Evidence generation system

A system for generating evidence of work performed in a vehicle repair facility comprising one or more controlled cameras and image storage means, wherein the cameras are triggered into capturing an image when an event takes place. The events triggered may be caused by motion detection, heat detection, noise level detection, facility door opened or closed, time lapsed since previous image, when a beam is broken or whether any processes, such as paint spraying or paint drying, have begun. The imaging devices may be housed in a heat resistant, fire resistant and explosion resistant housing. The images may be date-stamped and different cameras may be triggered depending on the category of event. A film over the camera lens may allow quick and simple removal of paint particles from the image capture path. The system allows car repair work to be verified for insurance reasons.
Evidence Generation System

This invention relates to repair facilities with apparatus for evidencing that repair work has been carried out, and in particular to vehicle repair facilities having an automated system for evidencing such work has been carried out on vehicle bodies.

Verification of work which has been done at a car body repair shop during the body repair stages of accident damaged vehicles is required by insurance companies as evidence that work has actually been done, before they will agree to pay an invoice. At the moment, any work being done in connection with insurance companies, requires the car repair shop to employ someone to attend the repair shop, taking photographs of the work being done. They also rely on the individuals doing the work to inform the photographer that additional, unforeseen work has been done, so that additional photographs can be taken as evidence. This can sometimes be missed or forgotten. Without this visual evidence the additional work required becomes a financial loss to the body repair shop.

As a result of the above two main problems have been identified:

Costs: Body-Shops (Car Body Repair Centres) have to employ staff for the generation of this evidence.

Unreliability: Frequent human errors and negligence in manually generating the required evidence causes constant loss of profit. This further adds to monthly costs of the staff taking the images.

No Proper Procedure: There is currently no proper reliable and professionally scalable procedure to manually generate imaging evidence in place. Estimators in the industry which lack overview are exposed to increased stress levels and would benefit from optimisation of their estimating and invoicing procedures.
It is an aim of the present invention to address some or all of the above problems.

In a first aspect of the invention there is provided a vehicle repair facility comprising a system for generating evidence of work performed in said vehicle repair facility, said system comprising: one or more imaging devices, means for controlling said one or more imaging devices, and means for storing images obtained from said one or more imaging devices, wherein said means for controlling said one or more imaging devices is arranged to trigger said one or more imaging devices into taking an image as a result of one or more events taking place.

Said events may comprise one or more of the following categories, alone or in combination: time lapsed since previous image, motion detection inside repair facility, heat detection within repair facility, noise level detection within repair facility, whether door to facility is opened and/or closed, whether a beam is broken, or whether any processes have begun, for example by using electronic timeline states of existing body-shop machinery. Such processes may include paint spraying and/or paint drying.

Where one of the event categories is time lapsed since previous image, said system may provide for user-adjustable snapshot intervals for all cameras, either individually, in groups or all together, without the need of accessing every single camera.

Said imaging devices may be housed in a heat resistant, fire resistant and/or explosion resistant housing. Said heat resistance may be such that said imaging devices can operate in temperatures up to 80 degrees centigrade, ideally for at least 30 to 60 minutes. Said housings may be made heat resistant due to application of a substance known as *Thermilate (RTM)*.

Where there is a plurality of imaging devices, some or each of said imaging devices may be operable to be triggered by different categories of events. Alternatively or in addition, where said there is a plurality of imaging devices that are each arranged to
be triggered by the same category of event, the actual events arranged to trigger said plurality of imaging devices may differ.

Where there is a plurality of imaging devices, the events at which each is arranged to be triggered, and/or the conditions required for triggering, may be individually settable.

Said system may comprise means to individually date stamp each of said images.

Said system may comprise means allowing simple removal of paint particles and/or other materials from the image capture path of said image capturing means. Said means allowing simple removal of paint particles may comprise a film located in the image capture path, said film being replaceable quickly. Said film may be for attaching to a glass window of a housing for said imaging means. said film may have the shape of the housing glass. It may be attachable by static and/or an adhesive substance on the outer edge.

Said system may comprise an IP-LAN infrastructure to connect together said imaging means and said means for storing images.

