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Bettlachstrasse 2 | 2540 Grenchen | Switzerland
phone +41 32 654 21 00 | +41 22 776 82 28
ryfag@ryfag.ch I www.ryfag.ch

O M N I 3

User Manual

Exhibit A

Definitions

Confidential Information	The Software, and all information, data, drawings, designs, specifications, documentation, and other items (in any form whatsoever) which the Licensor may (directly or indirectly) disclose or otherwise make available to the End User during the course of or in anticipation of this EULA.
Ash Product	The product on which the Software is installed
Software	The software which is pre-installed on the Ash Product and any upgrades, revisions, or new versions which may be supplied by the Licensor or made available to the End User from time to time
Start Date	*The date of purchase of the Ash Product*

RYF AG
Bettlachstrasse 2
CH-2540 Grenchen
Tel. +41 32 654 21 00
ryfag@ryfag.ch
www.@ryfag.ch

RYF SA Succursale
Route de Genève 9c
CH-1291 Commugny
Tel. +41 22 776 82 28
ryfag@ryfag.ch
www.@ryfag.ch

RYF AG
Im Hanselmaa 10
CH-8132 Egg / Uster/ ZH
Tel. +41 43 277 59 99
ryfag@ryfag.ch
www.@ryfag.ch

Contents

Section 1: Introduction

Fig. 1

The **OMNI 3** (Fig. 1) is a full HD (1080p) digital microscope inspection system that operates without a PC. The **OMNI 3** platform has a powerful image processing and control engine that delivers superb full live video image quality at 50/60 frames per second, enabling it to be utilised as a solution in a broad range of quality control, testing, network, assembly, inspection, and documentation tasks.

The **OMNI 3**'s flexible, custom platform is highly configurable with advanced inspection and measurement applications such as: 2D Measurement & Graticule (AP 100-001), Image Stacking (AP 100-002), Image Overlay Comparator (AP 100-003), Side by Side image Comparator (AP 100-004), DXF Importer (AP 100-005), Z Height (AP 100-008), Colour Analysis (AP 100-009) and Object Counting (AP 100-010) apps.

The OMNI 3 platform has the following key features and benefits.

AshCal™ Auto-Calibration:

- The AshCal™ auto-calibration feature removes the need for time-consuming zoom change re-calibrations. Its unique ability to maintain calibration over the entire zoom range is one of the many features that differentiate the **OMNI 3** from other digital inspection systems.

Image Capture:

- Image stamping with time, date, user details and magnification level allows for traceability of inspection.
- Capture annotation and measurement values on an image (if unit has 2-D measurement & graticules app).

Auto-Focus:

- The **OMNI 3** features a one-click auto-focus on-screen indicator. This allows the user to rapidly change between auto-focus and manual-focus as required (auto-focus should only be enabled for inspection; measurements are not possible when auto-focus is active).

Manual Rocker Focus:

- Automatically and rapidly adjust the focus using the manual rocker focus icons to inspect the area of interest on a sample part when in manual focus mode. No need to manually adjust to change focus position.

Spot Focus™:

- Quickly focus on the area of interest by simply using the mouse pointer. Improve accuracy and reduce human error with the capabilities of SpotFocus™*.

AshTruColour™ -True Colour Reproduction:

- View true colour reproduction of your sample with the **OMNI 3**. Replicate real colours as seen with the naked eye.

RTLDC™Real-Time Lens Distortion Correction*:

- Lens distortion is inherent in all microscopes. Image distortion at the outer edges of large samples is automatically corrected with **OMNI 3**.

Internal Storage:

- 10GB for storage of images or measurement files for off-network saving.

Save & Recall Inspection Settings:

- Custom system settings such as brightness, exposure and magnification can be saved into an individual measurement file and easily recalled enabling standardisation of inspection conditions.

User Privileges:

- Access to functionality can be restricted to enable operational control and traceability.

Intuitive GUI (Graphical User Interface):

- The **OMNI 3**'s GUI (Graphical User Interface) is a custom designed, mouse-controlled interface, delivering intuitive and efficient operation and control of the full app suite.

Camera Control Functions:

- Auto and manual focus, exposure, gain, brightness, and white balance customization ensure ultra-sharp, high contrast imaging.

Illumination Options:

- **OMNI 3** offers several quick release, cable free, interchangeable illumination options. With illumination intensity control and quadrant control, the user can ensure they have shadow-free illumination and glare reduction.

* Global Patent applied for by ASH.

Package Contents:

Your **OMNI 3** package contains:

- **OMNI 3**
- Quadrant Controllable Ring Light (attached)
- Lens +5 (attached)
- Keyboard and Mouse
- Mouse Mat
- Power Supply
- HDMI to HDMI Cable
- Mini USB Cable
- USB Memory Stick (containing User Manual)
- Grounding Cable – connected to grounding mat or plug if required (not supplied)
- Arm Bracket
- Arm Receiver
- Cleaning Cloth

Optional OMNI 3 Apps & Components

Apps:

- 2D Measurement & Graticule (AP 100-001)
- Z Height Measurement (AP 100-008 **Add-on** to Measurement app)
- Colour Analysis (AP 100-009)
- Object Counting (AP 100-010)
- Image Stacking (AP 100-002)
- Image Overlay Comparator (AP 100-003)
- Side by Side image Comparator (AP 100-004)
- Import DXF (AP 100-005)

Lens:

- +5 Lens (AI 280-150)
- +10 Plan 1x Lens (AI 100-055)
- +25 Lens (AI 280-053)
- +50 Lens (AI 100-064)

Other:

- Motorized XY Stage (AI 100-050)
- **OMNI 3** Touchscreen Workflow Controller (AI 100-049)
- Diffused LED Dome Light (AI 100-045) - For use with metallic sample analysis
- UV LED Light Ring: (AI 801-421)
- Ash 360⁰ Rotating Viewer: (AI 801-458)

- Footswitch (AI 801-418)
- External Keypad KPII (FI806-002) - Optional extra for use with Pre-set function (see Section 6.). Useful to improve workflow speed and for user access control.

*For full list of system components please contact us: info@ashvision.com

Please retain the packaging in case there is a need to return the unit for service or repair.

Section 2: Installation

Setup:

1. Attach the Arm Receiver to the Stand using the 4 screws provided (Fig. 2).

2. Hook the Arm Bracket onto the Arm Receiver using the 4 hooks, tighten the two thumb screws at the rear of the Arm Receiver.

Cabling (Fig. 3):

3a. Route all cables, such as power supply and ESD cables, through the hole of the underside of the Arm Bracket and ground the ESD cable to bench. Route the HDMI cable to the monitor. Insert the mouse dongle and keyboard dongle into the side ports on the **OMNI 3**. **Note:** The mouse dongle must be plugged in before powering the unit on. This will enable the mouse to be detected.
3b. Connect the cables to their corresponding ports on the **OMNI 3**.

4. Hook the **OMNI 3** onto the front hooks on the Arm Receiver using the 4 hooks.

5. Tighten the front two thumb screws on the Arm Receiver to secure **OMNI 3**.

Cables feed through hole in the Arm Bracket

3 cable routing
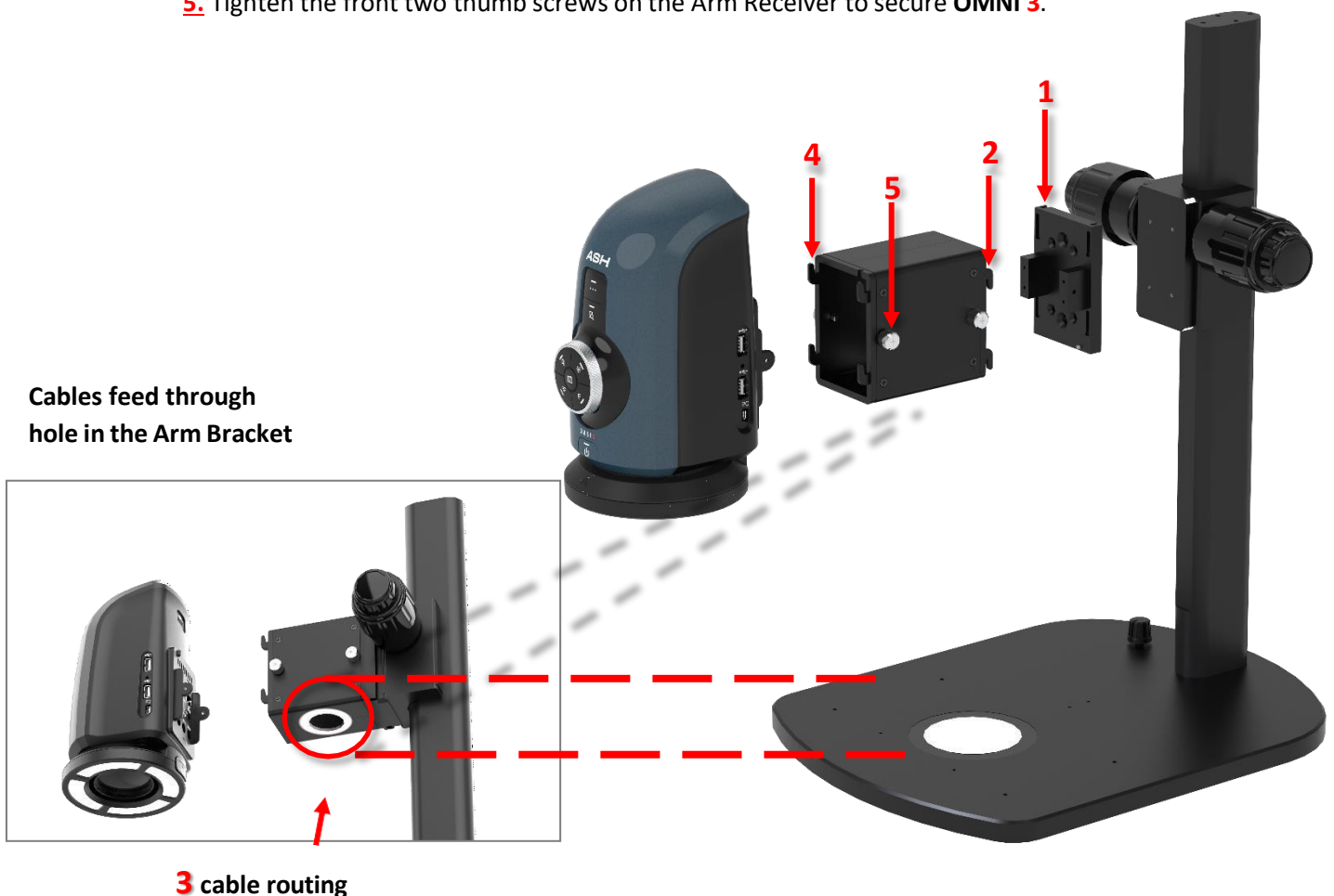
Fig. 3

Fig. 2

Connections:

Rear:

1. HDMI connector to TV/Monitor

2. 2 x USB Ports

3. Ethernet Connection to Network

4. DC Power Jack to Power Supply

5. External Aerial Connection

6. 3 x Auxiliary Communications Ports

7. Grounding Connection (grounding cable supplied)

Side:

8. 2 x USB Ports

9. Mini USB (PC) Connection (**OMNI 3** shows as removable media, read only, files and folders can be browsed and copied to PC).

> ⚠️ Never look directly at the LED light source for any prolonged period.

The Front Panel

The **OMNI 3** *Front Panel (Fig. 4) operates by selecting the function you wish to adjust via the Control Buttons, and then adjusting by turning the Intuitive Return Dial to the Right or Left.

White Balance

Image Overview

Zoom

Image Brightness

Return Dial

Image Capture

Ring Light Intensity

Manual/Auto Focus Toggle

Fig. 4

Power

Note: Front Panel is disabled when a menu is active or can be disabled in settings

Section 3: Initial Start-up

Setting the Correct Focal Point:

Before using the OMNI 3 the user must set the focal point of the lens first to suit the height of the object.

- Power up the unit.
- Ensure camera focus is set to Measurement Ready (Settings Section 4.7)
- Place the unit in Overview Mode by clicking the Overview icon in the menu bar.
- Move the object until the desired viewing area is under the crosshair of the screen.
- You can exit Overview mode by again selecting the Overview tab in the menu bar.
- Zoom to full magnification.
- Manually adjust the height of the **OMNI 3** up or down on the stand until the object is in focus. You have now achieved your optimal focal point.
- **When the focal plane is set you can only measure points at that plane.** You can now zoom in and out freely to take measurements of areas on the same plane as the focal point. The **OMNI 3** will automatically adjust the measurement value as you zoom. **If the user wishes to view/measure a different object with a different height, then the focal point will have to be set again.**
- To recall a Graticule/overlay file, you must also ensure the focal plane is set prior to opening the overlay file.
- You can now zoom out from full magnification (via zoom out icon) until the area you wish to measure can be viewed.

For best accuracy at low magnifications, try to align the area being measured to the center third of the screen.
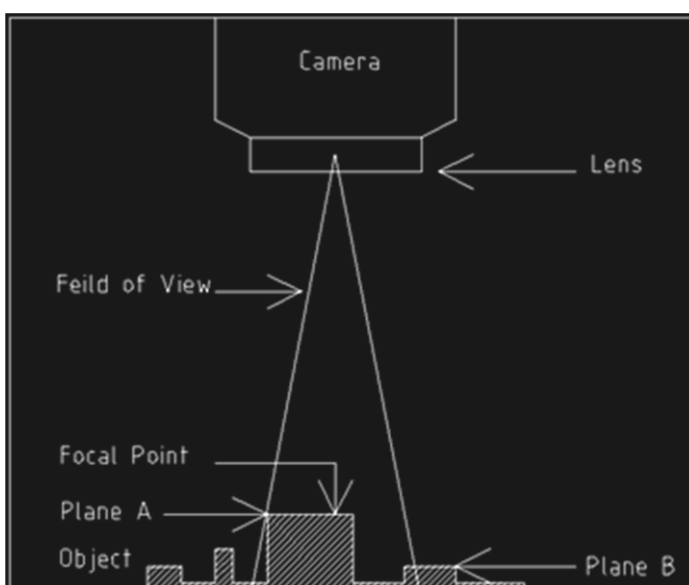
The image shows the focal point has been set to measure Plane A. **If the object is moved so that Plane B is within the field of view, then the Focal point will need to be set again for Plane B before you can measure.**

*Refer to **OMNI 3** Quick Start User Guide*

Fig. 5

Section 4: System Navigation: The Toolbar

 Omni3 Main Toolbar icons (fig.6)

Live x19.5

Live
Magnification
Field

Zoom in   *

Zoom out *

Toggle between live and static image

Take snapshot of a live image

Auto-focus

Manual Rocker Focus buttons

Camera Overview

Settings menu

Save file

Open file

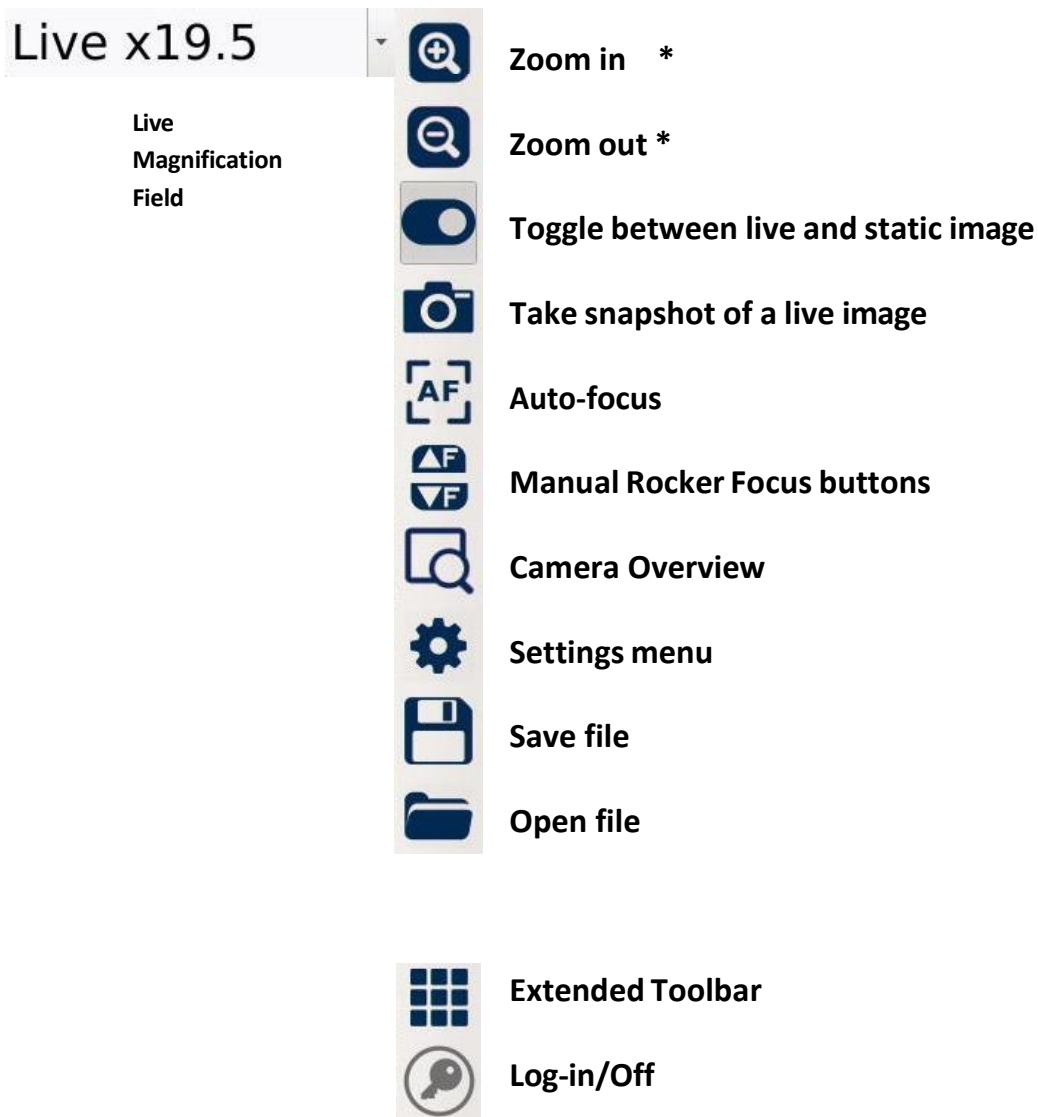**Extended Toolbar**

Log-in/Off

Fig. 6

> **Note: The Toolbar can be hidden by selecting 'Auto Hide Main Toolbar' in System Settings (see Section 4.7 b.)**

 * Ensure camera focus is set to 'Measurement Ready' (see Settings Section 4.7) when changing zoom levels so focus tracking is maintained.

