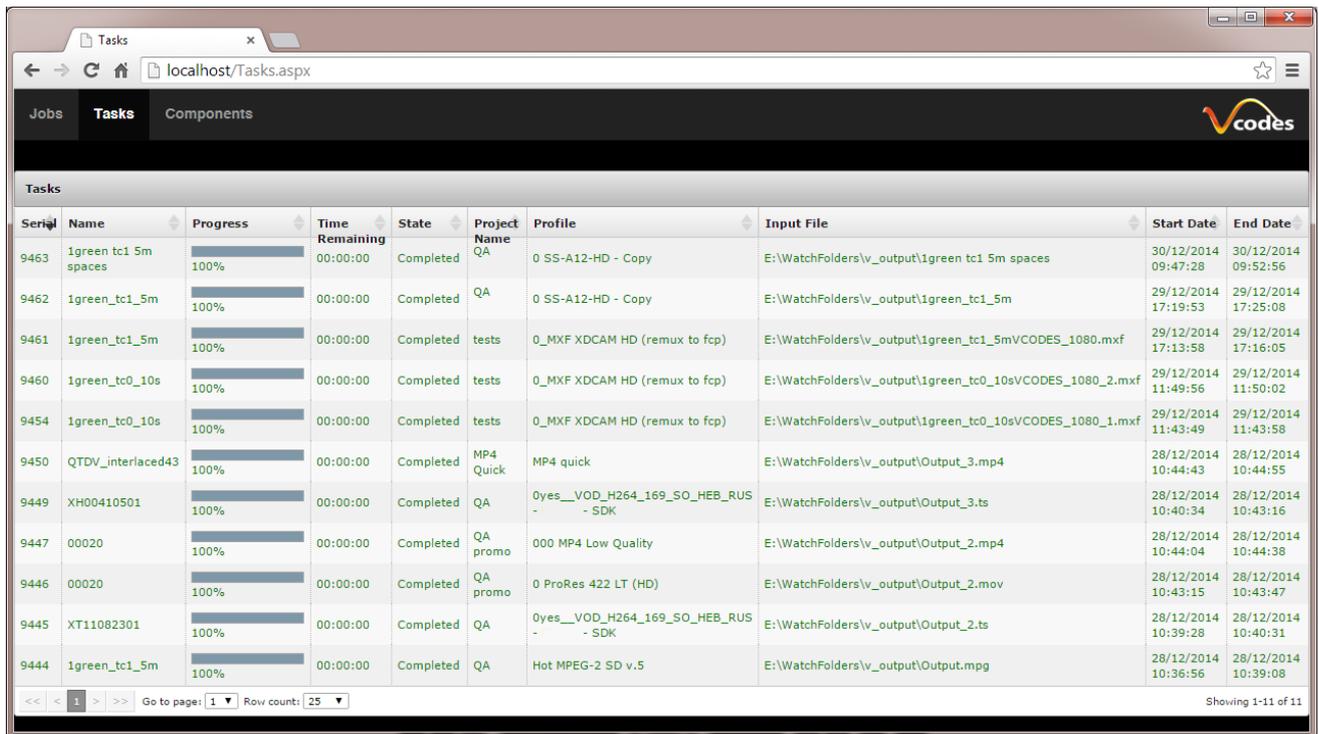
***Exact models and capacities depend on Vcodes configuration.*