Said system may be able to communicate with one or more known estimation applications, for example Audatex (RTM).

Said system may comprise means for transmitting said images for remote storage. In one embodiment said system may have the functionality to send said images to an Open Port of a known estimating software application (for example, Audatex (RTM)), pre-defined folders on estimator’s equipment, local back-up storage, and remote back-up storage.

Where there is a plurality of imaging devices, said means for controlling said imaging devices may comprise a single device to control all the imaging devices, or
a plurality of controlling means, in the latter case such that there is a control means for every imaging means, or alternatively for a group of said imaging means.

In a second aspect of the invention there is provided a method of generating evidence of work performed in a vehicle repair facility, comprising:

- providing one or more imaging devices within the vehicle repair facility;
- setting the imaging devices such that they are triggered to take images as a result of one or more events taking place within the vehicle repair facility;
- carrying out repair work within the vehicle repair facility, and
- storing some or all of the resultant images.

Said events may comprise one or more of the following categories, alone or in combination: time lapsed since previous image, motion detection inside repair facility, heat detection within repair facility, noise level detection within repair facility, whether door to facility is opened and/or closed, whether a beam is broken, or whether any processes have begun, for example by using electronic timeline states of existing body-shop machinery. Such processes may include paint spraying and/or paint drying.

Where there is a plurality of imaging devices, some or each of said imaging devices may be triggered by different categories of events. Alternatively or in addition, where said there is a plurality of imaging devices that are each triggered by the same category of event, the actual events which trigger said plurality of imaging devices may differ.

Where there is a plurality of imaging devices, the events at which each is triggered and/or the conditions required for triggering, may be individually settable.

Said method may include individually date stamping each of said images.

Said method may comprise transmitting said images for remote storage. In one embodiment said images may be sent to an Open Port of a known estimating
software application (for example, Audatex (RTM)), pre-defined folders on estimator’s equipment, local back-up storage, and remote back-up storage.

In a third aspect of the invention there is provided a method of providing repair work for a first party, whereby said first party requires evidence of said repair work having been done before making payment for said repair work, said method comprising:

- providing one or more imaging devices within a vehicle repair facility;
- setting the imaging devices such that they are triggered to take images as a result of one or more events taking place within the vehicle repair facility;
- carrying out repair work within the vehicle repair facility,
- storing some or all of the resultant images; and
- using said images as evidence of the work having been done when invoicing said first party for said repair work.

Said first party may be an insurance company, said repair work being vehicle body repair work being undertaken under the terms of an insurance policy of said first party.

The optional steps described in relation to the second aspect above are equally applicable to this third aspect of the invention.

**BRIEF DESCRIPTION OF THE DRAWINGS**

Embodiments of the invention will now be described, by way of example only, by reference to the accompanying drawings, in which:

Figure 1 shows a basic outline of a system according to an embodiment of the invention.
DETAILED DESCRIPTION OF THE EMBODIMENTS

Figure 1 shows a system according to an embodiment of the invention for the generation of evidence of work performed in a vehicle body repair facility. It shows a number of heat resistant CCTV camera housings, each containing a camera. Megapixel IP cameras, enabling live video as well as still images may be used. Each camera is connected via network to computer with storage device, such as a hard drive. Also shown are sensors for the automatic triggering of the taking of images.

Said computer is arranged to control each camera, in its most basic embodiment, so as to repeatedly take snapshots, each one after a predetermined interval of time, the time interval being individually settable for each camera. The computer then automatically stores the resultant images in job specific folders on its hard drive. No sensors are required for this embodiment.

In other embodiments, said cameras are controlled so as to be triggered to take a picture and/or start filming as a result of events happening inside the repair facility. As a consequence, sensors may be provided to sense such events. There may be a sensor provided for each camera, a single sensor for all cameras, or an arrangement as shown, where there are a different number of sensors than cameras, with one sensor possibly controlling two or more cameras as a group. The computer software may allow the actual controlling and triggering arrangement to be changed as desired.

