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Renishaw modulated optical probe transmission technology

Renishaw's modulated transmission technology is an optical transmission method first introduced in modules *TE420, Probe transmission technology* and *TE422, Optical transmission technology*. It replaces Renishaw's original transmission protocol, which is now referred to as 'Legacy' transmission or 'Legacy mode'.

Modulated transmission is used across the current range of Renishaw optical workpiece inspection probes as well as the OTS contact tool setter. The effective range of modulated optical transmission is up to 6 m and relies on line-of-sight, although it can benefit from reflections.

System components

Modulated transmission is used on the OMP, OLP and OTS ranges of probes, which utilise either an optical machine interface (OMI-2, OMI-2T, OMI-2C) or a combination of optical machine module receiver (OMM-2) and a separate machine interface (OSI). The separate interface allows two OMM-2s to be used, providing a solution for large machine tools or where line-of-sight difficulties exist.

Modulated transmission allows multiple optical probes to be used on a single machine tool. A common application of this uses one workpiece inspection probe and two OTS probes on a twin pallet machining centre, one OTS equipping each pallet.

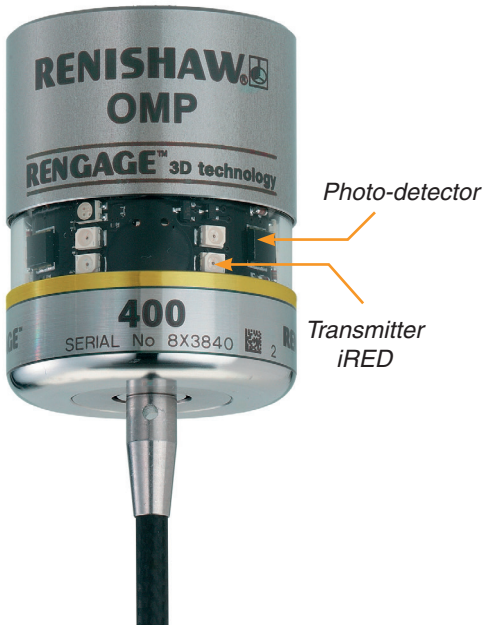

Figure 1: OMP400 workpiece inspection probe with optical transmission

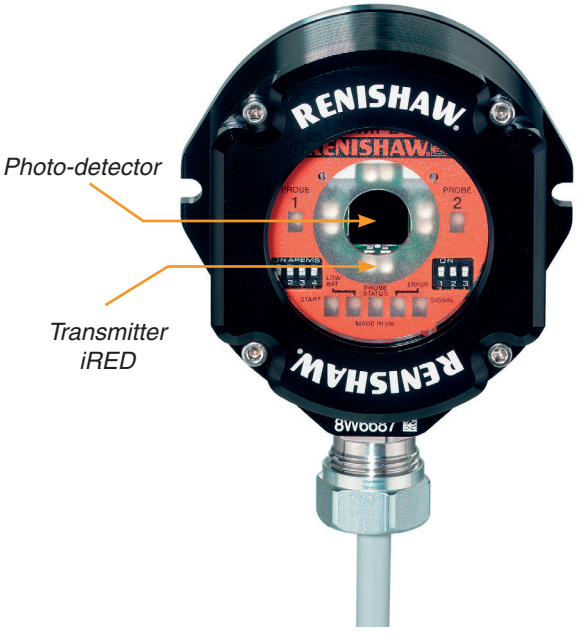

Figure 2: OMI-2T optical machine interface

TE427

White paper

Modulated transmission protocol

Optical transmission signals between the probe and receiver are coded into a series of flashes. Renishaw products use a modulated transmission protocol, which is robust and impervious to interference from other infrared light sources. Most Renishaw optical interfaces and probes can also operate in 'Legacy mode' providing compatibility with older probes and interfaces where necessary.

When a workpiece inspection probe is taken from a tool carousel and fitted into a spindle it can be activated by the interface using a start code. Renishaw's modulated transmission protocol prevents optical interference turning on the probe and wasting battery life.

The code allows separate activation signals for multiple probes using a single interface. For example, a machine tool with automatic pallet changing could be equipped with an optical inspection probe and two optical tool setting probes (OTS), one on each pallet. Such a configuration ensures tool setting and broken tool detection are always available.

Renishaw modulated transmission protocol is an extremely robust system. Under testing and in use it has proven to be highly immune to interference from sunlight and fluorescent light sources as described in module *TE422, Probe transmission technology: optical*. The coding mechanism ensures it is extremely unlikely that a fluorescent light source will emulate a probe signal, while further detection and rejection coding methods provide additional protection.