GUI Screenshots



Serial	Name	Progress	Time Remaining	State	Project Name	T.C. In	T.C. Out	Source Type	Profile
3363	XT1087726	32%	00:00:00	Encoding Video	Omneon SD	01:00:00:00	02:25:23:00	File	
3362	XT1087726	78%	00:00:00	Encoding Video	XDCAM HD	01:00:00:00	02:55:20:00	File	
3361	XT1087726	17%	00:00:00	Encoding Video	IMX 50	10:05:00:00	10:25:00:00	File	
3360	XT1087726	91%	00:00:00	Multiplexing	VOD SD	01:00:00:00	01:47:00:00	File	
3359	XT1087726	40%	00:00:00	Analyzing	VOD SD	01:00:00:00	01:55:22:00	File	
3358	XT1087726	89%	00:00:00	Analyzing	VOD HD	00:10:00:00	00:20:00:00	File	
3357	XT1087726	14%	00:00:00	Capturing	Mobile	01:00:00:00	02:25:23:00	Tape	
3356	XT1087726	56%	00:00:00	Capturing	Broadband	01:00:00:00	02:25:23:00	Tape	
3355	XT1087726	75%	00:00:00	Capturing	Omneon HD	08:00:00:00	08:05:00:00	Tape	
3354	XT1087726	0%	00:00:00	Pending Subtitles (1/3)	VOD MPEG-2	01:00:00:00	01:14:00:00	File	
3353	XT1087726	0%	00:00:00	Pending Analysis	VOD MPEG-2	19:01:00:00	20:12:50:00	Tape	
3352	XT1087726	0%	00:00:00	Pending Encoding	VOD SD	10:00:00:00	11:25:00:00	File	
3351	XT1087726	0%	00:00:00	Pending Encoding	VOD SD	01:00:00:00	01:42:56:00	File	
3350	XT1087726	0%	00:00:00	Pending Encoding	IMX 50	01:00:00:00	02:03:56:00	File	
3349	XT1087726	100%	00:00:00	Completed	Omneon SD	01:00:00:00	01:35:08:00	File	
3348	XT1087726	100%	00:00:00	Completed	Omneon SD	01:00:00:00	02:12:30:00	File	
3347	XT1087726	100%	00:00:00	Completed	XDCAM HD	01:00:00:00	02:49:00:00	File	
3346	XT1087726	100%	00:00:00	Completed	XDCAM HD	01:00:00:00	02:27:00:00	File	
3345	XT1087726	100%	00:00:00	Completed	Omneon HD	01:00:00:00	01:48:00:00	File	
3344	XT1087726	100%	00:00:00	Completed	Mobile	01:00:00:00	01:10:00:00	Tape	
3343	XT1087726	100%	00:00:00	Completed	XDCAM HD	01:00:00:00	01:10:00:00	File	
3342	XT1087726	100%	00:00:00	Failed	Omneon HD	01:00:00:00	02:12:00:00	File	
3341	XT1087726	100%	00:00:00	Completed	VOD HD	01:00:00:00	01:22:00:00	File	

Figure 1: Jobs monitoring - Windows



Serial	Name	Progress	Time Remaining	State	Project Name	Profile	Input File	Start Date	End Date
9463	1green tc1 5m spaces	100%	00:00:00	Completed	QA	0 SS-A12-HD - Copy	E:\WatchFolders\v_output\1green tc1 5m spaces	30/12/2014 09:47:28	30/12/2014 09:52:56
9462	1green_tc1_5m	100%	00:00:00	Completed	QA	0 SS-A12-HD - Copy	E:\WatchFolders\v_output\1green_tc1_5m	29/12/2014 17:19:53	29/12/2014 17:25:08
9461	1green_tc1_5m	100%	00:00:00	Completed	tests	0_MXF XDCAM HD (remux to fcp)	E:\WatchFolders\v_output\1green_tc1_5mVCODES_1080.mxf	29/12/2014 17:13:58	29/12/2014 17:16:05
9460	1green_tc0_10s	100%	00:00:00	Completed	tests	0_MXF XDCAM HD (remux to fcp)	E:\WatchFolders\v_output\1green_tc0_10sVCODES_1080_2.mxf	29/12/2014 11:49:56	29/12/2014 11:50:02
9454	1green_tc0_10s	100%	00:00:00	Completed	tests	0_MXF XDCAM HD (remux to fcp)	E:\WatchFolders\v_output\1green_tc0_10sVCODES_1080_1.mxf	29/12/2014 11:43:49	29/12/2014 11:43:58
9450	QTDV_interlaced43	100%	00:00:00	Completed	MP4 Quick	MP4 quick	E:\WatchFolders\v_output\Output_3.mp4	28/12/2014 10:44:43	28/12/2014 10:44:55
9449	XH00410501	100%	00:00:00	Completed	QA	0yes_VOD_H264_169_SO_HEB_RUS - SDK	E:\WatchFolders\v_output\Output_3.ts	28/12/2014 10:40:34	28/12/2014 10:43:16
9447	00020	100%	00:00:00	Completed	QA promo	000 MP4 Low Quality	E:\WatchFolders\v_output\Output_2.mp4	28/12/2014 10:44:04	28/12/2014 10:44:38
9446	00020	100%	00:00:00	Completed	QA promo	0 ProRes 422 LT (HD)	E:\WatchFolders\v_output\Output_2.mov	28/12/2014 10:43:15	28/12/2014 10:43:47
9445	XT11082301	100%	00:00:00	Completed	QA	0yes_VOD_H264_169_SO_HEB_RUS - SDK	E:\WatchFolders\v_output\Output_2.ts	28/12/2014 10:39:28	28/12/2014 10:40:31
9444	1green_tc1_5m	100%	00:00:00	Completed	QA	Hot MPEG-2 SD v.5	E:\WatchFolders\v_output\Output.mpg	28/12/2014 10:36:56	28/12/2014 10:39:08

