Waygate Technologies
a Baker Hughes business

Turning Tool Integration

Mentor Visual iQ+ and Rhinestahl Future Drive NG+

To enable repeatable image capture of every blade in each stage, the updated protocols let the MViQ+ video borescope and the Rhinestahl FutureDrive NG+ turning tool perform 2-way communication. Previous time delay image capture can sometimes cause errors and consume unnecessary waiting time between stop and image capture. Now consistent images are provided in less time.

1-Way Overview

1-way User Interface

Introduced in 2019. First iteration of TT control between FDNG+ and MViQ. Designed to enable the MVIQ to automatically capture each blade (jpg, bmp, stereo, 3DPM) without TT handset control. Once devices connected using USB, User needs to set the TT handset to 'Interval' and enter the appropriate time delay (seconds) such that this overall time was enough to accomodate the time to capture and save the image on the MViQ. Image capture was triggered by receiving the signal from the TT. The TT would rotate to the next blade after the interval time setting elapsed.

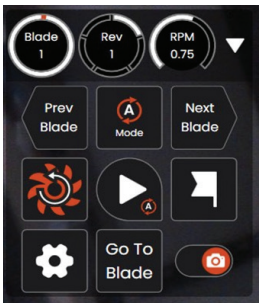
2-Way Basic Overview

2-Way User Interface

Introduced in 2024. Updated communication protocol supporting full 2-way communications between TT FDNG+ and MViQ(+). Designed to enable the MVIQ(+) automatically to capture each blade (jpg, bmp, stereo, 3DPM) without TT handset control. Once devices connected using USB, User no longer has access to TT handset controls and the User configures the TT start/pause/stop functions from the on-screen UI on the borescope.

Automated image capture could be easily toggled and the previous timed delay setting logic (in 1-way) was superceeded by signals generated between the borescope and TT. Image capture was triggered by receiving a signal from the TT. The TT would rotate to the next blade after the receiving signal from borescope once image has returned to the "live" state. Full rotation and capture of each blade with efficient duration was now made possible with added functionality to programme mutliple repeated revolutions that support inspection tasks requiring multiple views to capture blades that exceeded one Field of View. Additional safety functionality was incorporated such that should the User command tip articulation or enter into a different screen whereupon the 'live' image was not shown, then the TT would be automatically paused. A simple press of the on-screen button would resume rotation once returned back to the 'live' state.

2-Way Advanced Overview



2-Way Advanced User Interface

Introduced in 2025. Updated controls logic between TT FDNG+ and MViQ+. Designed to expose many more controls of the TT using only the MViQ+ device. With the exception of backlash setup and Setting View Position, all other movement controls are now exposed on the MViQ+. The panel also incorporates an intuitive suite of gauges providing quick and easy status of the inspection. There is a facility to mimise the buttons from within the panel such that once the inspection is underway, screen real estate is restored to enable focus on the inspection task.

The below table provides a reference for Waygate Technologies video borescope and Rhinestahl software compatibility and functions provided.

Customer facing description	1-way	2-way Basic	2-way Advanced
FutureDrive NG+ software version	1.00+	2.00+	2.14+
Mentor Visual iQ software version	3.50+	3.76	n/a
Mentor Visual iQ+ software version	4.00+	4.00+	4.10+
On-screen UI			
Engine selection	no	no	no
Stage selection	no	no	no
Backlash setup	no	no	no
Set view position	no	no	no
Automated on-screen TT text	✓	✓	✓
Capture toggle	✓	✓	✓
Auto rotation	no	✓	✓
Blade number gauge dial	no	no	✓
Revolution number gauge dial	no	✓	✓
RPM setting gauge dial	no	no	✓
Manual blade rotation	no	no	✓
Jog forward/back control	no	no	✓
Automatic mode	no	no	✓
Next/previous blade control	no	no	✓
Flag mode	no	no	✓
Next/previous flag control	no	no	✓
Blade flag/unflag toggle	no	no	✓
Manual movement mode	no	no	✓
Goto blade function	no	no	✓
Settings options			
Asset/serial number assignment	✓	✓	✓
Image save type	✓	✓	✓
Image (non-3DPM) capture delay	✓	n/a	no
Image capture delay	✓	n/a	no
TT control mode (revolution/indefinite)	no	✓	✓
Number of revolutions	no	✓	✓
Delay (seconds) before blade rotation	no	✓	✓
Manual RPM setting prompt	no	no	✓
Automatic annotation toggle	✓	✓	✓
Automatic file naming toggle	✓	✓	✓
Automatic folder creation hide/show toggle	✓	✓	✓
MDI overlay toggle	✓	✓	✓

For example: MViQ version 3.50 coupled with FDNG+ version 2.00 will provide 1-way turning protocol. The MViQ will need to be updated to version 3.76 in order to exploit 2-way Basic. Likewise, MViQ+ version 4.10 coupled with FDNG+ version 2.00 will provide 2-way Basic turning tool communication. The FDNG+ will need to be updated to version 2.14+ in order to exploit 2-way Advanced.

Both MViQ or MVIQ+ along with the FDNG+ must be equipped with the software version numbers quoted here in order to exploit the given type of communication protocol.

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