Extended Toolbar:

 Fig. 7

Click on the Extended Toolbar icon to display Extended Toolbar (Fig. 7) selection. To display any of the Apps on the main toolbar **enable the check boxes for the App** based on your preference and workflow requirements. Once selected, they are easily accessible on the main toolbar. You can also launch the App from within the extended toolbar by clicking on the App icon. A max. of 5 apps can be added to the main toolbar at any one time.

To save the current toolbar setup click the small Save icon at the bottom right (Fig. 7).

Light blue coloured icons indicate the App is in trial mode. **Trial mode allows the App to be launched 30 times.** Grey icons indicate the trial period for that app has expired.

Contact **info@ashvision.com** for further details if a full version of an app needs to be purchased.

App Icons:

Graticule	DXF Importer
Measurement	Object Counting
Image Stack	Colour Analysis
Comparator Side by Side	Email
Comparator Overlay	Motorized XY stage

Functions explained in detail Apps Section 5

Main Toolbar Icons Explained:

4.1 Toggle:
Use the toggle icon to switch between **LIVE** and **Saved/Captured** images.

4.2 Snapshot:
To capture an image from a **Live** video feed, click on the Snapshot icon. A still image from the camera is captured and displayed (basic toolbar functions will "grey out" i.e. deactivate). To switch back to the Live video feed, use the Toggle icon as explained above.

4.3 Auto Focus:
When this icon is highlighted in green, the **OMNI 3** is in autofocus. Click the icon to disable/enable autofocus. The icon will flash red as the camera makes a refocus. *Note: When AF is enabled measurements are not possible and measurement tools deactivate; suitable for inspection only. If Autofocus on a sample cannot be achieved on a surface the working height may not be set correctly, adjust working height to correct*.

4.4 Spot Focus™:
When autofocus has been enabled an additional focus feature becomes active, Spot Focus. The Spot Focus icon appears in place of the Rocker focus buttons, when clicked this intuitive feature allows the user to quickly focus on an area of interest by simply using the mouse pointer.

4.5 Manual Rocker Focus:
Automatically and rapidly adjust the camera focus using the focus rocker icons to inspect the area of interest on a sample part when in manual focus mode. Use the Rocker focus up button to fine adjust focus and increase focal length, use the Rocker focus down button to decrease focal length.

4.6 Overview:
The Overview function will move the zoom position to the lowest magnification for an overview of the object being viewed. A crosshair is provided allowing the sample and area of interest to be centred. When the Overview icon is clicked again, the camera will return to the original zoom level.

*After Focus features have been used, Measurement Ready (Settings Section 4.7) may have to be set to allow measurement and correct focus tracking.

For Reference: Real Time Lens Distortion Correction (RTLDC):

Lens Distortion is an inherent characteristic of vision systems, because of the curviture of a lens images can display distortion around the edges at very low magnification. **Lens Distortion** can be seen as a bend on the straight edge of the object at the very edge of the screen (Fig 8.). This effect is not as visible at higher magnification levels (>10X). **Lens Distortion Correction** is now applied automatically in the software, eliminating any distortion on objects that are viewed at lower magnifications.

Fig. 9 below shows how **Lens Distortion Correction** has processed and removed the Pin Cushioning effect

Distorted Image:

Fig. 8

Undistorted image:

Fig. 9

Section 4.7: Settings
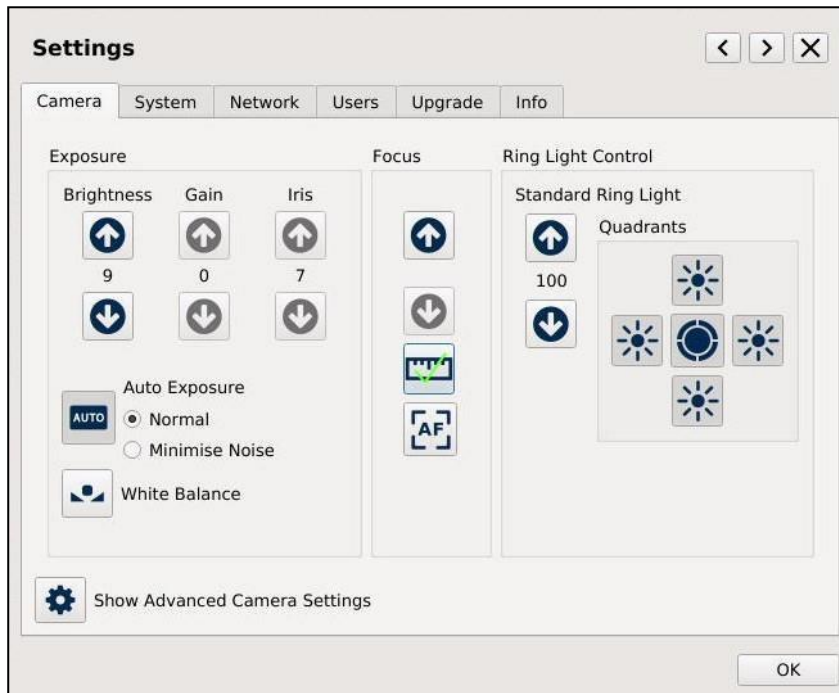
4.7: a(i) Camera:

Fig. 10

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*N.B. Measurements are only valid if the Focus Measurement Ready icon shows ⟦ruler icon⟧ .

If the focus settings are not valid for measurement, then click on the icon ⟦crossed ruler icon⟧ to set the focus to Measurement Ready mode.

Exposure: Switch between Auto & Manual exposure modes. In Auto Exposure mode, the Gain and Iris settings are automatically adjusted, and the user can adjust the image Brightness if required. In Manual Exposure mode the user can adjust both the gain and the iris settings of the camera. Higher gain values will increase noise on the image. Lower iris value will reduce the amount of light entering the camera but will improve focus depth.

Auto Exposure: Auto Exposure can be set to Normal or Minimise Noise setting. Camera settings are adjusted when Minimise Noise is selected, and this may improve an inspection scenario. *(Please Note: When Auto Exposure is enabled, Gain, Iris and Shutter adjustments are disabled and automatically adjusted. The values for these disabled settings are not relevant when auto exposure is set as active).*

White Balance: White balance can be carried out to colour balance the camera (also possible via camera front panel if panel is enabled)

Focus: Switch between Auto & Manual Focus modes and set Measurement Ready focus (Infinity Focus). In Manual mode the focal point can be adjusted and set by the user.

Lighting Control: Select which ring light LED quadrant to turn on/off. Set the intensity value of the LEDs and toggle all the LEDs ON/OFF. The **OMNI 3** will auto-detect the type of ring light that is connected.

* Note: when the **OMNI 3** *Diffused Dome light is connected, the quadrant buttons are disabled.*

4.7: a(ii) Advanced Camera Settings:

When the Show Advanced Camera Settings button is clicked some additional camera settings can be accessed (Fig. 11).
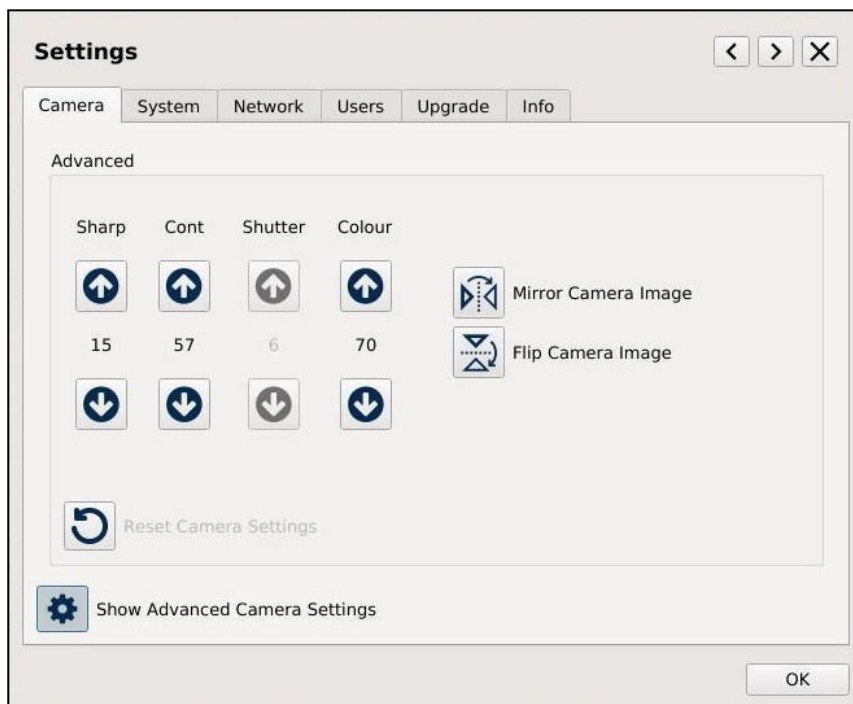

Fig. 11

Sharp:
Sharp or sharpness control is a function which adjusts the edge enhancement of objects. There are 15 levels of adjustment, a low value will produce a softer image vs a high value will produce a sharper image.

Cont:
Cont or Contrast allows the user to adjust the contrast of an image. The contrast level range can be adjusted from 1 to 64.
Please Note: A higher contrast value coupled with a high sharpness value can introduce noise into an image.

Shutter:
When Auto Exposure is deselected the shutter speed can be adjusted. Increasing the value speeds up the shutter allowing less light to travel to the camera sensor, decreasing does the reverse.

Colour:

The camera colour can be adjusted to enhance the vibrancy of colours making use of the AshTru Colour™ algorithm.

Mirror and Flip:

The camera image can be mirrored or flipped to suit the needs of an application or the orientation of the camera head.

*Any changes that wish to be applied can be saved via Settings>System>Save Startup Settings or can be saved for a specific inspection or measurement by saving as a .ash measurement file. These specific camera settings will reload when the file is reopened.
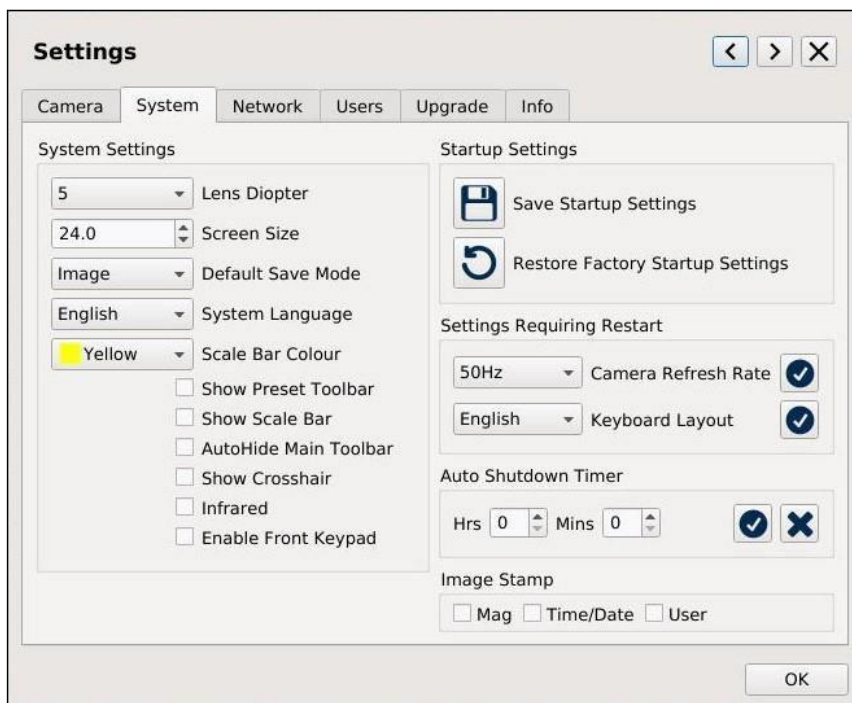
4.7 b. System Settings:

Fig. 12

Lens Diopter:	Choose a lens from the drop-down list to correspond with the lens that is fitted to the **OMNI 3**.
Screen Size:	Enter the correct screen size to correctly display the magnification.
Default Save Mode:	Set the default file type to save as an image file or as a measurement Ash files.
System Language:	Select your preferred system language.
Scale Bar Colour:	Change the on-screen scale bar colour if required.
Show Preset Toolbar:	Enable if using defined presets (see presets Section 6).
Show Scale Bar:	Enable to show on-screen dynamic scale bar.

AutoHide Main Toolbar: To auto-hide the toolbar on the main window, enable this option. To reveal the hidden toolbar, move the mouse over the toolbar area.

Show Crosshair: Display full screen Crosshair when selected.

Infrared: Disable/Enable the IR filter.

Enable Front Keypad: Enable / Disable the Front Keypad.

System: Start-up Settings: (Fig. 12)

Save: Save the current settings as the System Startup Settings.

Restore: Factory (default) System Settings. (When performing, images will not be deleted. However, a backup is always recommended if performing this.) Click Save Startup Settings to hold newly restored settings.

Refresh Rate: Change 50Hz or 60Hz (change to correct for flicker of ambient lighting if required, depending on region).

Keyboard Layout: Can be currently set to one of 4 configurations, they are English, German, French or Swiss.

Auto Shutdown Timer:

We have always considered the environment when designing our systems. For this reason, we have introduced an Auto Shutdown Timer, to automatically shut-down the system at a specific time to save energy. This feature allows the user to set a shutdown time after start-up. Once the user has set the specific time and selected "Apply", the user is prompted with a message to confirm that this has been saved. This message will read: 'Auto Shutdown Timer Set. Please save start-up settings to make change persistent'.
After saving to start-up settings, the unit will power off after the set time has expired. To unset this, set the values to zero and select "Apply". The user will receive a confirmation message stating: 'Auto Shutdown Timer Disabled. Please save start-up settings to make change persistent'

Image Stamp: Prints the magnification, Time & Date and/or User onto an image when taking a snapshot or saving a measurement/image file.

