



A window into the body – Occuity harnesses Renishaw encoders in life-changing optical health screening devices



Background:

Global health challenges such as myopia and glaucoma demand early and accessible screening. Occuity aims to expand access to preventative care by developing handheld optical devices that use the eye as a window into systemic health. This goal requires highly accurate miniature components within tightly constrained form factors.



Challenge:

Traditional desktop instruments lack the portability and ease of use required for widespread screening. To deliver reliable non-contact screening, Occuity needed precise position measurement within a small handheld optical system. The challenge was to integrate a miniature high-accuracy position feedback system into a compact device chassis.



Solution:

Occuity selected Renishaw's ATOM DX™ optical encoder for its reliable high-resolution position feedback, integrated interpolation, and compact readhead. Its quick and easy installation and set-up method, combined with Renishaw's ADTi-100 diagnostic tool, ensured rapid manufacture and consistent, optimised performance for every Occuity AX1 Axiometer™ device.



The ATOM DX encoder is a 'drop-in' solution that meets our needs perfectly.

Jamie Serjeant,
Lead Engineer, Occuity





The global health challenge

Throughout the world, the diagnosis and treatment of systemic disease present major health challenges. While solutions vary, experts worldwide agree that early detection is key to improving outcomes. Embracing this challenge, medical technology company Occuity has developed a groundbreaking optical screening device that enables health professionals to provide rapid, portable, non-invasive screening and disease management.

The portable optical technology solution

Founded in 2019 by Dr Dan Daly and Dr Robin Taylor, Occuity's mission is to improve lives through better diagnosis and monitoring of some of the world's most prevalent diseases. It is achieving this by drawing on the unique properties of the human eye to unlock invaluable health data for diseases such as glaucoma and axial myopia.

"By using the eye as a window into the health of the body, our aim is to identify disease earlier, improve patient outcomes, and reduce the overall burden on healthcare systems," says Dr Dan Daly, CEO. "Our innovative optical technology makes this possible."

Launched in September 2024, Occuity's PM1 Pachymeter is the first in a series of handheld ophthalmic products designed to revolutionise healthcare screening. The PM1 measures corneal thickness with high precision, supporting the early detection and monitoring of eye health and disease, particularly glaucoma. Glaucoma is a group of eye diseases that damage the optic nerve, usually due to increased pressure in the eye. Vision loss from glaucoma is gradual and permanent, so it is critical to find and treat the condition as soon as possible.



Occuity headquarters in Reading, United Kingdom



The Occuity AX1 handheld Axiometer



Dr Dan Daly, founder and CEO of Occuity

Building on the success of the PM1, Occuity has extended the range of its optical technology products. With a planned launch in 2026, Occuity's AX1 Axiometer™ is designed to measure corneal curvature and axial eye parameters. This enables the diagnosis and management of axial myopia, a condition caused by abnormally large axial lengths of the eye. If left unmanaged – especially in children – myopia can increase the risk of serious eye problems later in life, such as retinal detachment or glaucoma. The AX1 will be used in clinical and screening settings to support the detection of axial myopia, plan treatment, and monitor ocular health on an ongoing basis.

The AX1 will be the only handheld non-contact device capable of measuring axial eye length with an accuracy of $\pm 25 \mu\text{m}$ – an unprecedented capability in a handheld device. As with the PM1, the portability and ease of use of the AX1 contrasts sharply with traditional bulky desktop equipment which requires chin rests, alignment systems, and trained operators. This makes the AX1 invaluable for eye health specialists who might be constrained by space limitations or who work in settings such as mobile clinics or schools.

“PM1 and AX1 are built on the same platform, but with AX1 we have developed additional systems that allow us to measure the front and back of the eye concurrently,” says Dr Dan Daly, CEO of Occuity. “These technologies provide the backbone for our other disease monitoring projects, such as those for monitoring blood glucose. The insights gained from AX1 are already informing R&D for our future roadmap.”

To achieve this level of precision in a compact form factor, Occuity turned to Renishaw's encoder expertise.



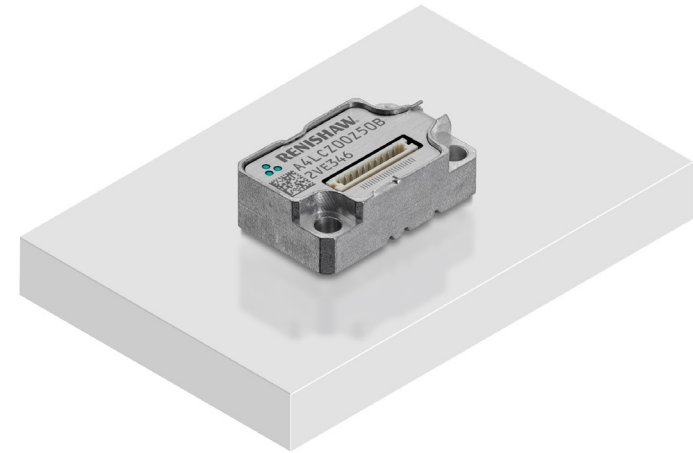
Renishaw's ATOM DX™ optical encoder

The key to the AX1's portability lies in the miniaturisation of its technology. Fitting a complex optical system into a small portable device demanded extreme precision and Occuity needed absolute confidence in the solution. Renishaw's ATOM DX optical encoder provided the answer.