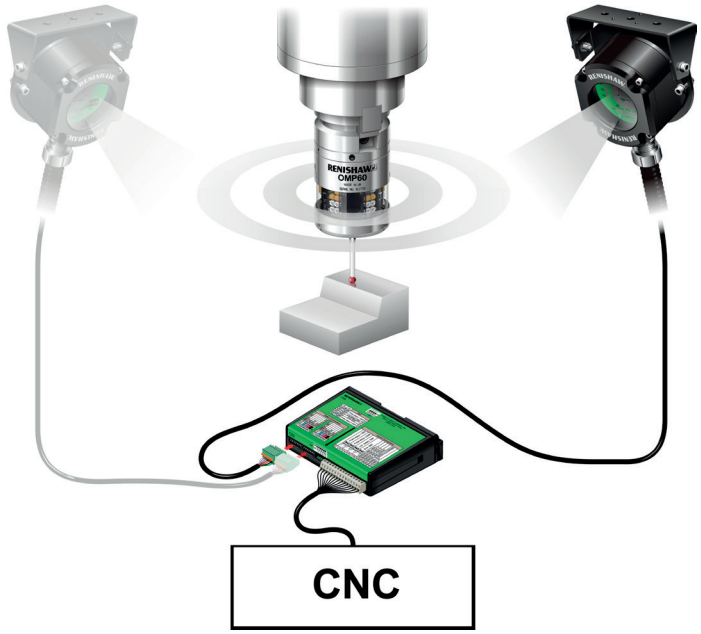

Figure 3: OMM-2 with OSI shown with an optional second OMM-2

Effective range of modulated transmission

Modulated optical transmission systems are directional, with the probe and receiver having defined windows of operation as shown in figure 4. Maximum range is achieved by fitting the system components to face along the optical centre-line.

The size of probe can have an effect on its transmission range. Smaller Renishaw probes, designated by the figures 40 or 400 in their model name, have fewer iREDs which results in a lower intensity of infrared light emission and reduced range. However, as the smaller probes are intended for use on smaller machine tools, the required transmission range is also correspondingly reduced.