*__N.B.*__ If you are viewing a particular object which requires custom settings such as Brightness, Exposure, Magnification, etc. (**System settings**) then you may want to **save** them as an .ash file so you can easily **load** them if viewing the object again in the future as a graticule or measurement. The .ash file holds all unique system settings for that file.*
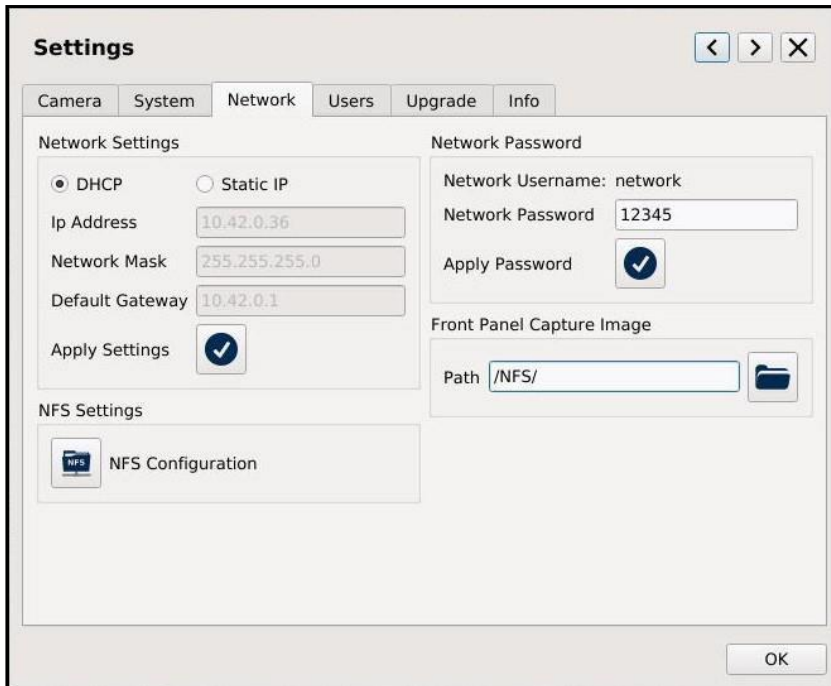
Settings:

4.7 c. Network Settings:

Fig. 13

The **OMNI 3** supports Networking via the Ethernet port on the back. The network settings (Fig. 13) can be configured automatically using (DHCP) Dynamic Host Configuration Protocol or manually by assigning a Static IP, Network Mask and Default Gateway.
To configure the DHCP ,the **OMNI 3** <u>must</u> be connected to a network. Select DHCP and press apply and the network configuration will be automatically applied.
To configure the network with a Static IP, select Static IP and enter Static IP, Network Mask and Default Gateway. Press Apply and the Networks Settings will be updated with the changes.

Connecting to the Omni 3 via the Network:

The **OMNI 3** supports (SFTP) Secure File Transfer Protocol and all files can be accessed from the **OMNI 3** as a Read Only Drive. Any operating system software that supports SFTP should work but below are software verified by Ash Technologies.
For Microsoft Windows, Ash Technologies has tested and recommends WinSCP. This is open source and is available at https://winscp.net .

When using this software, "Host" is the **OMNI 3** IP address which can be found in Settings/Network. For Linux this is already supported in the mainline distributions.
For Android Turbo Client has been tested and verified to work (https://youtu.be/qKRAT533CtE)
Username: network
Password: **The network password needs to be set if you want to connect the OMNI 3 to a network.**
The User can then change the password by entering a new password and clicking Apply.

NFS Configuration:

The **OMNI 3** can connect to a Network File System (NFS) server running on a Linux/Windows machine.
Please note: *Currently we do not support authentication with Windows Server.*

To connect to the NFS server you will need the **IP Address** of the server and the full **Path** to the shared folder. These details can be obtained from your IT Administrator.
It should be similar to:
IP Address: 192.168.0.11
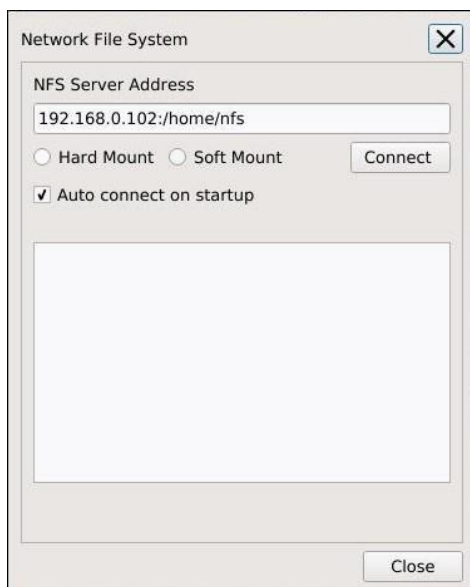Path: /home/user/nfs_server_directory
Click the NFS Configuration button in the Settings->Network tab.
Enter the NFS server address in the following format.
IP Address:/Path
Linux server: (example: 192.168.0.11:/home/user/nfs_server_directory)
Windows 10: example: 192.168.0.11:/c/nfs_server_directory). (using **FreeNFS, HaneWin**)

Hard Mount: If the server connection is lost while navigating the NFS directory, the system may stall and will need to be manually restarted to reconnect.

Soft Mount: If the server connection is lost while navigating the NFS directory, the system will not stall but data corruption may occur.

Click Connect, the **OMNI 3** will verify the server address and mount a new folder in the top directory of **OMNI 3**. If the connection is a success, Close the NFS Configuration window. Click on the Open File icon to see a new folder called NFS. This is your shared Network folder.

Fig. 14

Auto connect will automatically connect to the server when the unit starts. If this option is enabled the NFS window will also open and show the process details during startup.
It is recommended to back up all NFS data periodically.

NB* Username: 'network' applies for all languages, DO NOT TRANSLATE. Some software versions may translate Network Username: network to selected language translation. 'network' is the username regardless of language and cannot be changed. This applies for both SFTP and NFS connections.

Please see Ash Networking Guide provided on packaged USB for further networking detail.

Front Panel Capture Image:

Here the user can assign a default path location for images captured by the Front Panel Capture button.
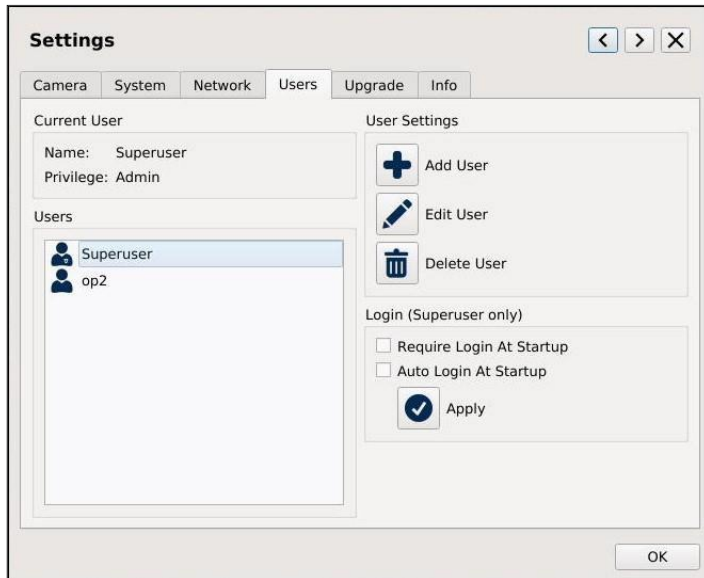
Settings:

4.7 d. Users Settings:

Fig. 15 User Settings

There are 3 levels of access on the **OMNI 3**. **Superuser**, **Admin** and **User**.

Superuser: Complete control of all functions with no restrictions. The Superuser can create, edit, and limit all "Admin" and "User" accounts, see Fig. 16. The Superuser can enable/disable a login requirement at startup.

Note: Once additional accounts are created the Superuser must enable login at startup, this will enable the Login/Logoff feature

There is only one Superuser and this user cannot be deleted.

**N.B. It is important to take note of the Superuser password before you enable login at Startup or if it is changed.
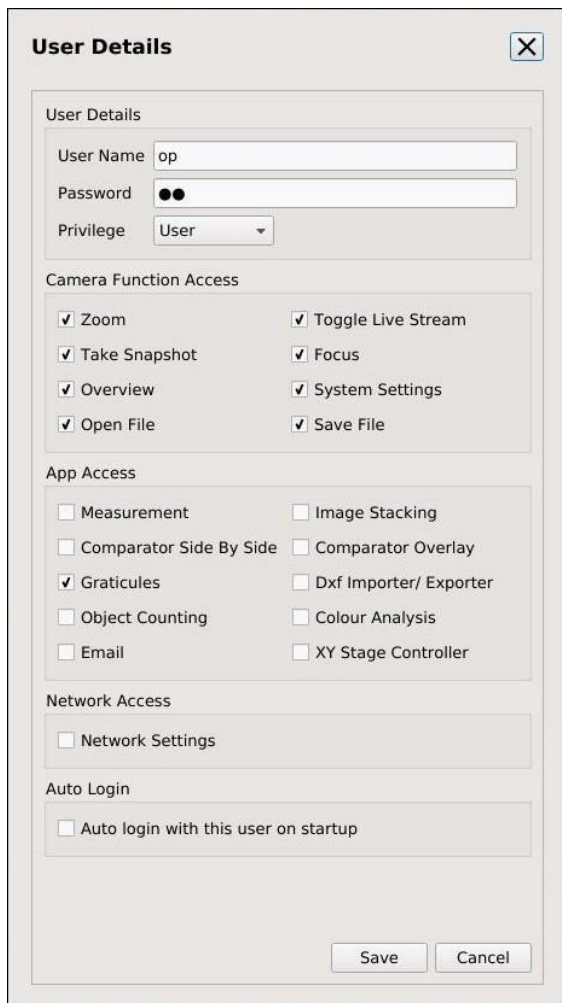
Admin: Admin can create and edit "Admin" and "User" accounts. Set Access to System functions, Apps and Networking for User accounts.

User: The User privileges are set by either the "Admin" or the "Superuser". A User cannot create or edit another account.

⚠️ **Superuser Login** ⚠️

Username: **Superuser**
Password: **password123**
You can view the Superuser password by selecting Superuser and clicking the edit button.

Users Settings Continued:

Fig. 16 User details

Settings:

4.7 e. Upgrade:

To perform a system upgrade, insert a USB Memory Stick containing the upgrade .asu file*. Click on the associated upgrade button to upload the files. Upgrades should be installed individually for System Software, ring light or keypad firmware. (Fig. 17)

*Upgrade files can be obtained from Ash and are included in your standard warranty, which is valid one year from purchase. (see p61 for full warranty policy). Please contact Ash for further details on upgrades.
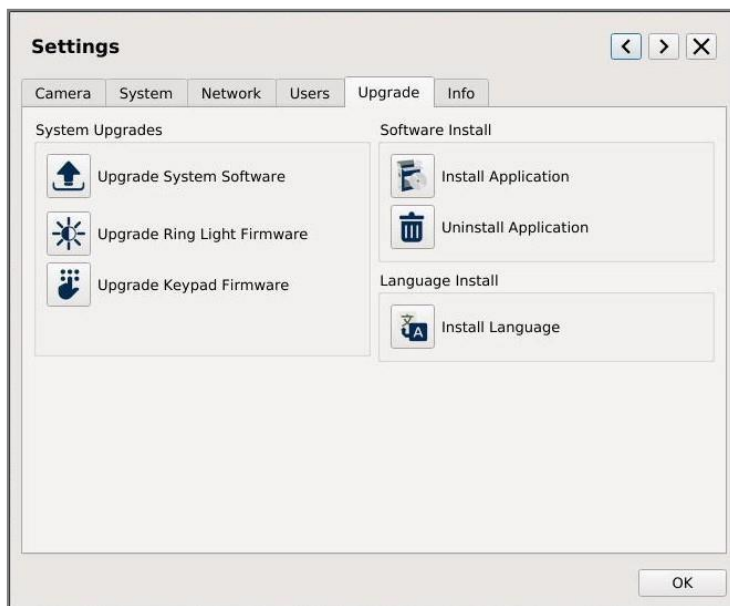
Fig. 17

Application Installer:

To install additional apps, download the provided file to a FAT 32 formatted memory key and insert in the Omni 3. Click on the Install Application icon, navigate to the *.app file on the USB and upgrade. The icon for the new application will be shown at the bottom of the toolbar after a reboot. NOTE: The 'Uninstall' button will remove applications from the **OMNI 3**.

*For information on OMNI 3 Apps and system upgrade files please contact ASH.

System Language:

Additional Language packs may also be installed by clicking the "Install Language" button and selecting the relevant .alf file.

Settings:

4.7 f. Info:
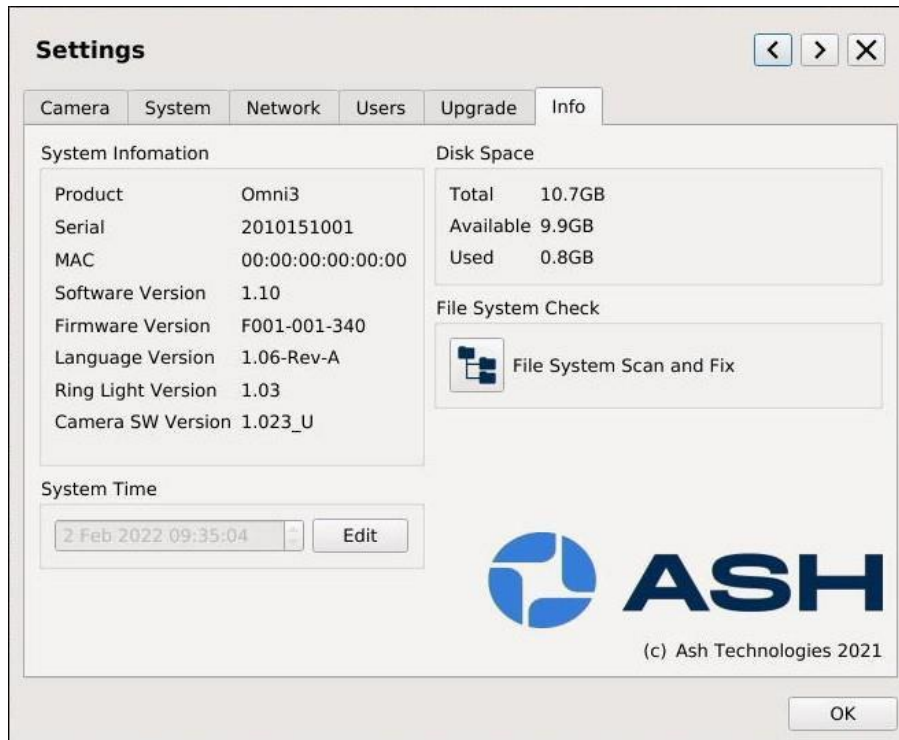
Fig. 18

System Information:

System information shows details of the software, firmware and language versions, serial number, MAC address and Ring Light Version (if attached).

Disk Space:

Disk space displays the total, available and used space on the system.

System Time:

Click the Edit button to change the system time and date to your locality.

File System Check:

The **OMNI 3** provides a File System Check utility that can be used to scan the internal file system for any errors and repair any issues detected.

N.B. Software version, Serial Number and MAC Address should be noted for any Support issues

Section 4.8 Save File:
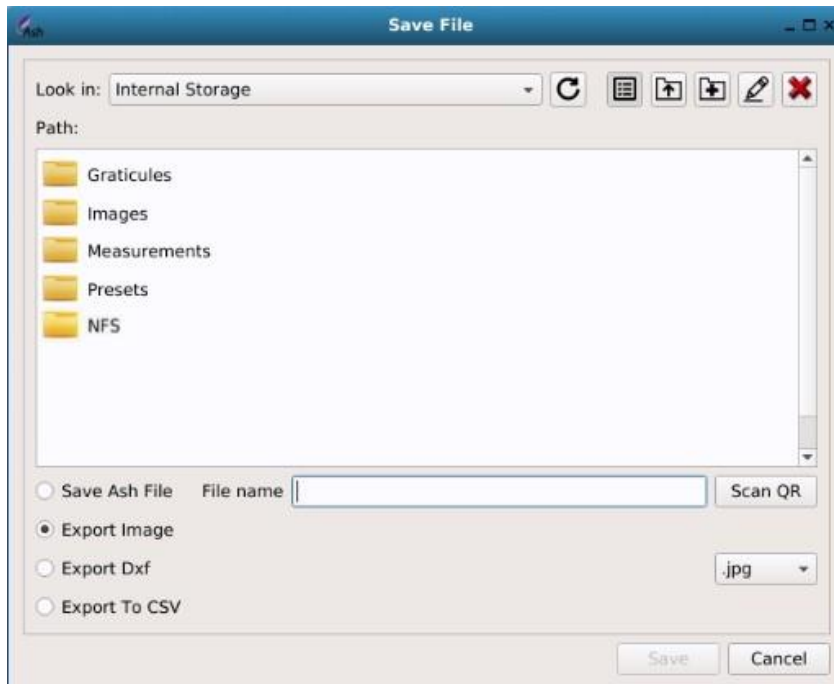
Fig. 19 Save File

⚠️ If using external storage, ensure that the device is formatted to **FAT32**.USB

When saving a file choose to save to Internal Storage, to a USB Key or if a NFS connection has been configured, a NFS folder location on a network.

A file can be saved/exported in the Measurement (.ash), Image (.jpg/.bmp), DXF and .csv formats:

Measurement:

A measurement file is saved as a **.ash** format (Ash Technologies specific format). When the file is reopened on the **OMNI 3** as a measurement, the measurements can then be edited. They cannot be edited when opened via the Graticule function. This file is only recognized by **OMNI 3** units and cannot be opened on a PC. A measurement file holds all specific system settings saved for that measurement.