Figure 2: Jobs monitoring - Web

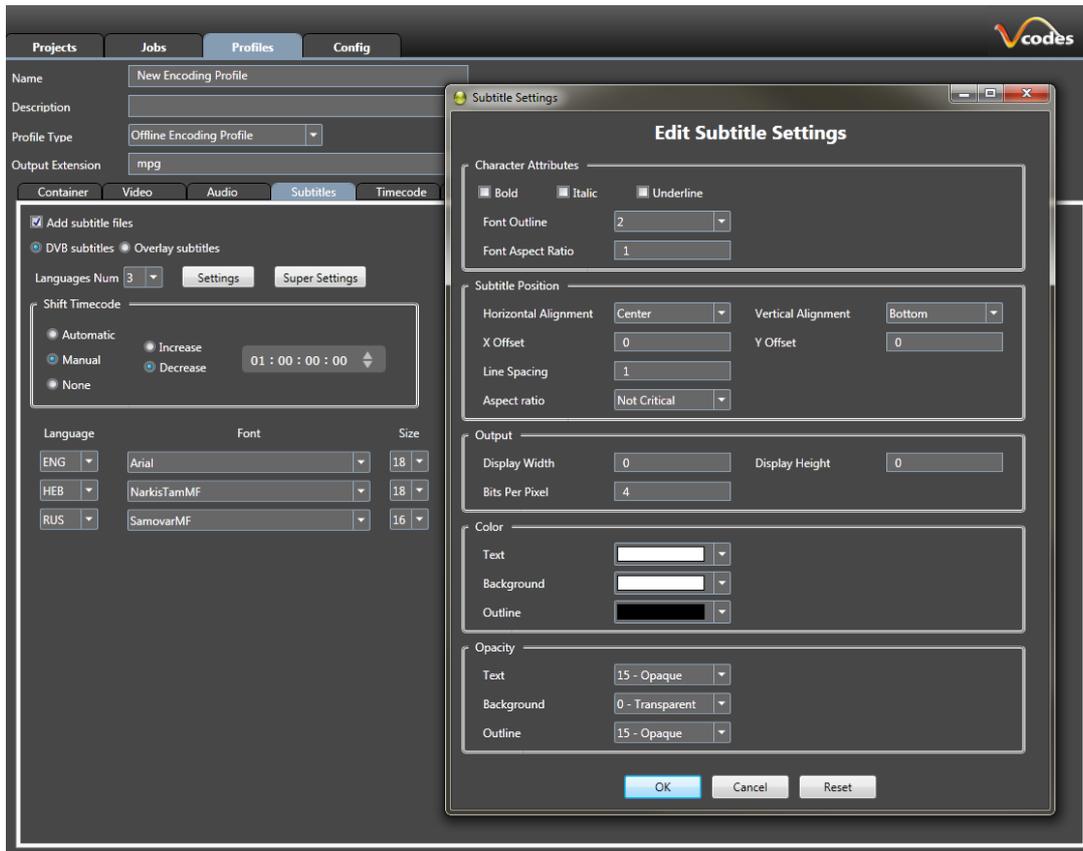


Figure 3: Profile design – subtitle