Examples of triggering technologies which may be used include motion detection and/or video motion detection within the facility. In a similar manner, said facility may be provided with a number of beam generators and detectors, such that one or more cameras are triggered every time a beam is broken within the facility. Other alternatives may include triggering the cameras at set intervals when the door to the facility is opened or closed, on detection of a certain temperature and/or change in temperature using heat sensors, on detection of a certain noise level and/or change
in noise level using noise level sensors, or electronic timeline states of existing body-shop machinery (like when the drying oven is started or airing finished). An example of this would be triggering on the beginning, (and at intervals throughout) the paint drying process.

Inside the drying ovens, the temperature rises to about 80 degrees Centigrade for intervals of, on average, 45 minutes. No currently available camera housing was available which would allow operation of CCTV Cameras/ IP Cameras in this particular environment, other than those specified for many hundred degrees Centigrade. This is a much higher resistance than required, and such housings cost at least 10 times more than the solution proposed herein.

The heat resistant camera housings 10 may be achieved by application of a multicoat temperature protective paint, ideally with a fire-proof finish. This is to protect against the high temperatures reached in the repair facility during the paint drying process. The heat resistance should be capable of protecting the cameras from temperatures up to 80 degrees centigrade for 45 minutes, although this maximum temperature and/or exposure time can be increased for use in a more demanding environment. The housings 10 may additionally be made explosion proof.

The main camera body housing 10 is created of PVC/Plastic (instead of temperature conducting metal) and the glass (window for camera) is smaller than on most common Camera Housings. The housings are cleansed and tested for quality. Used is a special NASA developed Heat-Shield Technology Insulation material marketed as, and available from, a company called Thermilate (RTM). This material creates many layers and bubble type cavities and has immense temperature resistance characteristics, and can also be mixed with all paints.

During the housing 10 preparation, a heavy layer of priming paint is sprayed in and outside of the housing, followed by a number of further coats of standard spray-paint, heavily enriched with the insulation material. A final Fire-Resistant pure
finishing coat is applied to the outside of the housing in order to make it approved for use in fire risk areas.

The network 30 infrastructure linking the cameras 20 with the computer 40 and any triggering sensors etc, in a main embodiment, is a local area network type using Internet protocol (IP LAN). This allows evidence to be stored as Megapixel images. Said images may be time/date stamped and/or stamped with identifying information.

Said computer 40 may store the images on its local hard drive. It may also be arranged to transmit the images for remote storage, for example over the internet. In one embodiment the system utilises IP Network Infrastructure to communicate and deliver the evidence directly to:

- An Open Port of Estimating Software (for example Audatex)
- Defined folders on Estimator’s PC
- A Local Back-Up Server / PC
- Remote Back-Up and / or a Central Office, where applicable.

Furthermore, the camera housings 10 may be provided with an easily and quickly removable and replaceable film covering the lens window. This means that any paint particles which would otherwise settle on the lens window, reducing picture quality, can be removed quickly by simply replacing the film. The film ideally has the shape of the housing glass and attaches to it smoothly by either static and/or a glue substance alongside the outer edge. In another embodiment, it can be slid between the plastic and glass. Upon exceeding of a certain level of paint particles on the film, it can be easily peeled off and replaced within seconds, thereby solving the problem of paint obstruction. Said film may be provided as a bulk maintenance item.

The system may also include a Plastic Cover with a rubber / rope to protect, cover and separate the housing from direct contact of pressure-washers and similar used
cleaning equipment. The system and its components may also be made suitable for use in an explosive atmosphere.

The system may use software operable to provide the following functionality:

- User-adjustable snapshot intervals for every single channel/camera, without the need of accessing every single camera though its Setup IP access portal.
- Integration ports to communicate with other IP Based Estimation programs like Audatex (RTM) etc.
- Fully definable picture file transfer and filing options, as well as back-up rules and conditions – Remote Back-Up.
- Simultaneous monitoring of selected cameras to gain overview on the state of processes in the booths. Layout of windows/screens fully scalable.

In summary, the main benefits of the above system include:-

- Reduction in the number of people required to run around taking photographs, a cost saving to the body repair shop.
- No need for workers to remember to tell someone that additional photographs need to be taken, a cost saving to the body repair shop because of less missed evidence.
- Guaranteed collection of all evidence as required by insurance companies.
- Good for the insurance companies for audit purposes and a saving on field engineers' time on site.