Image:

An image can be saved as a .bmp or .jpg. Any measurement, text, shapes or grids are saved onto the image and are not editable when the image is reopened. The .bmp and .jpg are standard image formats and can be opened on any computer.

DXF:

When the DXF Import app has been purchased and install, an image can be exported as a DXF, holding true dimensions (provided focus plane was set correctly) and can be imported into a CAD program. An overlay CAD drawing can then be created from this. It is recommended that an edge or well-defined image is used.

Note: It is not possible to directly import back into the **OMNI 3** *DXF importer the exported DXF, as it is exported as polylines and the* **OMNI 3** *cannot process these drawing elements.*

CSV:

On screen measurements can be exported to a .csv format and tabulated into a spreadsheet software package.

Scan QR Function:
When saving/exporting a file, if an in focus QR code is present in the field of view of the camera and 'Scan QR' is clicked the **OMNI 3** will read the code and the file can be saved as the QR code's representation.

Section 4.9: Open File:

To open an image (.bmp/.jpg), or a measurement file(.ash), click on the open file icon. Files can be accessed here from an Internal, USB or network storage location. Folders or files can also be created or deleted. To delete an item, select open file, select the item, and click the red 'X' icon to delete or right-click and select the delete option.

⚠️ **The OMNI 3 will only recognize ASCII filenames. UNICODE file names are not supported.**

Section 5: Apps:

The following section explains the advanced inspection and measurement applications that are configurable to the OMNI 3 platform. Apps can come preinstalled when purchased with the OMNI 3, can be used on a trial basis (app will appear as a lighter blue icon and can be used 30 times) or can be purchased and installed later by the user. Please contact ASH for further details.

Section 5.1: Graticule, Measurement & Annotation Apps (AP 100-001):

5.1 (a) Graticule (Overlay):
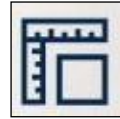
When AP 100-001 is purchased the Graticule and Measurement apps become fully available. The Graticule feature can be used to show an overlay of reference edges or dimensions, giving the operator a Go/No-Go tool for multiple part inspections. A Graticule should be thought of as a 'Graphical Reticule' that a user can customize specific to their needs.

To Create a Graticule:

- Place the sample under the **OMNI 3** and set the focal point. Do this by zooming to full magnification. Manually adjust the height of the **OMNI 3** until the image is in focus. *(*Reference page 13 for how to set the focal point).*

- Adjust the zoom and illumination settings to the required levels.

- Click on the Measurement icon. Use the tools to add dimensions, shapes and text over the images. Click on the Save icon and choose 'Save as File'.

- To open, click on the Graticule icon. When opening this file, the **OMNI 3** will recall any dimensions, shapes, or text that was saved. It will also load the zoom position and illumination settings.

- Samples can now be aligned with the overlay for qualitative analysis.

- Complicated drawings can first be created in CAD (saved as a DXF), imported to the **OMNI 3** (DXF Importer) and then saved as graticules.

Using existing Graticule(s):
- Press the Graticule button and select the required Graticule file.
- Press open and the Graticule will be displayed at the correct magnification.

> ⚠ A Graticule contains the System settings specific to that file and will adjust lens diopter, illumination, magnification etc. when opened. The live view will not revert to current settings.
>
> Use the Graticule function to show an overlay of reference edges or dimensions i.e., as a Go/No-Go tool. The measurement function should be disabled in user level (see *p24*) to prevent unauthorized editing of created Graticule.

Save Merged Graticule Image:

When a Graticule/Preset has been loaded, it is possible to add additional measurements or annotation. Save this detail as a Merged Gratiucle Image (Fig.20) for reference or to make an observation. It can only be exported as an image .jpg/.bmp and **not** as an .ash file. This is to prevent the Overlay/Preset from being accidently overwritten.
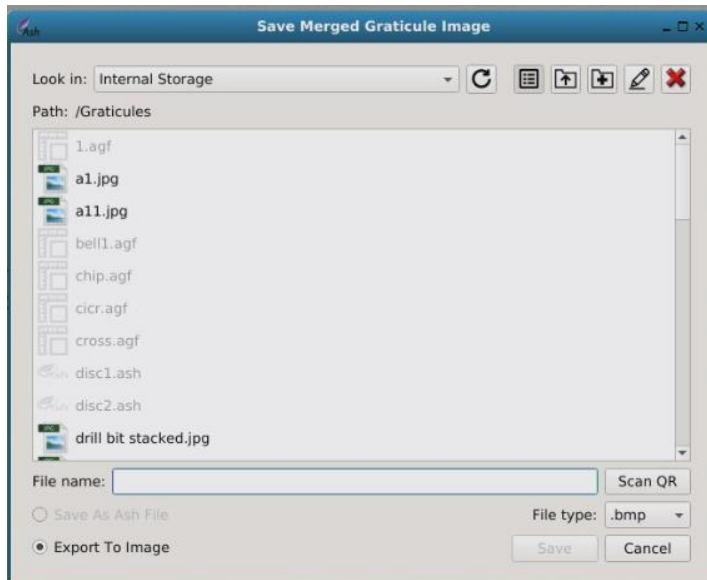

Fig. 20

5.1(b) Measurement Plus & Annotation:

Add Measurements, Objects or Annotations by using the Measurement and Annotation Application. Simply draw shapes, measurements, or text onto a saved or live image, save these drawings and notes along with the image direct to the **OMNI 3** memory or to a USB key.

Measurement Toolbar:

1. 2. 3. 4. 5. 6. 7. 8.   9. 10.   11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21.

Fig. 21(a) Measurement Toolbar

Toolbar Explained: (Fig. 21(a))

1. Measurement Settings
2. Object Properties (allows some basic drawing element length values to be changed)
3. Measurement Table (lists measurements and allows dimension name to be changed if exporting to a .csv file)
4. Height Measurement (additional add-on app to measurement, see Section 5.1(c))
5. Snap to Edge
6. Snap to Node
7. Snap to Line Centre
8. Snap to Grid
9. Restore View
10. Pan Mode (static image move when mouse scroll zoomed)
11. Select Object
12. Move Object Horizontally
13. Move Object Vertically
14. Horizontal Dimension
15. Vertical Dimension
16. Line Dimension
17. Circle Diameter
18. Circle Radius
19. Rectangle Dimension
20. Area Polyline *(**Tip**: Right click when last point is selected to finish area)*
21. Draw Spline (Allows measurement of irregular lengths)

Measurement Toolbar continued:

28. 29. 30. 31. 32.   33.   34. 35. 36. 37. 38. 39. 40.

Fig. 21(b) Measurement Toolbar
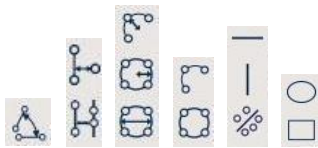
22. 23. 24. 25. 26. 27.

Toolbar Explained: (Fig. 21(b))

22. Draw Angle/Angle Without Origin *(Tip: After drawing angle, double click angle line for outside angle value)*

23. Draw Best Fit Line With Measurement/3 Point Perpendicular Dimension/4 Point Perpendicular Dimension (with parallel guidelines)

24. 3 pt Circle Dimension/3 pt Arc Radius/Best Fit Circle with Radius/Best Fit Circle with Diameter

25. Draw 3 pt Circle/3 pt Arc/Best fit Circle

26. Draw Line/Horizontal Line/Vertical Line/Best Fit Line

27. Draw Circle/Ellipse/Rectangle

28. Text Leader

29. Copy Objects

30. Add Text

31. Edit Text Toolbar

32. Object Colour

33. Line Width

34. Grid On

35. Set Grid Origin

36. Delete Item from Scene

37. Bring Item to Front

38. Send Item to Back

39. Clear All (delete all items)

40. Refresh Screen (clear any drawing artefacts from view)

- *Tip: For Additional functionality Mouse right click>Repeat Last Command/change the Snap mode.*
- *Select an on-screen Best Fit drawing object or polyline area and right click to duplicate existing nodes (this can be done x4), with snap to edge enabled select object and right click again, now select snap all nodes. Doing this achieves best accuracy on an edge measurement.*

Most of the Toolbar icons are self-explanatory; more complex icon features will be explained in the next section.

⬇ Indicates additional dropdown measurement/drawing functions.

Measurement Settings:

When Measurement Settings is selected the Measurement Settings window opens (Fig. 22).
This window not only contains Measurement settings (explained below), but it also gives access to the Snap to Edge, Grid Settings and Single Zoom Level Calibration tabs whose functions will be covered in the next section.
note: Measurement Settings is in a different location to main settings (measurement toolbar icon 1. Fig 21(a))

|	
Line Style:	Selects the type of line to be used.
Unit Type:	Set unit type to be Metric or Imperial.
Precision:	Choose the number of decimal places.
Ash Image Format	Set output format to .bmp or .jpg files.
Antialiasing:	Enable this to smooth line curves.
Show Dim Index:	Enable to show numbered sequence of measurements made.
Show RMS Error:	Enable to Show Root Mean Square Error of a Best Fit Circle (the closer the value is to zero gives an idea how true the circle shape is to a perfect circle).
Show Dim Text:	Allows Dimension Text (value) to shown or not. (useful if a blind measurement is required on a sample)
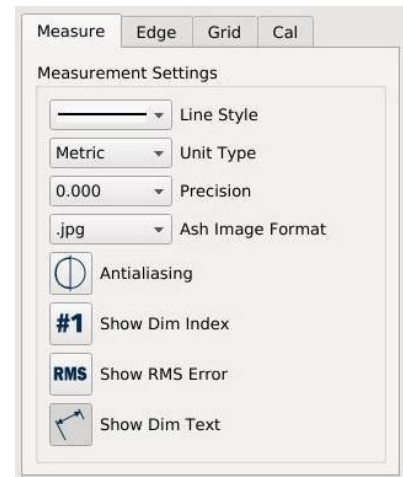
Fig. 22 Measurement Settings

Snap to Edge:

The Snap-to-Edge feature provides an automatic aid for finding object edges.

N.B.** The lighting setup of the system must be optimized so that the highest contrast between the part and light source is obtained, then an accurate sharp edge can be defined by the software. When creating a measurement after Snap-to-Edge has been enabled, just click near the object edge that you wish to measure from, and the Snap-to-Edge feature will automatically snap to the nearest edge.

Depending on lighting conditions, Edge settings may need to be adjusted. To open the Edge settings, click on Measurement Settings and select the Edge tab.

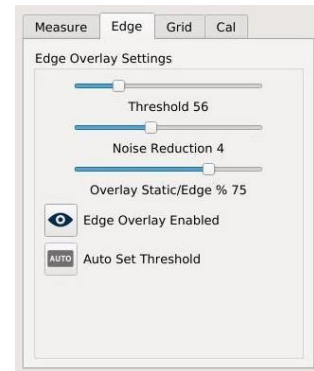The Snap-to-Edge Settings tab will also open when Snap-to-Edge is selected (Measurement Toolbar Icon **5** Fig 21(a)).

Fig. 23 Snap Settings
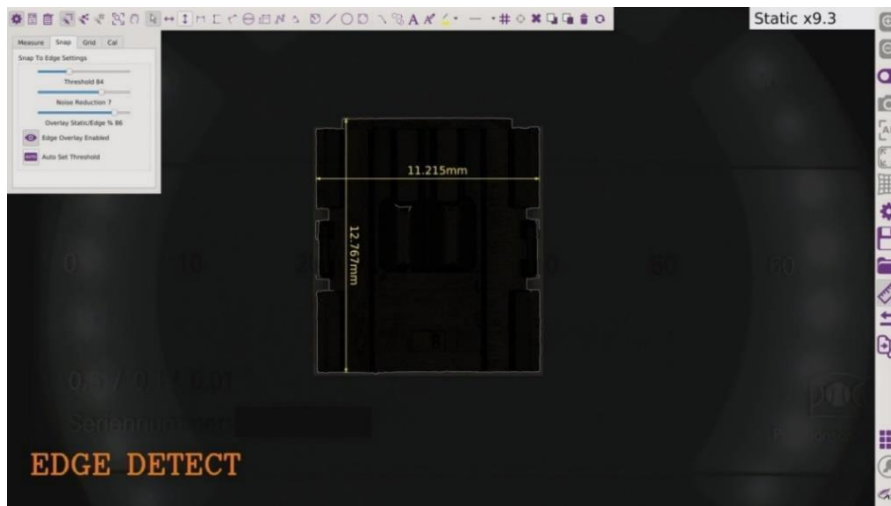
Fig. 24 Snap to Edge

Snap to Edge Settings:

Threshold: The user can set the threshold level using the slider. If the value is set too high the edges will not be detected. If the value is too low, it will produce a noisier image. When Auto Set Threshold is selected the software will use adaptive thresholding to find the best setting.

Noise Reduction: An edge image with low threshold can display noise making it difficult to define a good edge, if noise reduction is increased noise reduces and a good edge image can still be achieved.

Overlay Static/Edge %: Adjust this value to view less or more of the static and edge image overlay. Click Edge Overlay Enabled to On/Off

The following points may help to select the correct settings.
- Increasing the threshold level will result in fewer edges being detected.
- Decreasing the threshold level will result in more edges being generated.

- A high noise reduction level will result in better defined edges if a low threshold is used.

Grid Settings:

Grid Spacing: Sets to a multiple of a unit type. Depending
if the Measurement Settings are set to inches or mm,
the grid will have a spacing of 1mm or 1 inch.

Grid Line: Pixel width of the line.

Grid Colour: Set the grid line colour.

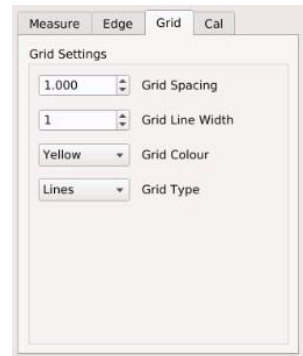**Grid Type:**   Lines or dots.

Fig. 25 Grid Settings

Single Zoom Level Calibration:

The AshCal™ auto-calibration feature removes the need for time-consuming zoom change re-calibrations. Its unique ability to stay in calibration over the entire zoom range is one of the many features that differentiate the **OMNI 3** from other digital inspection systems.

The single zoom calibration feature (Fig. 26) can be used to temporarily override the AshCal feature should the requirement arise e.g. using a non-system calibrated lens or making measurements at lower magnifications.

To do this carry out the following steps:
- Position sample and achieve approx. FOV of measurement required
- Position calibrated ruler under camera with the same approx. sample FOV and fix focal plane.
- Take a snapshot, make a measurement on the ruler across field of view and zoom to measurement edges to fine tune exact position
- Go to Single Zoom Level Calibration Tab (Measurement Settings see fig. 26)
- follow tab procedure i.e.: Click on measurement and change value to actual ruler value to override calibration
- Save as .ash file
- Position sample under camera and set focal plane, load the saved .ash custom cal. file
- Measurements with improved accuracy can now be made.

Custom Cal should appear under the Mag field. All other on-screen or additional measurements will use this calibration, click reset to revert to system calibration or zoom in/out.

This custom calibration .ash measurement file will hold the set calibration values and can be used for future reference/measurements.

Note: to maintain increased accuracy of single zoom calibration, ideally measurements should be carried out in area of FOV where single zoom calibration was set.
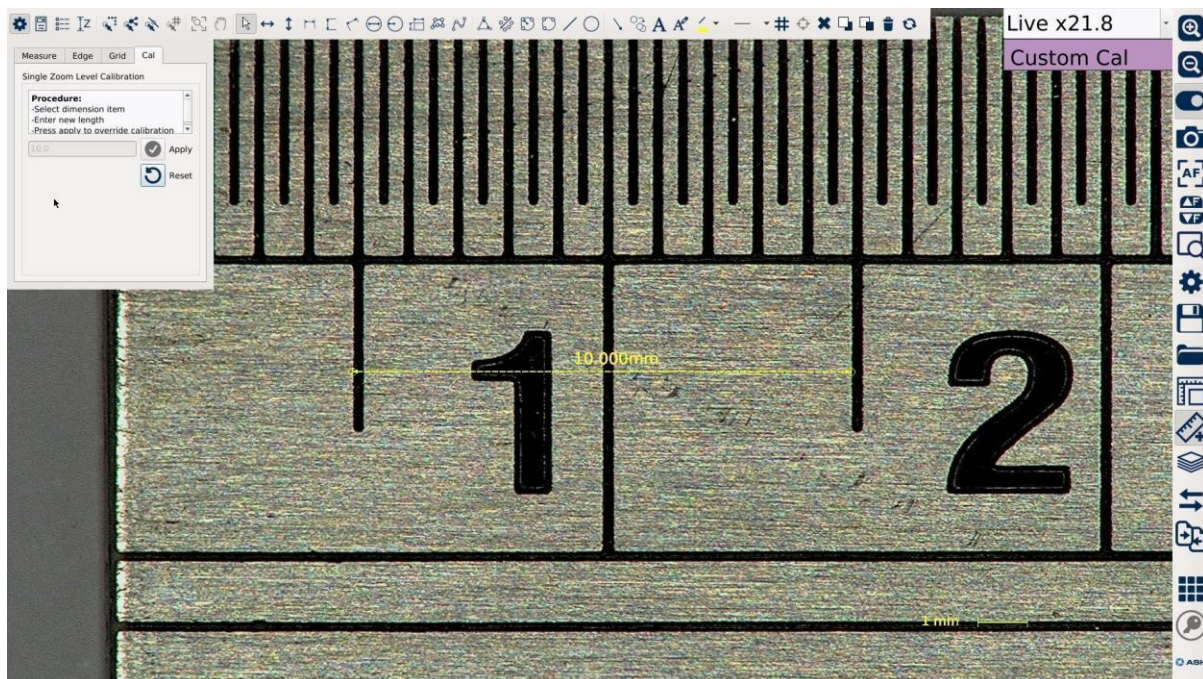

Fig. 26

5.1(c) Z Height Measurement (AP 100-008):

The Measurement App (AP 100-001) is a pre-requisite for the Z Height Measurement App.