"ATOM DX is a high-resolution optical digital encoder that allows us to measure the position of our scanning system with ten times greater resolution," says Jamie Serjeant, Lead Engineer at Occuity. "It's a 'drop-in' solution that meets our needs perfectly. It's also easy to install using the built-in mounting points that we designed our chassis around. By avoiding the need for precise manual location, we save invaluable time on the production line."



Jamie Serjeant, Lead Engineer, Occuity



The ATOM DX encoder series is Renishaw's smallest digital incremental optical encoder. It provides positional feedback, incorporating onboard interpolation and filtering optics, making it ideal for compact or space-constrained applications.

The ATOM DX encoder is built on the optical system platform of the market-proven ATOM™ encoder. It integrates Renishaw's interpolation technology within the readhead, reducing the overall system size and eliminating the need for further adaptors or interfaces.

ATOM DX encoders are compatible with Renishaw's ADTpro-100 standalone encoder diagnostic tool and ADTi-100 diagnostic tool, both of which work with ADT View software. These tools provide detailed diagnostic information, supporting encoder set-up, optimisation, and fault analysis in the most complex of motion control systems.

ATOM DX encoder readheads can be used with a variety of linear, partial arc, and rotary scales in cabled and top-exit variants, with 20 µm or 40 µm scale options to suit different application requirements.



Precise, alias-free data

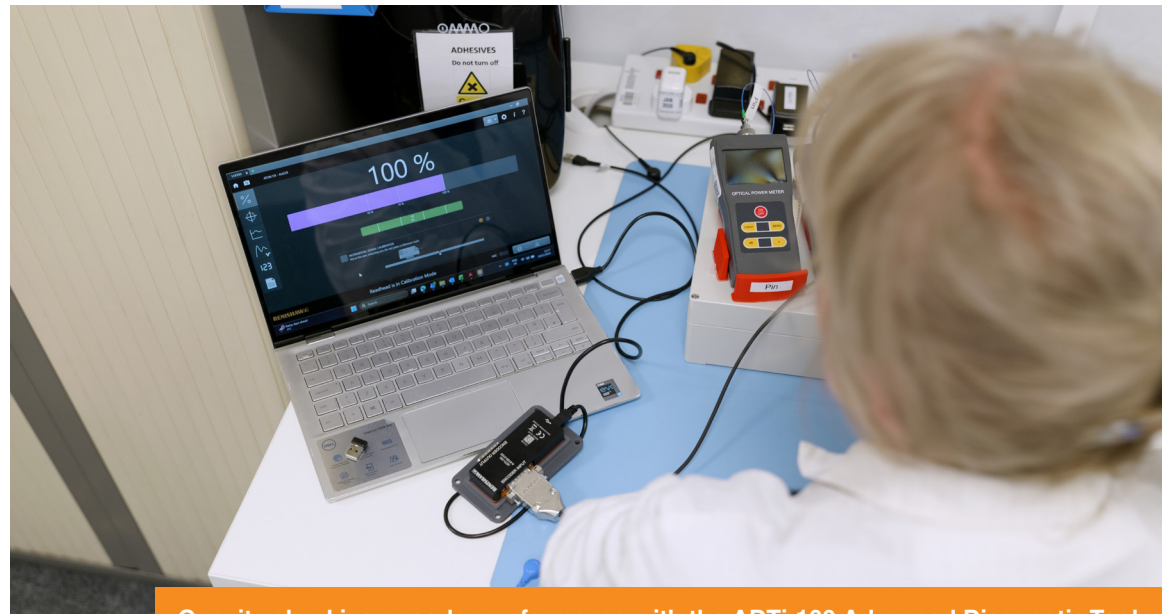
In precision optical systems, aliasing – the false interpretation of rapidly changing signals – can compromise accuracy. To overcome this, the ATOM DX encoder enables Occuity to resolve signals far above the Nyquist limit – the fastest rate a signal can change before it starts to be misread or distorted when measured or recorded. By maintaining precise, alias-free position data, Occuity can be confident in the accuracy of its axial length measurements.

Renishaw's Advanced Diagnostic Tool (ADT)

Occuity deploys Renishaw's ADTi-100 Advanced Diagnostic Tool on its production line to ensure that every ATOM DX encoder is set up correctly and performing well. The ADTi-100 connects to the ATOM DX readhead to display real-time signal strength, diagnostics, and calibration data, verifying installation quality. The ADTi-100 assists with challenging motion control installations, helping Occuity to set up and diagnose faults quickly and easily. This process guarantees that every AX1 shipped has been checked and that the Renishaw encoder is providing optimal performance.



Installing an ATOM DX encoder



Occuity checking encoder performance with the ADTi-100 Advanced Diagnostic Tool



The future

Renishaw and Occuity's close collaboration combines precision engineering and optical innovation to power Occuity's vision of accessible preventative healthcare. With Renishaw's technical knowledge and expertise, Occuity can further refine its optical technology platform to address major health challenges, and improve outcomes for people affected by systemic disease.

"We're developing revolutionary healthcare devices using a defined set of underlying technologies, all of which depend on miniature high-resolution encoders." reaffirms Taylor. "That is why our relationship with Renishaw is invaluable. We look forward to working even more closely with their engineering team to deliver groundbreaking solutions that allow us to create smaller, easier-to-use devices that may one day end up in people's pockets."





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