The foregoing examples are for illustrative purposes only, and it should be understood that other embodiments and variations are envisaged without departing from the spirit and scope of the invention. For example the types of camera (video or still), network, software, computer, image storage means may differ from those described or shown. Also, it is possible that, either alternatively or additionally to the IP LAN infrastructure described, said system may comprise an Active-Video CCTV infrastructure. Where there are both, said system may be arranged to store images
received from each imaging device via said IP-LAN infrastructure and via said Active Video CCTV infrastructure.
CLAIMS

1. A vehicle repair facility comprising a system for generating evidence of work performed in said vehicle repair facility, said system comprising: one or more imaging devices, means for controlling said one or more imaging devices, and means for storing images obtained from said one or more imaging devices, wherein said means for controlling said one or more imaging devices is arranged to trigger said one or more imaging devices into taking an image as a result of one or more events taking place.

2. A vehicle repair facility as claimed in claim 1 wherein said events comprise one or more of the following categories, alone or in combination: time lapsed since previous image, motion detection inside repair facility, heat detection within repair facility, noise level detection within repair facility, whether door to facility is opened and/or closed, whether a beam is broken, or whether any processes have begun.

3. A vehicle repair facility as claimed in claim 2 wherein, should said events include determination of whether any processes have begun, this is done by using electronic timeline states of existing body-shop machinery.

3. A vehicle repair facility as claimed in claim 2 or 3 wherein said processes include paint spraying and/or paint drying.

4. A vehicle repair facility as claimed in claim 2, 3 or 4 wherein, where one of the event categories is time lapsed since previous image, said system provides for user-adjustable snapshot intervals for all cameras, either individually, in groups or all together, without the need of accessing every single camera.

5. A vehicle repair facility as claimed in any preceding claim wherein said imaging devices are housed in a heat resistant, fire resistant and/or explosion resistant housing.
6. A vehicle repair facility as claimed in claim 5 wherein said heat resistance is such that said imaging devices can operate in temperatures up to 80 degrees centigrade, for at least 30 minutes.

7. A vehicle repair facility as claimed in claim 5 or 6 wherein said housings are made heat resistant due to application of a substance known as *Thermilate (RTM)*.

8. A vehicle repair facility as claimed in any of claims 2 to 7 wherein, where there are a plurality of imaging devices, some or each of said imaging devices are/is operable to be triggered by different categories of events.

9. A vehicle repair facility as claimed in any of claims 2 to 8 wherein, where there is a plurality of imaging devices that are each arranged to be triggered by the same category of event, the actual events arranged to trigger said plurality of imaging devices differ.

10. A vehicle repair facility as claimed in any of claims 2 to 7 wherein, where there is a plurality of imaging devices, the events at which each is arranged to be triggered, and/or the conditions required for triggering, is individually settable.

11. A vehicle repair facility as claimed in any preceding claim wherein said system comprises means to individually date stamp each of said images.

12. A vehicle repair facility as claimed in any preceding claim wherein said system comprises means allowing simple removal of paint particles and/or other materials from the image capture path of said image capturing means.

13. A vehicle repair facility as claimed in claim 12 wherein said means allowing simple removal of paint particles comprises a film located in the image capture path, said film being replaceable quickly.
14. A vehicle repair facility as claimed in claim 13 wherein said film is for attaching to a glass window of a housing for said imaging means.

15. A vehicle repair facility as claimed in claim 14 wherein said film is attachable by static and/or an adhesive substance on the outer edge.

16. A vehicle repair facility as claimed in any preceding claim wherein said system comprises an IP-LAN infrastructure to connect together said imaging means and said means for storing images.

17. A vehicle repair facility as claimed in any preceding claim wherein said system is able to communicate with one or more known estimation applications, for example Audatex (RTM).

18. A vehicle repair facility as claimed in any preceding claim wherein said system comprises means for transmitting said images for remote storage.

19. A vehicle repair facility as claimed in claim 18 wherein said system has the functionality to send said images to an Open Port of a known estimating software application (for example, Audatex (RTM)), pre-defined folders on estimator’s equipment, local back-up storage, and/or remote back-up storage.