The Z Height Measurement App allows the user to make simple 3D measurements in the Z axis. Follow the procedure below to carry out height measurement with ease and efficiency.

Method:

1. Position the part to be measured in the FOV and set the focal height (see Section 3) of the surface plane to be measured as 0.
2. Open the Measurement app and then open the Z Height app (Measurement Toolbar icon **4** Fig 21(a).).
3. The program will automatically zoom to the max. optical zoom and will Auto Focus to the target surface plane. Ensure the target surface is positioned under the spot focus circle (Fig. 27).
4. When focus has been achieved, click the "Set Zero" button to set zero for the selected surface plane.
5. Click the "Reset Zero" button if 0.00mm is not achieved in the Approx. Height field and Set Zero again. Repeat until 0.00mm has been achieved.
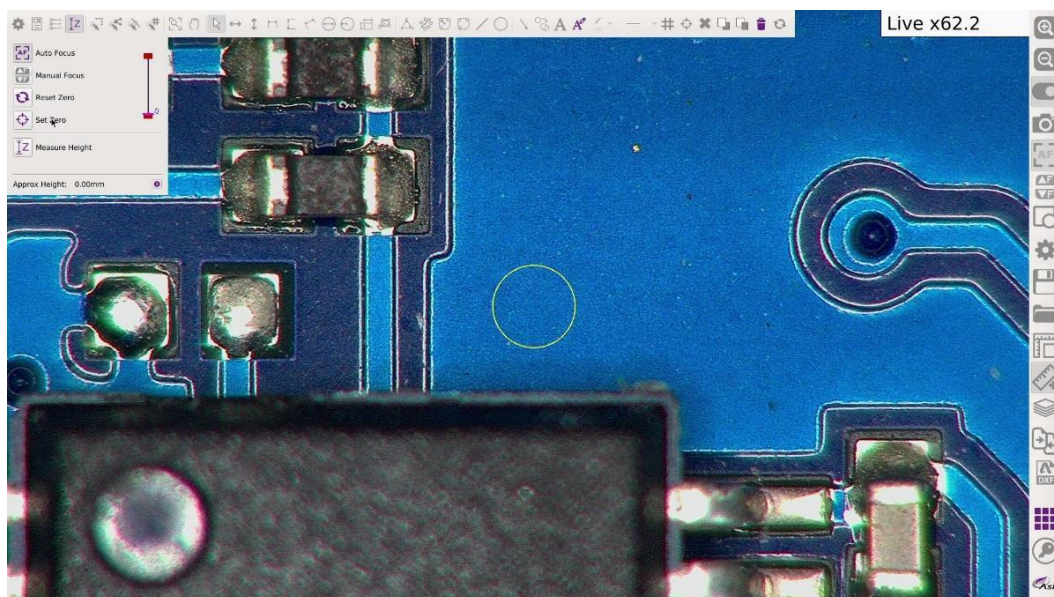
Fig. 27

6. Next move the element of the part that requires height measurement into the centre of the FOV, again ensure the spot focus is positioned on its surface for height measurement. As the camera focuses to this plane an approximate height read-out will be displayed.
7. After the focus has stabilised, a height measurement can now be made.
8. Click the "Measure Height" button. The camera will once again refocus, and an actual measurement will generate and display at the bottom left of the FOV (see Fig. 28)

Z Height Measurement continued:
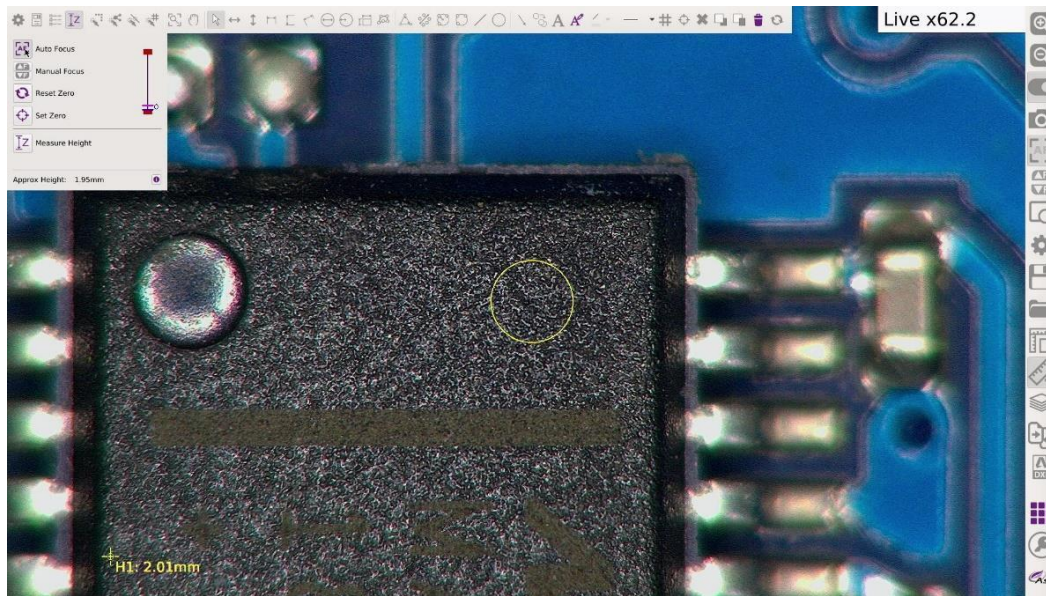
Fig. 28

9. Repeat steps 5-6 for all other height measurements.

10. Exit the program by clicking the Z Height icon again. The camera will return to its last state before Z Height was started.

11. Now the height measurement values can be repositioned beside the measured features if required and can also be given specific names by opening the Measurement Table (Fig. 29) (Measurement Toolbar icon **3** Fig 21(a).). This allows for clear identification on an exported image or export to a .csv file.

Fig. 29

* To carry out a Z depth measurement, the initial focal height of the part should be ideally setup to the lowest point to be measured.

Snap to Node:

Most drawing elements contain nodes, whether it is a line with a node on each end or a 3-point Circle Dim. Drawing nodes can be seen by clicking on the object or by highlighting an object with the selection tool. When **Snap to Node** is selected (Measurement Toolbar icon **6**.) a drawing element can be snapped to the nearest node. This feature can be useful when measuring distances between hole centers etc. (see example Fig. 30)
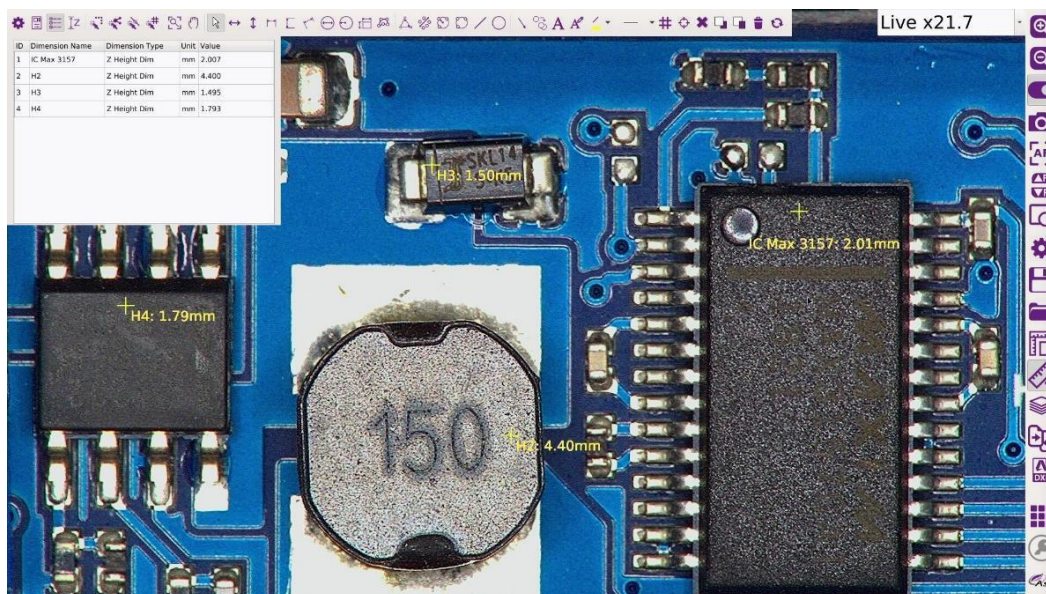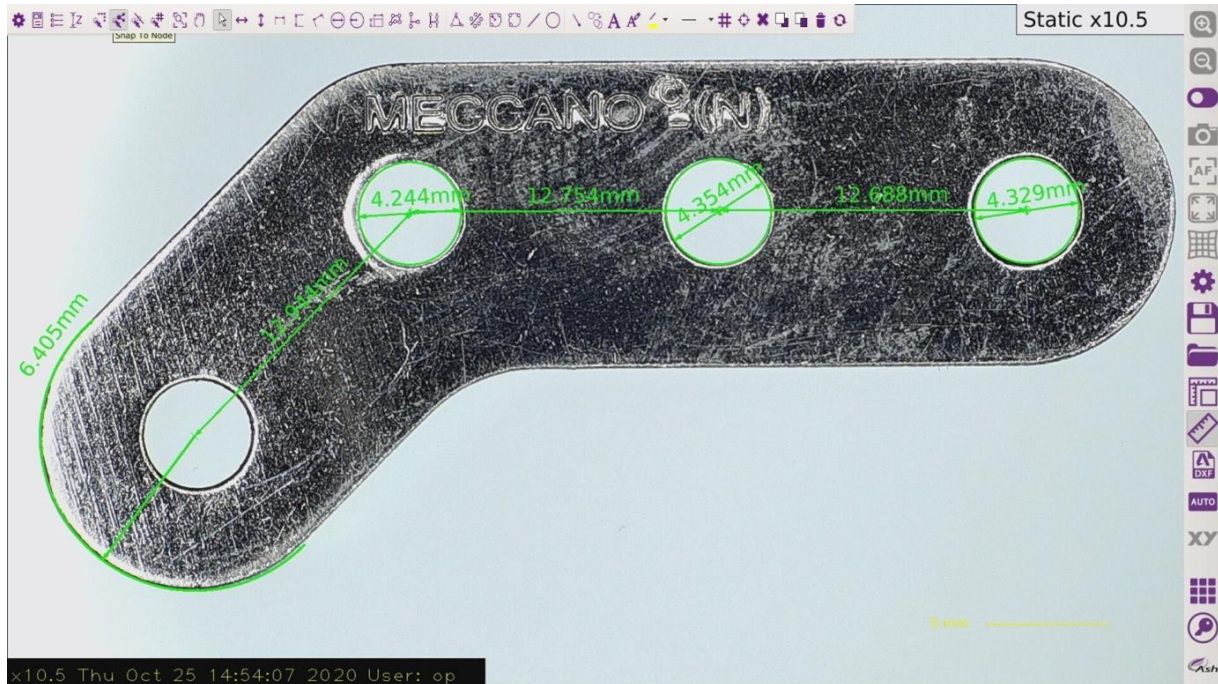

Fig. 30 Snap to Node

Snap to Line Centre:

When Snap to Line Centre is enabled (Measurement Toolbar icon **7**.) any on screen lines display a centre point, allowing easy measurement between corresponding line centres.

Snap to Grid:

Snap to Grid (Measurement Toolbar icon **8**.) is enabled when Grid On has been selected (Measurement Toolbar icon **35**.). Drawing objects will then snap to the nearest grid edge and intersection point.

Restore View:

When a static image has been zoomed in via the mouse scroll wheel, the Restore View button (Measurement Toolbar icon **9**.) will restore the view to the original state when clicked.

Section 5.2: Image Stacking App (AP 100-002):

When viewing an object with different component heights, all parts will not be in focus at the same time (Fig. 31), to overcome this you can switch the focus from auto to manual and move the camera closer or further away from the object. This however does not solve the issue of having all components in focus on the one image at the same time. To do this you can use the Image Stacking function.

Note: When processed, the stacked image will only be viewable as a static image.

Out of focus → ← In focus

Fig. 31

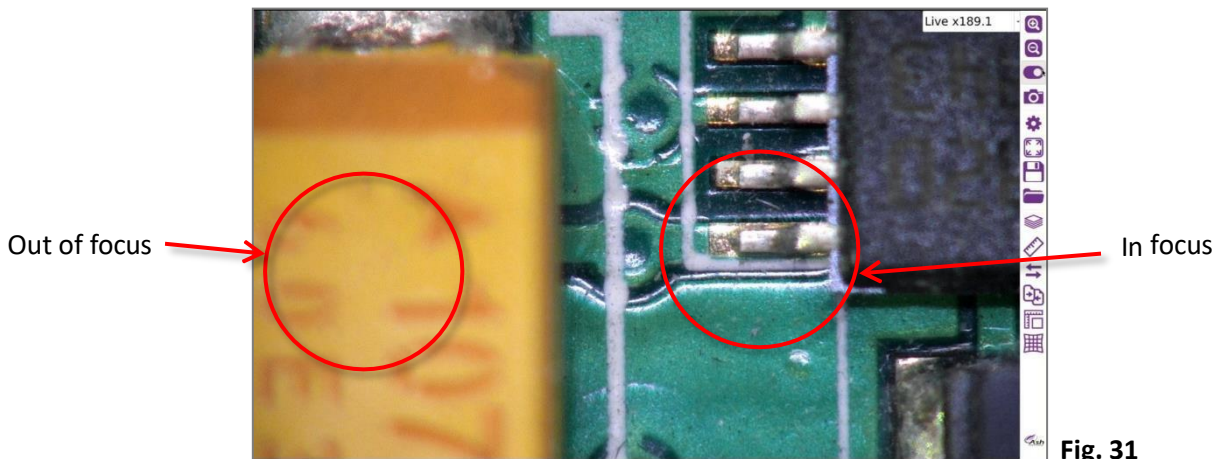## Image Stacking Procedure:

1. Click on the Image Stacking icon. This will display the Extended Focus window (Fig.32). (after a reboot or mag. level change the 'Go To' buttons will be greyed out as the focus points have to be set)

If you wish to extend the range of the focus because of high components, you can check the "**Ignore Focus Limits box**".
Note: this may cause artefacts.
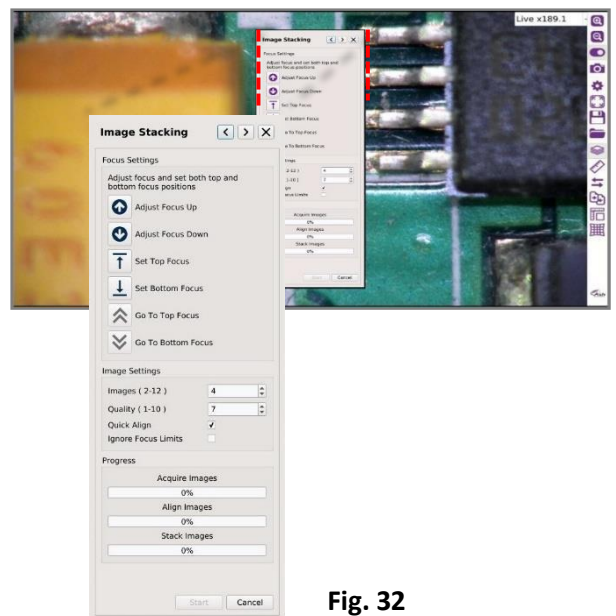
Fig. 32

2. Manually adjust the height of the camera until the bottom of the image is in focus (Fig. 33). This is done by using the height adjustment mechanism on the stand the **OMNI 3** is mounted on. Click Set Bottom Focus and the Go To Bottom Focus button will become active.
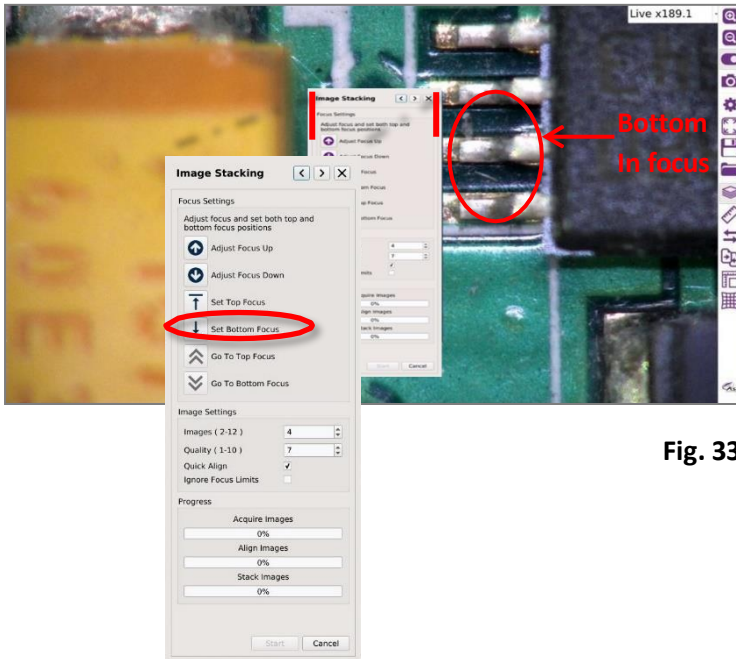
Fig. 33

3. Now bring the top of the sample into focus with the Adjust Focus up and down arrow buttons **(A)**, click on the Set Top Focus button**(B)**, the Go To Top Focus button will then become active (Fig. 34).