insertion controls

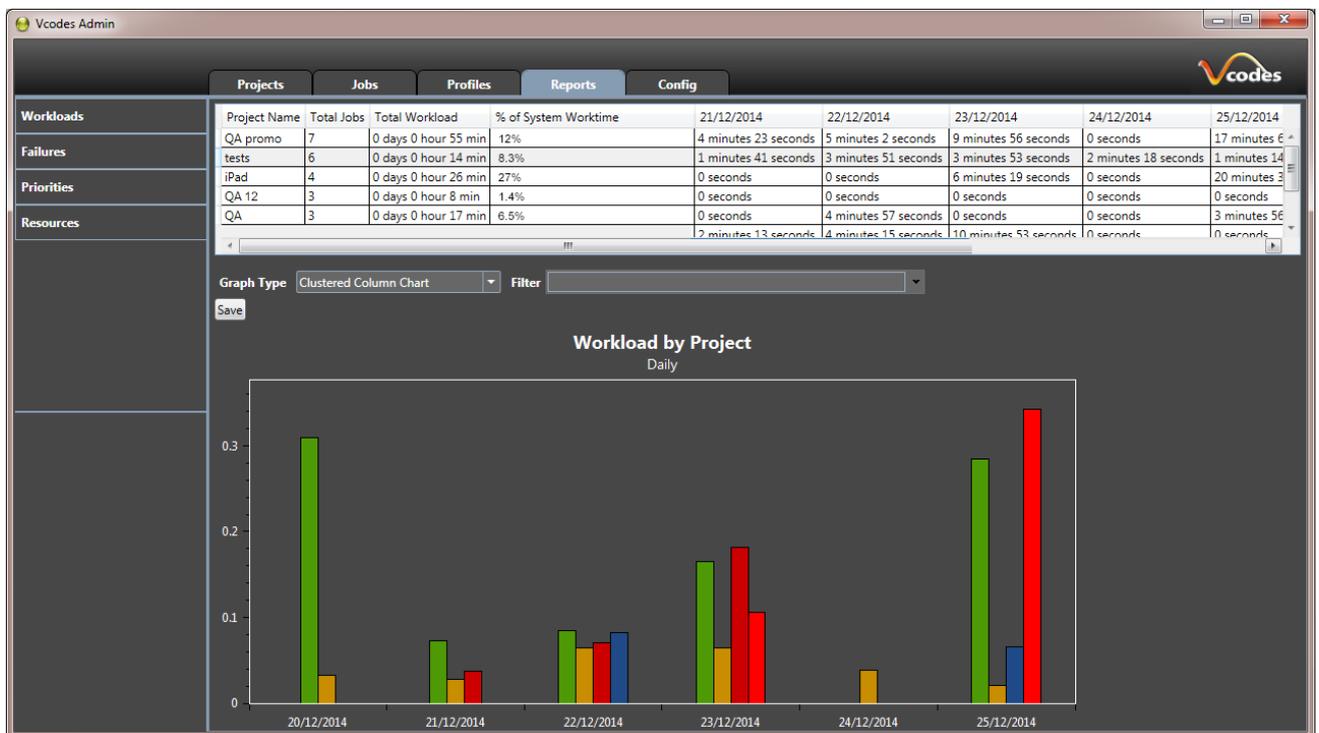


Figure 4: The Reports % Statistics module