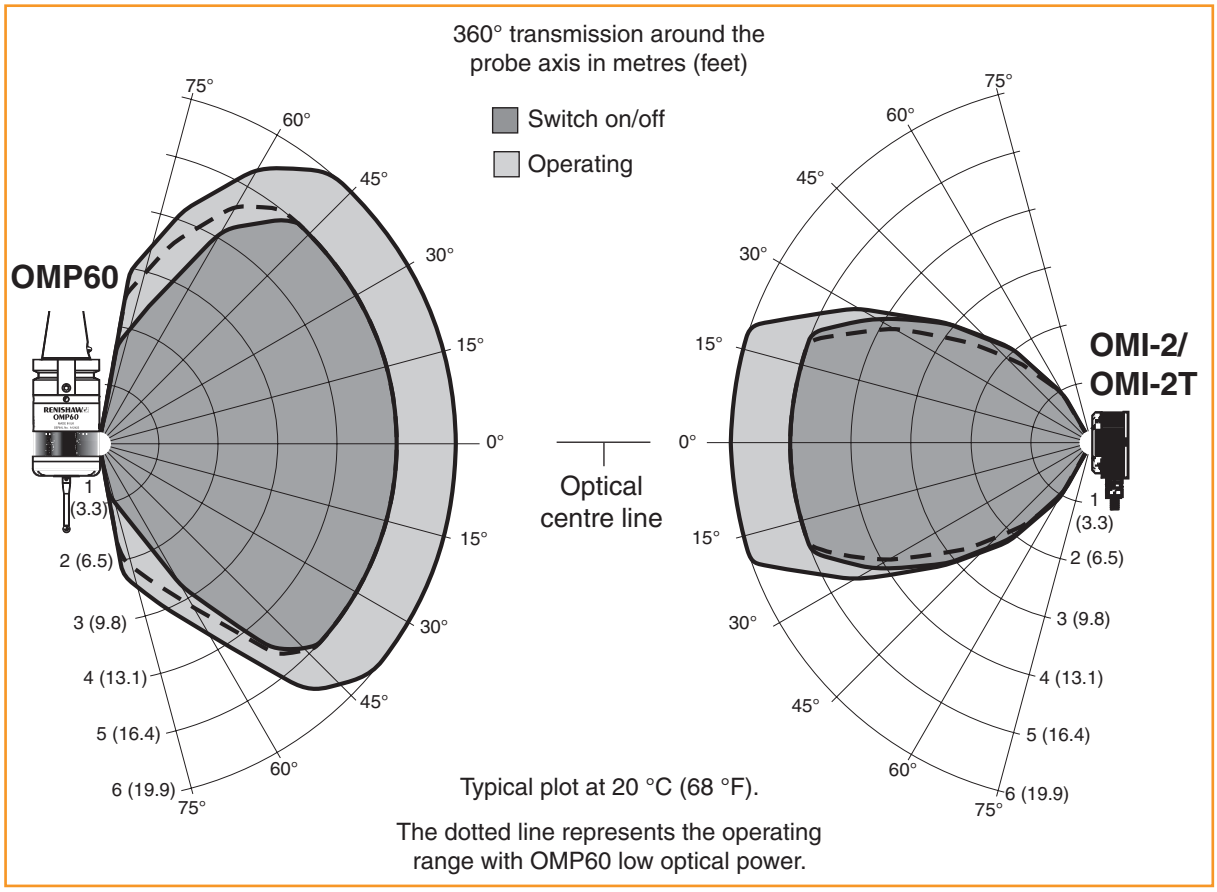

Figure 4: transmission plots of an OMP60 probe and OMI-2/OMI-2T interfaces

Summary

Renishaw modulated transmission technology produces a highly effective and robust communication system to enable interference-free wireless inspection probing. It is available on a wide range of workpiece inspection and tool setting probes, providing a transmission solution for all small-to-medium sized machine tools.

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About Renishaw

Renishaw is an established world leader in engineering technologies, with a strong history of innovation in product development and manufacturing. Since its formation in 1973, the company has supplied leading-edge products that increase process productivity, improve product quality and deliver cost-effective automation solutions.

A worldwide network of subsidiary companies and distributors provides exceptional service and support for its customers.

Products include:

- Additive manufacturing, vacuum casting, and injection moulding technologies for design, prototyping, and production applications
- Advanced material technologies with a variety of applications in multiple fields
- Dental CAD/CAM scanning and milling systems and supply of dental structures
- Encoder systems for high accuracy linear, angle and rotary position feedback
- Fixturing for CMMs (co-ordinate measuring machines) and gauging systems
- Gauging systems for comparative measurement of machined parts
- High speed laser measurement and surveying systems for use in extreme environments
- Laser and ballbar systems for performance measurement and calibration of machines
- Medical devices for neurosurgical applications
- Probe systems and software for job set-up, tool setting and inspection on CNC machine tools
- Raman spectroscopy systems for non-destructive material analysis
- Sensor systems and software for measurement on CMMs
- Styli for CMM and machine tool probe applications

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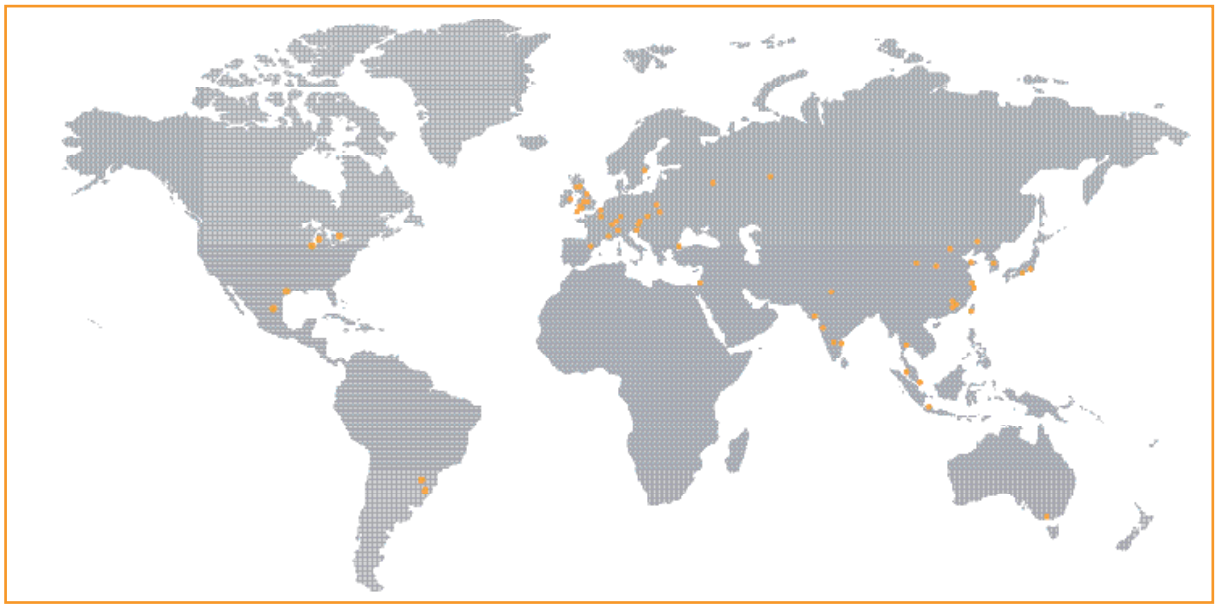

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