When this is done you can press the Go To Top Focus and Go To Bottom Focus buttons to switch between both to double check your focus. Make an adjustment and set again if required.
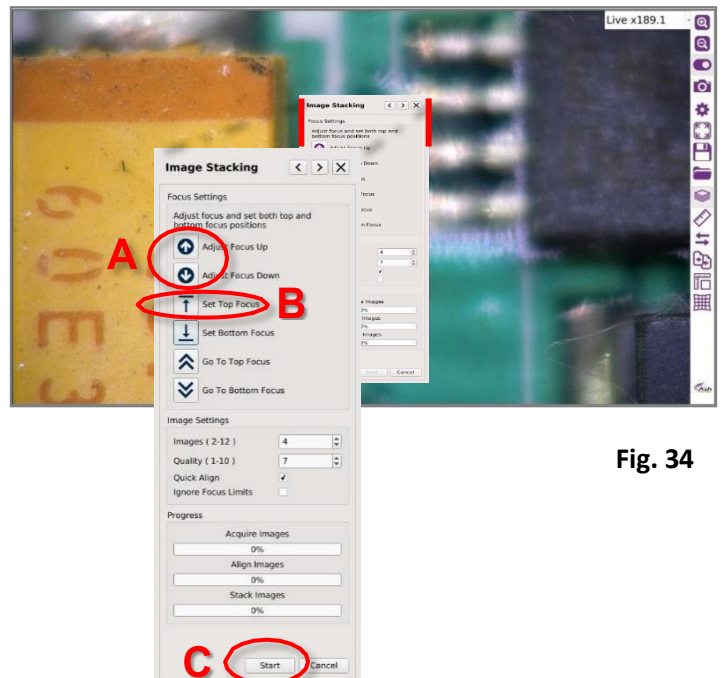
4. When you are satisfied with the settings, click the **Start** button **(C)** and **OMNI 3** will start processing the image.

Fig. 34

5. The processed image will now be displayed in static form with all components (heights) in-focus (Fig.35).
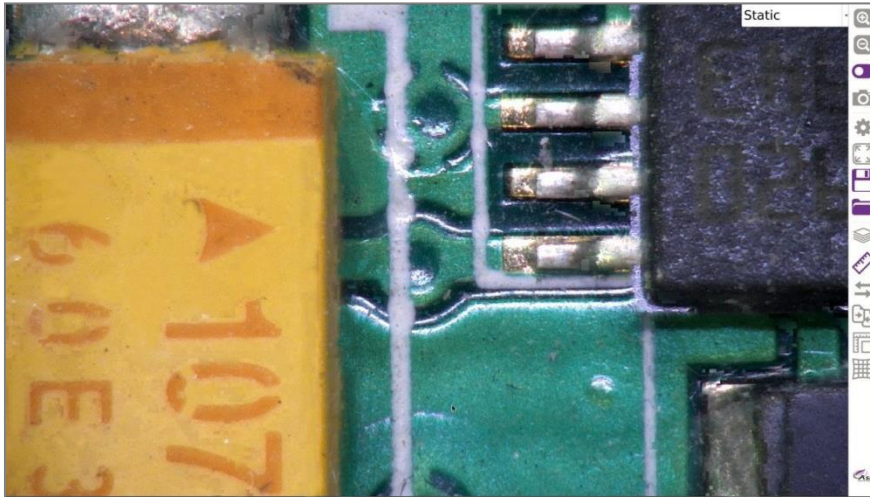
Fig. 35

6. For improved image quality you can increase the number of images taken in the stack and/or you can increase the quality (Fig.36). Doing so will increase the file size of the end image and may also slow the stacking process.
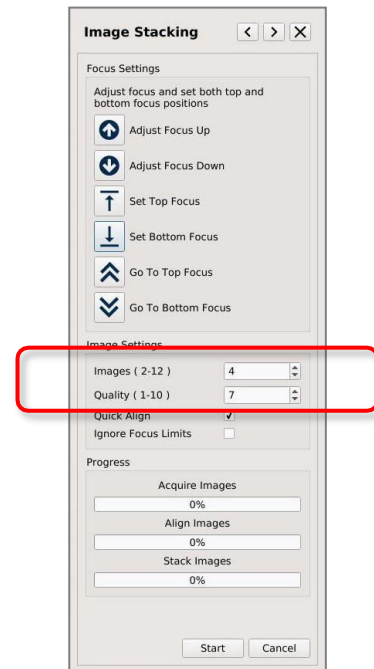
Fig. 36

Section 5.3: Side by Side Image Comparator App (AP 100-004):

The Side-by-Side comparator can be used to compare a live image against a master image by splitting the display vertically with an adjustable position.
The left side of the screen displays the live image, and the right side displays the saved image.
The saved image will almost always be the master image for all other images to be compared to.

Step 1:

Place the part you wish to compare (master) under the camera. Because this is a side-by-side comparison make sure you place it on the right side of the screen (Fig. 37) as the screen will be split in the middle.

Fig. 37

Step 2:

- Save image of sample
- Save as a .ash measurement file also as it will save system lighting and zoom settings should a sample comparison be required at another time.
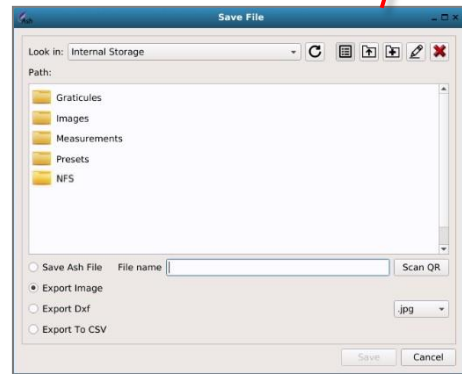
Step 3:

a. Click on the Side by Side Comparator icon (Fig. 38).
b. Open the saved image file
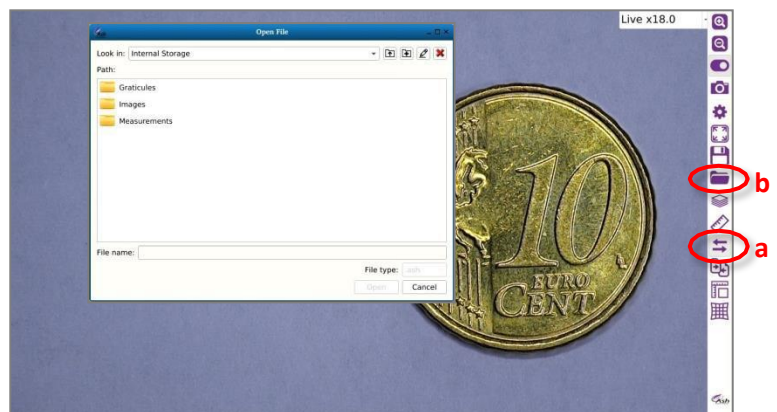
Fig. 38

Step 4:

The saved image will be displayed on the right side of the screen (Fig. 39).

There is also a split line displayed down the middle of the screen.

Fig. 39

Step 5:

Slide the sample for comparison over until it comes into view on the left side of the screen. You can now compare an object in Live View against a previously saved image (Fig. 40).

Step 6:

Fig. 40

The split screen line can be moved to the left or right by clicking and dragging the intersection point of the two lines displayed (Fig. 41).

Fig. 41

Note: Option to mirror and flip live image if required, useful for negative and positive sample comparisons

Section 5.4: Overlay Image Comparator App (AP 100-003):

The Image Overlay Comparator is ideal for comparing multiple parts against an image of a known good part (see below images). Any differences between the two parts will appear to 'flash' as the images are alternated. Below are instructions for using the Image Overlay Comparator to compare two parts. One is the 'test sample part' which will be compared to the 'golden sample part'.
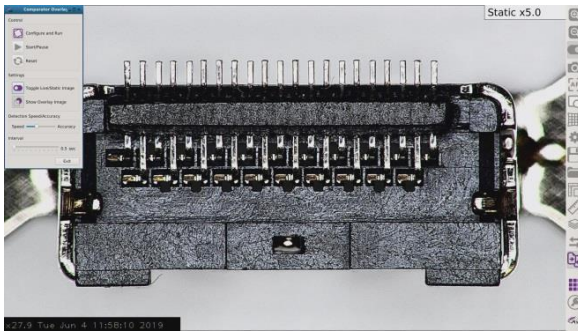
Fig. 42a Golden Sample
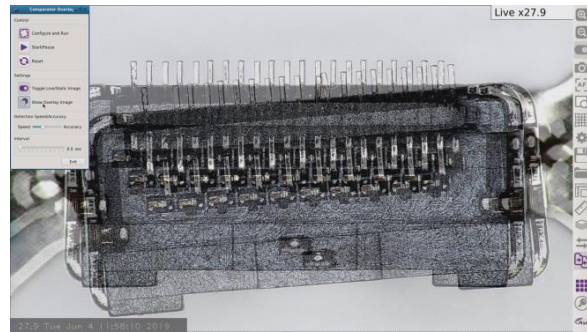
Fig. 42b Golden Sample & Test Sample Overlay
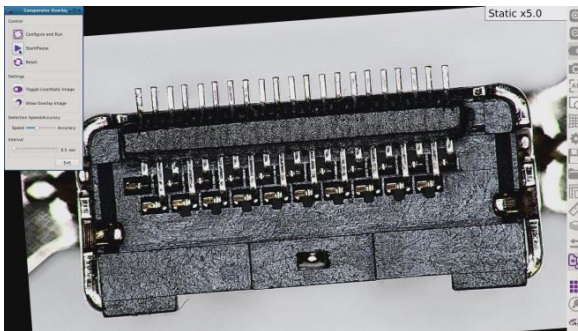
Fig. 42c Golden Sample Skewed
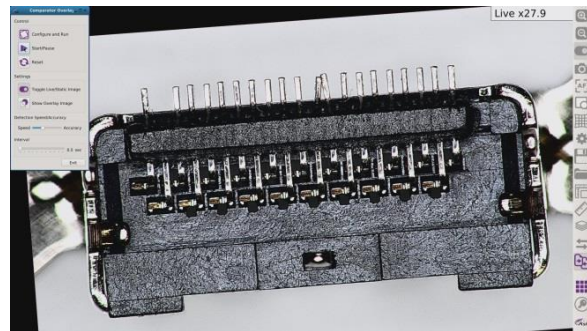
Fig. 42d Test Sample

Method:

1. Place the 'golden sample part' under the **OMNI 3** and set the focal height. Do this by zooming to full magnification. Now adjust the height of the **OMNI 3** until the image is in focus.

2. Adjust the Zoom and Illumination settings to the required levels.

3. To recall these settings for future inspection, save it as an Ash measurement file. Click the save icon and 'Save as Ash File'.

4. Save it as an image for use with the comparator.

5. Open the Comparator App and select and open the 'Golden Sample Part' image (Fig. 42a). An Overlay image (Fig 42b) allows the alignment of both the 'Golden Sample' and the next sample to be compared. Exact alignment is not required as the app can adjust for any misalignment up to 30° rotation or X-Y movement around the FOV.

6. Click the "**Configure and Run"** button and the app will automatically adjust any misalignment to allow for accurate comparison (Fig. 42c and 42d). The speed of the comparison can be adjusted from the default of 0.5 sec to 3 sec via the Interval Slider.

7. Pause the App and insert the next sample into the approximate position (click Show Overlay Image if you wish to align to 'golden sample') and then click Configure and Run to compare. If the Detection Speed/Accuracy slider is moved from left to right, the speed of detection will increase. However, if speed of detection is increased, then match detection accuracy is reduced and may result in an Auto Alignment failure message reading: 'Could not find any matches between images'. If this occurs, simply drag back the slider and restart the process until the software can make a match. The Reset button will reset any adjustment made between live and static images.

8. Click on the Exit button to exit the application.

NB: sample requires detail for comparator to work correctly i.e. a simple outline profile of a sample may not be suitable. Best suited for pcb, counterfeiting and forensics applications.

Section 5.5: DXF Import App (AP 100-004):

Overview:

The DXF Import App allows standard DXF (Drawing Exchange Format) files to be imported to the **OMNI 3** Inspection Unit. This allows existing CAD drawings to be used to create graticules/overlays or automatic measurement templates using the full functionality of programs, such as AutoCad, QCAD and so forth.

During import, the OMNI 3 unit automatically positions and scales the input CAD vectors and sets the Camera magnification to give the optimum field of view for the object being inspected. The imported vectors (drawings items) can then be edited and saved as a graticule/overlay.

Fig. 43: DXF Import Dialog

Step One: Preparing cad (.DXF) file:

- Use a CAD (Computer Aided Design) program such as AutoCad, QCad or similar to prepare your drawings. It must be capable of outputting files in .DXF format.
- Draw the object to be imported or use an existing drawing at a scale of 1:1.
- For best results the .DXF drawing should only contain the object being imported (e.g. one part per .DXF file).
- **Splines, ellipse** and **leader dims** are not yet supported so they will need to be exploded to primitive items (e.g. arcs, lines and circles).
- Multiline text is not yet supported so ensure all text is single line/simple text.
- Set all text alignment values to bottom-left.
- When importing vector images there is a limit of 1500 vector items for performance purposes. If the .DXF file contains more vector items than the limit the file will be imported as an image by default.
- Set all CAD drawing items colour to "By Object" as "By Layer" is not yet supported.
- Once you are finished preparing your drawings, save the drawing file in .DXF format to a USB key for insertion to the **OMNI 3** unit.

Step Two: Importing DXF file onto the OMNI 3 system:

- Open the DXF Import App from the **OMNI 3'**s main toolbar (when installed).
- Use the file browser in the 'File Input' section to select the .DXF file to import.
- Click on the import �ö 🔒 icon if some further editing is needed or choose the 'Import as Image' option and adjust the border percentage if required (See below). Click on the import icon.

Import Options:

- **Import as image** - With this option enabled drawing items are painted to an image at import time instead of added as vectors to the **OMNI 3'**s measurement system. This is useful if the input .DXF file has many vector items which may impact performance. The resulting image is displayed on the screen. The painted items cannot be edited but they can be added to and the result can be saved as a graticule/overlay file.
- **Auto calculate mag value** is selected by default, deselect and a custom mag can be set on import.
- **Border Percentages** - Allows more space to be left around the item after import. This has the effect of reducing the magnification of the **OMNI 3** system at import time.

Step Three: After Importing:

After importing a DXF file, the drawing is visible on the screen, positioned and scaled correctly. The **OMNI 3** system's magnification is set to an optimal value and the imported vectors/image can be edited and used to create a graticule by clicking on the save icon and saving as a measurement '.ash' file.

*Tip: If imported .dxf appears off centre in **OMNI 3**, edit in CAD and draw box around object. This should centre object more precisely when imported back into **OMNI 3**.*

Section 5.6: Object Counting App:

The Object Counting App allows the user to automatically identify and count the number of objects within your region of interest. Increase efficiency by 70% whilst eliminating human error. Significantly reduce the time spent manually counting parts while reducing costly overheads. Report generation is quick and simple for easy documentation and traceability.

The Object Counting App works by using a colour identification algorithm and therefore relies on a sample being setup with good colour definition and separation between objects.