20. A vehicle repair facility as claimed in any preceding claim wherein, where there is a plurality of imaging devices, said means for controlling said imaging devices comprises a single device to control all the imaging devices.

21. A vehicle repair facility as claimed in any of claims 1 to 19 wherein, where there is a plurality of imaging devices, said means for controlling said imaging devices comprises a plurality of controlling means,

22. A vehicle repair facility as claimed in claim 21 wherein there is a control means for every imaging means.
23. A vehicle repair facility as claimed in claim 21 wherein, the imaging means are grouped and there is a separate control means for every group of said imaging means.

24. A method of generating evidence of work performed in a vehicle repair facility, comprising:
   providing one or more imaging devices within the vehicle repair facility;
   setting the imaging devices such that they are triggered to take images as a result of one or more events taking place within the vehicle repair facility;
   carrying out repair work within the vehicle repair facility, and storing some or all of the resultant images.

25. A method as claimed in claim 24 wherein said events comprise one or more of the following categories, alone or in combination: time lapsed since previous image, motion detection inside repair facility, heat detection within repair facility, noise level detection within repair facility, whether door to facility is opened and/or closed, whether a beam is broken, or whether any processes have begun.

26. A method as claimed in claim 25 wherein, should said events include determination of whether any processes have begun, this is done by using electronic timeline states of existing body-shop machinery.

27. A method as claimed in claim 25 or 26 wherein said processes include paint spraying and/or paint drying.

28. A method as claimed in claim 25, 26 or 27 wherein, where one of the event categories is time lapsed since previous image, said system provides for user-adjustable snapshot intervals for all cameras, either individually, in groups or all together, without the need of accessing every single camera.
29. A method as claimed in any of claims 25 to 28 wherein, where there are a plurality of imaging devices, some or each of said imaging devices are/is triggered by different categories of events.

30. A method as claimed in any of claims 25 to 29 wherein, where there is a plurality of imaging devices that are each arranged to be triggered by the same category of event, the actual events that trigger said plurality of imaging devices differ.

31. A method as claimed in any of claims 25 to 18 wherein, where there is a plurality of imaging devices, the events at which each is arranged to be triggered, and/or the conditions required for triggering, is individually settable.

32. A method as claimed in any of claims 24 to 31 wherein said method includes individually date stamping each of said images.

33. A method as claimed in any of claims 24 to 31 comprising transmitting said images for remote storage.

34. A method as claimed in claim 33 wherein said images are sent to an Open Port of a known estimating software application (for example, Audatex (RTM)), pre-defined folders on estimator’s equipment, local back-up storage, and remote back-up storage.

35. A method of providing repair work for a first party, whereby said first party requires evidence of said repair work having been done before making payment for said repair work, said method comprising:

   providing one or more imaging devices within a vehicle repair facility;
   setting the imaging devices such that they are triggered to take images as a result of one or more events taking place within the vehicle repair facility;
   carrying out repair work within the vehicle repair facility,
   storing some or all of the resultant images; and
using said images as evidence of the work having been done when invoicing said first party for said repair work.

36. A method according to claim 35 wherein said first party is an insurance company, said repair work being vehicle body repair work being undertaken under the terms of an insurance policy of said first party.

37. A method according to claim 35 or 36 further including any of the steps of claims 25 to 34.

38. A method according to any of the claims 24 to 37 wherein said vehicle repair facility is as claimed in any of claims 1 to 23.
Patents Act 1977: Search Report under Section 17

### Documents considered to be relevant:

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<td>EP 1447780 A1 (HO) See abstract and Figure 2.</td>
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<td>X</td>
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<td>GB 2449718 A (APPRO TECHNOLOGY) See abstract and Figures 1A and 1B.</td>
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<td>US 2008/174675 A1 (SEIKO) See abstract and Figure 1.</td>
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<td>JP 2002053015 A (TERESHIKO) and WPI Abstract Accession No. 2002-299499 [34] - see abstract and Figures 1-3.</td>
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**Field of Search:**

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC:

- H04N
The following online and other databases have been used in the preparation of this search report:

Online: EPODOC, WPI

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