Method:

1. Place the parts to be counted under the **OMNI 3**and set the focal length. Do this by zooming to full magnification. Now adjust the height of the **OMNI 3** until the parts are in focus.

2. Adjust the Zoom, Illumination and camera settings to the required levels giving good colour definition on the samples.

3. To recall these settings for future counts, save it as an .Ash measurement file. Click the save icon and 'Save as Ash File'.
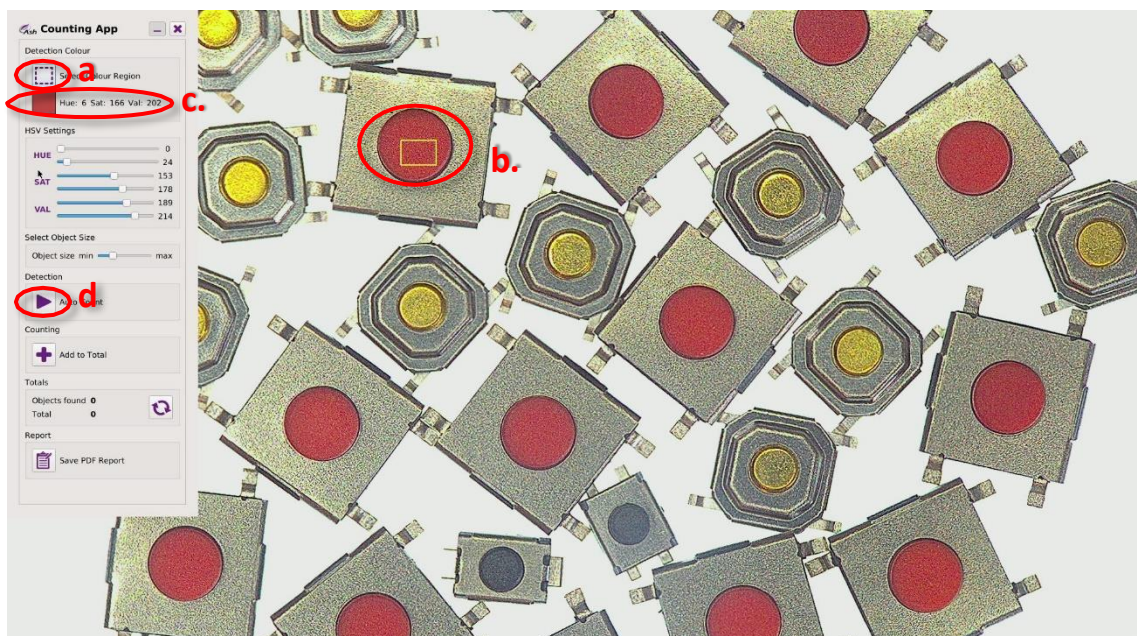
Fig. 44: Object Counting Colour region selection

5. Open the Object Counting App from the main toolbar (or Extended toolbar if not added to main toolbar). Click the Select Colour Region button (Fig 44a.) and drag an area over the object to be counted (b.). The selected colour will display with the calculated avg. HSV value (c.).
6. Next click the Auto Count button (Fig 44d.), the program will process and count the objects containing the colour that was selected in point 5.

7. Observe counted objects and minimize menu to check status of objects under it. If count is valid, click Add to Total button and Save as PDF Report if required. If a cumulative count is required,

position the next batch of objects to be counted, click Auto Count and Add to Total. Repeat this process until a final count has been reached. All added counts will be saved to the PDF as individual image counts for increased traceability.
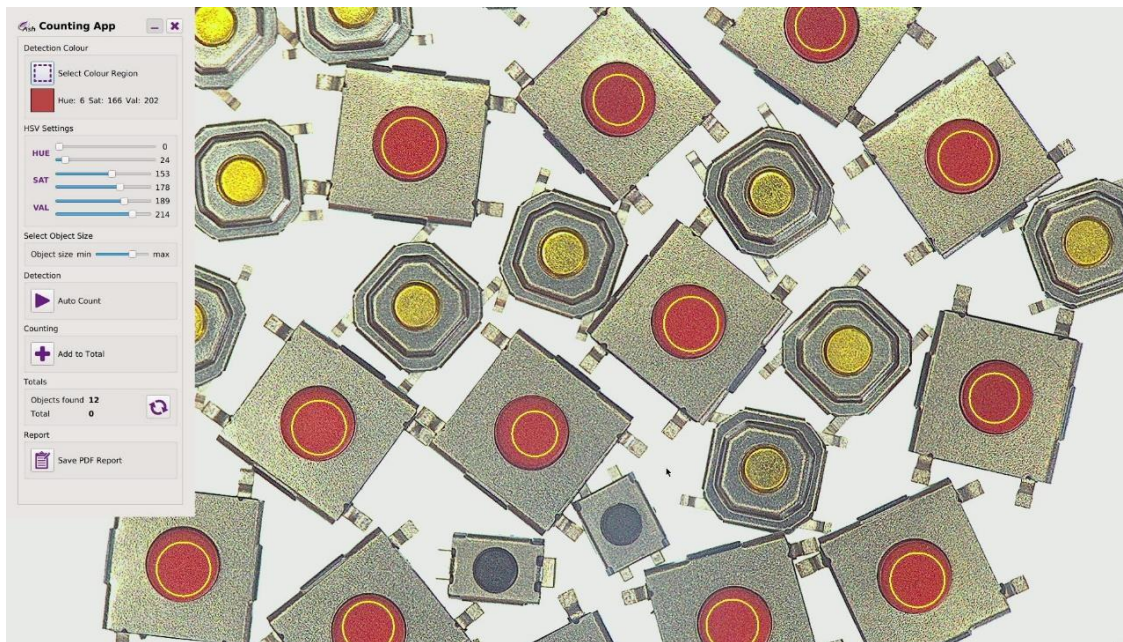
Fig. 45: Counted objects

7. If an object deemed not to be part of the count has been counted, mouse left click on the circle to remove it from the count or if an object has not been counted, mouse left click on the object to add it to the count.

For Reference:

HSV Settings: Sliders can be adjusted to fine tune a selected colour if a miscount has occurred or if some objects have not been detected.

Object size: This slider can be adjusted to add or subtract larger/smaller objects from a count that may have a similar colour to the objects of interest that require counting. Adjust and start Auto Count again to observe effect of slider change.

Refresh: Click the Refresh icon to clear any counts.

Section 5.7: Colour Analysis App:

Advanced algorithms automatically calculate the colour value of any sample. Identify contaminants, subtle process changes or foreign objects within your sample. Eliminate human error and improve yield by up to 50%.

To use the Colour Analysis App the following steps should be followed:

1. Place the sample for analysis under the **OMNI 3** and set the focal length. Do this by zooming to full magnification. Now adjust the height of the **OMNI 3** until the sample is in focus.

2. Adjust the zoom, illumination and camera settings to the required levels giving good colour definition on the sample.

3. **To recall these settings for future analysis**, save it as an Ash measurement file. Click the save icon and 'Save as Ash File'.

4. Save an image file as a reference for future analysis comparison. (A referenced image file can be reloaded and the average colour can be taken from this image. Switch to live mode to make analysis on live sample).

5. With the reference sample still in position, open the Colour Analysis app. Click the Update Average button (Fig. 46(a)). The program will calculate the average colour of the sample and the Test button will become active (Fig. 46(b)). Set percentage % tolerances or limits as required.

Fig. 46 (a)   **Fig. 46 (b)**

6. Next, position the live sample for analysis and click the "Test" button to get a result (Fig. 47). A Pass or Fail will result depending on the tolerances that are set.

Fig. 47

Section 5.8: Email:

All captured and edited images can be Emailed via the **OMNI 3**'s Email application (Fig. 48).

Sending mail is done via Google gmail servers. A google **Gmail** account is required before you can send mail from the **OMNI 3**.

The **OMNI 3** Email works just like any other standard email application. Enter the main recipient, Carbon Copy recipients and Email suject. Files can also be attached.

You will need to adjust your Gmail account settings to **allow access for less secure apps.**
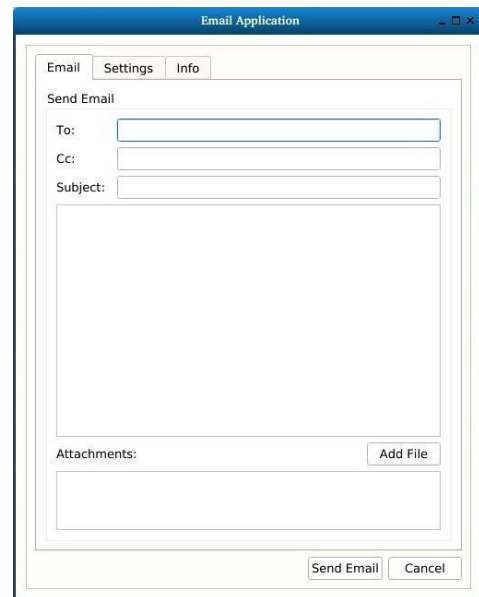
Fig. 48

Email Settings:

Sender:	Name of Sender.
Username:	Username of Gmail account.
Password:	Password on Gmail account
SMTP server:	Not editable.
Port:	Not editable.
SSL:	Not editable.
Use authentication:	Not editable
Remember Settings:	Saves the current settings.

Test Internet Connection:	Test Internet connectivity
Email Sever:	Tests the email server.

Email Settings Fig. 49

* The info tab shows the Email app software version number.

Section 5.7: XY Stage Controller:
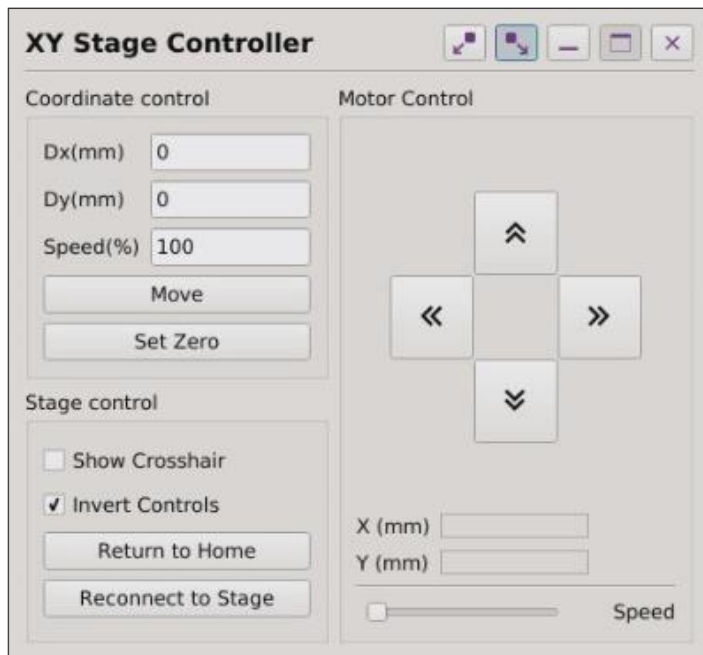
Fig. 50

The XY Stage Controller menu (Fig. 50) is used to communicate with the optional Motorized XY Stage (AI 100-050). Please refer to the XY Stage manual for setup and connection. When used in conjunction with the Measurement and Graticule apps the specific XY location of sample measurements can be stored and recalled specific to that measurement file.

Coordinate control:

Dx(mm)	Each press of the Move button will change the X axis by this value.
Dy(mm)	Each press of the Move button will change the Y axis by this value.
Speed(%)	Controls the speed of the move command.
Move	The stage will move by the amounts entered for Dx and Dy.
Set Zero	Reset the current position to 0,0.

Stage control:

Show crosshair	Shows a cross hair on screen.
Invert Controls	Inverts the movement of both axis.
Return To Home	Moves the bottom-left of the table into the center of the screen (0,0).
Reconnect to Stage	Re-establishes lost communication between the **OMNI 3** and stage

Motor Control:

X(mm)	current distance from 0 on the X axis.
Y(mm)	current distance from 0 on the Y axis.
Speed	The speed the stage will move when using the up, down, left and right arrow buttons.

Section 6: Presets:

A preset can be customised to hold specific system settings and measurement detail.
Up to 5 presets can be added.

- If using the preset function, first enable the Show Preset Toolbar function *(*refer to Settings page 20).*
- Presets 1-5 will then be selectable at the bottom right of screen if previously assigned. (Fig.51)
- Each Preset can be selected by clicking on the number of the Preset on the toolbar, or alternatively by pressing the corresponding button on the Optional Accessory External Keypad *(KPII). External Keypad KPII (FI806-002) - Optional extra for use with preset function. Useful to improve workflow speed and for user access control.*

   *NOTE: Show Preset Toolbar must be enabled when creating and saving a Preset.

Creating A New Preset:

5 sample Presets are supplied with the unit in the Presets directory. They can be updated as follows:

- Make necessary system adjustments, such as illumination, magnification etc.
- Select measurement and add new measurement detail if required (dimensions, text, etc.). You can then save these changes as an .ash file in the Preset folder (Fig. 52)

   Note: This file must be called **preset1.ash** through to **preset5.ash,** corresponding to each preset number. If the saved file does not have the exact name, it will not apply as a preset.

- When creating an additional preset: make system adjustments if required, select measurement, clear all and add new measurement detail. Then "Save As Ash File" as corresponding preset.
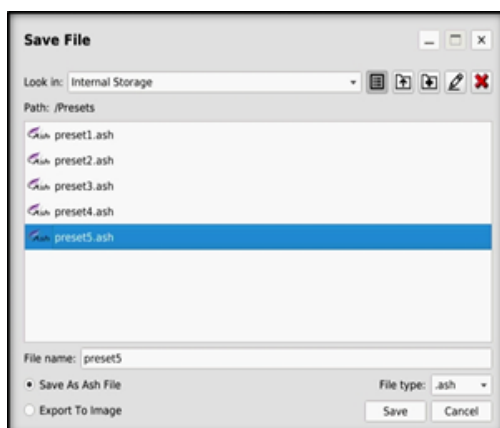

Fig. 51

Fig. 52

Section 7: Measurement Accuracy:

The accuracy of a measurement is specified as ±1% within the working range of each calibrated lens. The recommended approx. working-range of each lens is shown in green in the table below (Fig. 53) (magnification values refer to a 24" monitor). The min and max horizontal FOV for measurements are shown in bold (this table should be used as a guide when deciding what lens to use for a particular sample/application). The internal temperature of the **OMNI 3** also influences the measurement, and it is recommended to give 30mins for the **OMNI 3** to reach a stable internal temperature. Although the **OMNI 3** uses temperature compensation algorithms to adjust the measurement values to achieve ±1% accuracy, it should be noted that measurements of the same object may show small differences when measured at different temperatures. These differences are still within the specified ±1% accuracy.

The maximum length that can be measured accurately with the +5 lens is 44mm horizontal. It is recommended to use a Graticule or Single Zoom Calibration (see p38) if an item larger than 50mm is to be used.
* See Graticule Section 5.1.

Magnification	X12	X20	X55	X115	X125	X140	X170	X200	X270	X380	X670	X1322
+5 Lens (FOV)				44.5mm to 3.75mm								
Plan1x (FOV)				26mm to 1.9mm								
+25 Lens (FOV)					5.4mm to 0.75mm							
+50 (FOV)					2.0mm to 0.38mm							

Fig. 53 Lens Working Range

Below is a reference table which shows a difference of 1% on some standard measurements.

Measurement(mm)	0.1	0.5	0.8	1	1.5	2	5	10	15	20	30
1% Difference(mm)	0.001	0.005	0.008	0.01	0.015	0.02	0.05	0.1	0.15	0.2	0.3

Fig. 54 Measurement % difference

It is recommended to use the centre 1/3 of the screen when making measurements at lower magnifications.

Technical Specifications:

Zoom Range (with supplied +5 Lens)	2.5x - 68x (Optical) 69d – 136.5d (Digital)		
Camera Resolution	1920 x 1080 Resolution	50/60 fps	30x Optical, 2x Digital
Monitor Connections	HDMI / DVI		
Monitor Requirements	HD Ready or Full HD (recommended)		
Input / Output	- HDMI Output - USB 2.0 Port x 4 - RJ45 Ethernet Connector (for networking) - General Purpose IO Port x 3 - DC Power Jack (24V)		
Image Capture	- Internal Image Storage - Removable USB Image Storage - USB On the Go (PC Connectivity)		
Power	24W		
Dimensions	216mm x 125mm x 136mm		
Weight	1.75Kg		
Operating Temperature	Storage: -10C to +60C Operating: +5C to +40C		
Input Voltage	90~264VAC, 50/60hz		
Humidity	20%RH to 80%RH (no condensation)		

As we strive to constantly improve our products, this information is subject to change without notice.

> ⚠️ Never look directly at the LED light source for a prolonged period.

Camera Lens and Accuracy Specifications:

Camera Specifications

	Lens Type	+5	+10 Plan 1x	+25	+50
Optical	Magnification Range (X)	2.5 - 68	4.8 - 136	54.7 - 336	109.4 – 673
	X-axis FOV (mm)	200 - 7.5	76 - 3.8	9.3 - 1.5	4.6 - 0.76
	Y-axis FOV (mm)	112 - 4.2	59.5 - 2.1	5.4 - 0.85	2.6- 0.43
Digital	Magnification Range (X)	69d - 136.5d	137d - 272d	337d - 673.3d	674d – 1346d
	X-axis FOV (mm)	7.5 x 3.75	3.8 x 1.9	1.5 x 0.75	0.76 – 0.37
	Y-axis FOV (mm)	4.2 x 2.1	2.1 x 1.1	0.85 x 0.425	0.43 – 0.22
	Working Distance (mm)	195	78	45	34
	Depth of Field (mm)	80 (min. zoom) / 0.5 (max. optical)	35 (min. zoom) / 0.1 (max. optical)	0.3 (min. zoom) / 0.1(max. optical)	0.1 (min. zoom) / 0.05 (max. optical)
	Video Latency (milli seconds)	20/17	20/17	20/17	20/17

2-D Measurement Accuracy

Lens Type	+5	+10 Plan 1x	+25	+50
Accuracy (%)	+/- 1	+/- 1	+/- 1	+/- 1

Z Height Range & Accuracy

Lens Type	Range	Accuracy
+5	0 - 25mm	100 µm
+10 Plan 1x	0 - 6mm	100 µm

* Specifications obtained using a 24" Monitor.
* Depth of Field measured with optimal image setting.

Declaration of Conformity:

We, **Ash Technologies Ltd.,** declare under our sole responsibility that this product **OMNI 3**, of the brand **Ash Technologies** to which this declaration relates, is in conformity with the following standards or other normative documents:

BS EN 60601-1-2:2015 Medical Electrical Equipment – Electromagnetic Compatibility.

Classification: Residential

Following the provisions of EMC directive 2004/108/EC.

Signed, for and on behalf of Ash Technologies Ltd,

Martin Cahill,

Naas, Ireland.

June 2016.

Warranty:

Ash Technologies warrants the equipment, when purchased new, to be free from defects in material and workmanship and will repair or replace at Ash Technologies' discretion, any equipment which exhibits such defects; provided that the equipment has been operated under the proper conditions of installation and has not been tampered with by any persons not authorised by Ash Technologies or its agents and that it is solely serviced by Ash Technologies or its agents.

In no event shall Ash Technologies or its agents be liable for special, indirect, incidental or consequential damages; the original user's remedies being limited to repair or replacement. This warranty is valid only when serviced in the country of original purchase.

Ash Technologies makes no other or further warranty, express or implied, including and warranty of fitness for a specific purpose or warranty of merchantability.

This warranty is valid for a period of
12 Months
Effective from the date of delivery.

For warranty claims or service during or after warranty period please contact your distributor.

⚠ General Safety

- Indoor use only
- Exercise caution when lifting, handling, or moving the **OMNI 3**.
- Exercise caution when installing or removing accessories, ensuring a central and stable body position, thus preventing any possible strains or injury.
- Ensure all screws and fixings are properly secured.
- Disconnect all power sources prior to moving or working on equipment.
- Do not stare at operating lights as it may be harmful to the eyes.

⚡ Electrical Safety

To prevent electrical shock or accidental short circuits leading to component damage, follow the points outlined below.

- Ensure proper grounding of AC adapters.
- Do not operate with open housing, both from a safety and warranty perspective (there are no user-serviceable parts or fuses in the system).
- Do not operate in environments of excessive humidity and keep away from liquids.
- Operate away from metal filings and similar debris.
- Should any power cords become damaged, switch off, disconnect, and replace before using the unit again.
- Do not position the equipment so that it is difficult to operate the disconnecting device, mains plug in this case.
- Please be aware of protection impairment if used in a manner not specified by the manufacturer.

End User Licence Agreement – Ash Technologies Ltd. 2016

This End User Software Licence Agreement (the "**EULA**") is a contract between the user of the Software (the "**End User**") and Ash Technologies Limited (the "**Licensor**"), a company incorporated in Ireland under registration number 220749 whose principal place registered office is at B5, M7 Business Park, Naas, Co Kildare, Ireland. The Licensor and the End User together shall be referred to as the "**Parties**" and individually shall be referred to as a "**Party**".

Please read this EULA carefully. The Software is provided to you pre-installed on your Ash Product. By purchasing and using the Ash Product, the End User accepts all of the terms and conditions set out in this EULA. If the End User does not wish to be legally bound by the terms and conditions of this EULA, do not use the Ash Product.

The Parties agree as follows:

1. Definitions

1.1 *Definitions.* Unless otherwise provided in the main body of this EULA, capitalised terms shall have the meaning given to them in the attached Exhibit A, which forms part of this EULA as if set out here.

2. Licence

2.1 *Licence.* In consideration of your purchase of the Ash Product and subject to the provisions of this EULA, the Licensor grants to the End User a non-transferable, non-sub-licensable, and non-exclusive licence to use, solely with the Ash Product and solely in object code form, the Software.

2.2 *Reservation of rights.* Except for the licence explicitly granted by Clause 2.1, the Licensor reserves all its rights. The End User acknowledges and agrees that the End User is licensed to use the Software only in accordance with the express provisions of this EULA and not further or otherwise.

2.3 *No support, etc.* Unless otherwise agreed by the Parties in writing, the Licensor shall have no obligation to upgrade, update, bug-fix, to provide support or maintenance services, or to provide assistance or consultancy services in relation to the Software.

3. Use, etc.

3.1 *Restrictions.* Except to the extent permitted by applicable mandatory law, the End User shall not: (a) copy or reproduce the Software; (b) merge the Software with any other software; (c) translate, adapt, vary, or modify the Software; or (d) disassemble, decompile, or reverse engineer the Software, or otherwise attempt to derive the source code of the Software.

3.2 *Further restrictions.* The End User shall not: (a) provide, disclose, demonstrate, or otherwise make available the Software to any third party; or (b) use the Software to provide any services or training for any third party; or (c) sell, lease, rent, transfer, hire-out, license, sub-license, assign, distribute, publish, charge, pledge, encumber, commercially exploit, or otherwise deal with the Software (including by selling the Ash Product), or have any software written or developed that is based on or derived from the Software.

3.3 *Obligations.* The End User shall at all times: (a) effect and maintain adequate security measures to safeguard the Software from unauthorised access, use, and disclosure; (b) supervise and control access to and use of the Software in accordance with the provisions of this EULA; (c) provide the Licensor from time to time on request with contact details for the person responsible for supervising and controlling such access and use; and (d) ensure that the Software is at all times clearly labelled as the property of the Licensor. The provisions of this Clause 3.3 are without prejudice to the provisions of Clause 5.1.

4. Confidential Information

4.1 *Confidentiality obligations.* As between the Parties, all Confidential Information belongs to the Licensor. At all times during the term of this EULA and at all times subsequently, the End User shall: (a) maintain all Confidential Information securely and in the strictest confidence and shall respect the Licensor's rights therein; (b) not disclose or otherwise make available any Confidential Information to any third party; and (c) not use any Confidential Information for any purpose, except for the purpose of using the Software in accordance with the provisions of this EULA.

4.2 *Exceptions to obligations.* The provisions of Clause 4.1 shall not apply to Confidential Information which the End User can demonstrate by reasonable, written evidence: (a) is subsequently disclosed to the End User without any obligations

of confidence by a third party who has not derived it directly or indirectly from the Licensor; or (b) is or becomes generally available to the public through no act or default of the End User or its agents, employees, or affiliates.

4.3   *Disclosure to employees, etc.* The End User shall procure that all its employees and other personnel who have access to any Confidential Information: (a) shall be made aware of, and subject to the obligations, set out in Clause 4.1; and (b) shall have entered into written undertakings of confidentiality and non-use which are at least as restrictive as Clause 4.1 and Clause 4.2 and which apply to the Confidential Information.

4.4   *Return of Confidential Information.* Upon any termination of this EULA for any reason, the End User shall: (a) return to the Licensor any documents and other materials that contain any Confidential Information including all copies made, except for one (1) copy as may be necessary to be retained for the purpose of compliance with any continuing obligations under this EULA; and (b) make no further use, copy, or disclosure thereof.

5.   Acknowledgements, disclaimers, etc.

5.1   *Acknowledgements.* The End User acknowledges and agrees that software in general is not error-free and agrees that the existence of any errors in the Software shall not constitute a breach of this EULA by the Licensor.

5.2   *Obligation to correct material errors, etc.* If the End User discovers a material error in the functionality of the Software which substantially affects the End User's use of the Software and the End User notifies the Licensor of such material error in writing within one year of the date of this EULA, the Licensor shall use reasonable endeavours to correct, by patch or new release (at the Licensor's option), that part of the Software which is affected by such material error.

5.3   *Further support.* If the End User requires any further support and/or maintenance services in respect of the Software, the End User shall notify the Licensor in writing and the Parties may discuss the possibility of entering into a support agreement.

5.4   *No such obligation in certain circumstances.* The Licensor's obligations under Clause 5.2 shall be excluded in the following circumstances: (a) following wilful damage to the Software or the Ash Product or negligence in their use; (b) where the Software or Ash Product has not been used, maintained, and/or stored in accordance with any instructions or recommendations given by the Licensor or in accordance with the provisions of this EULA; (c) where the problem arises from software or hardware not supplied by the Licensor; (d) where the Software or Ash Product is used other than in the correct configuration; (e) where any warranty seal on the Ash Product is broken by the End User or a third party; and/or (f) following any unauthorised use of or modification to the Software or Ash Product.

5.5   *Viruses, etc.* The Licensor does not warrant that the Software supplied under this EULA shall be free from all viruses. The End User acknowledges and agrees that it is solely the End User's responsibility to conduct appropriate virus scanning of the Software prior to installation and use.

5.6   *Possible charges.* Where a defect in the Software is found upon investigation not to be the Licensor's responsibility, the Licensor reserves the right to charge the End User on a time and materials basis at the Licensor's then current rates for all time, costs, and expenses incurred by the Licensor in consequence of such investigation.

5.7   *No implied warranties, etc.* The express undertakings and warranties given by the Licensor in this EULA are in lieu of all other warranties, conditions, terms, undertakings and obligations, whether express or implied by statute, common law, custom, trade usage, course of dealing or in any other way, including any implied warranty of merchantability, satisfactory quality, fitness for any particular purpose. All of these are excluded to the fullest extent permitted by applicable law. Without limiting the scope of the preceding sentences, the Licensor gives no warranty or guarantee that the Software will meet the End User's requirements, that the use of the Software will be un-interrupted, or that any errors and/or defects in the Software can or will be corrected.

5.8   *Open source software.* Any open source software provided by the Licensor may be used according to the terms and conditions of the specific licence under which the relevant open source software is distributed, but is provided "as is" and expressly subject to the disclaimer in clause 5.7.

5.9   *Indemnity.* The End User shall indemnify the Licensor from and against any and all losses, damages, claims, demands, liabilities, costs, and expenses of any nature whatsoever that may be asserted against or suffered by the Licensor and which relate to: (a) any use by the End User of the Software; and/or (b) the development, manufacture, use, supply, or any other dealing in any products or services that were generated from the use of the Software, including any claims based on product liability laws.

5.10   *Limit of liability.* The cumulative maximum liability of the Licensor to the End User under or in connection with this EULA, irrespective of the basis of the claim (whether in contract, tort, negligence, or otherwise), shall be limited in accordance with the provisions of this Clause 5.10:

(a)   The Licensor does not seek to exclude or limit liability where such exclusion or limitation is precluded from applicable law, including any liability that may arise in respect of (i) death or personal injury resulting from the Licensor's negligence, or (ii) fraud.

(b)   Subject to the rest of the provisions of this Clause 5.10, the cumulative liability of the Licensor in respect of any and all claims made under or in connection with this EULA shall not exceed an amount that is equal to the price paid for the ASH Product excluding VAT and other applicable taxes.

(c)   Subject to Clause 5.10(a), the Licensor shall in no circumstances be liable for any type of special, indirect or consequential loss, for any loss of profit, revenue, or anticipated saving, lost, incorrect or spoilt data, loss of use, loss of contracts with third parties, loss of business or loss of goodwill, even if such loss was reasonably foreseeable or the Licensor had been advised of the possibility of the same arising.

6.   Duration and termination

6.1   *Commencement and termination.* This EULA, and the licence granted hereunder, shall come into effect on the Start Date and shall continue in force unless and until terminated in accordance with Clause 6.2 or Clause 6.3.

6.2   *Termination by either party.* Either Party may terminate this EULA, and the licence granted hereunder, at any time by notice in writing to the other Party (the "**Other Party**"), such termination to take effect as specified in the notice:

(a)   if the Other Party is in material or persistent breach of any provision of this EULA and, in the case of a breach capable of remedy within 30 days, the breach is not remedied within 30 days of the Other Party receiving notice specifying the breach and requiring its remedy; or

(b)   if (i) the Other Party becomes insolvent or unable to pay its debts as and when they become due; or (ii) an order is made or a resolution is passed for the winding up of the Other Party (other than voluntarily for the purpose of solvent amalgamation or reconstruction); or (iii) a liquidator, examiner, receiver, receiver manager, or trustee is appointed in respect of the whole or any part of the Other Party's assets or business; or (iv) the Other Party makes any composition with its creditors; or (v) the Other Party ceases to continue its business; or (vi) as a result of debt and/or maladministration the Other Party takes or suffers any similar or analogous action in any jurisdiction.

6.3   *Termination if the Ash Product is sold.* This EULA will terminate automatically if the Ash Product is sold.

6.4   *Consequences of termination.* In the event of any termination of this EULA for any reason any licence granted by the Licensor under this EULA shall automatically terminate without further notice, and the End User shall make no further use of, or carry out any other activity in relation to, the Software; and

6.5   *Accrued rights.* Termination of this EULA for any reason shall not affect the rights and obligations of the Parties accrued before termination, including any right to claim damages. The rights and obligations of the Parties set out in Clauses 4, 5.9, 5.10, 6.4, 6.5, and 7 shall survive any termination of this EULA for any reason.

7.   General

7.1   *Amendments.* This EULA may only be amended in writing signed by duly authorised representatives of the Licensor and the End User.

7.2   *Invalid clauses.* If any provision or part of this EULA is held to be invalid, amendments to this EULA may be made by the addition or deletion of wording as appropriate to remove the invalid part or provision but otherwise retain the provision and the other provisions of this EULA to the maximum extent permissible under applicable law.

7.3   *No agency.* Nothing in this EULA shall create, evidence, or imply any agency, partnership, or joint venture between the Parties. Neither Party shall act or describe itself as the agent of the other, nor shall it make or represent that it has authority to make any commitments on the other's behalf.

7.4   *Interpretation.* In this EULA:

(a)   references to persons include incorporated and unincorporated persons and references to the singular include the plural and vice versa;

(b)   references to Clauses and Exhibits mean clauses of, and exhibits to, this EULA;

(c)   references in this EULA to termination include termination by expiry; and

    (d)   where the word "including" is used it means "including without limitation".

7.5   *Governing law and jurisdiction.* The validity, construction, and performance of this EULA shall be governed by and construed in accordance with the laws of the Republic of Ireland and shall be subject to the exclusive jurisdiction of the courts of the Republic of Ireland to which the Parties hereby submit.

7.6   *No use of names, etc.* Neither Party shall use the names, marks, trade names, trade marks, crests, logos, or registered images of the other Party without that Party's prior written consent.

7.7   *Entire agreement.* This EULA, including the attached Exhibits, sets out the entire agreement between the Parties relating to its subject matter and supersedes all prior oral and written agreements, arrangements, or understandings between them relating to such subject matter.

Exhibit A

Definitions

Confidential Information	The Software, and all information, data, drawings, designs, specifications, documentation, and other items (in any form whatsoever) which the Licensor may (directly or indirectly) disclose or otherwise make available to the End User during the course of or in anticipation of this EULA.
Ash Product	The product on which the Software is installed
Software	The software which is pre-installed on the Ash Product and any upgrades, revisions, or new versions which may be supplied by the Licensor or made available to the End User from time to time
Start Date	*The date of purchase of the Ash Product*

RYF AG
Bettlachstrasse 2
CH-2540 Grenchen
Tel. +41 32 654 21 00
ryfag@ryfag.ch
www.@ryfag.ch

RYF SA Succursale
Route de Genève 9c
CH-1291 Commugny
Tel. +41 22 776 82 28
ryfag@ryfag.ch
www.@ryfag.ch

RYF AG
Im Hanselmaa 10
CH-8132 Egg / Uster/ ZH
Tel. +41 43 277 59 99
ryfag@ryfag.ch
www.@ryfag.ch