

ASX Announcement ([ASX: AXE](#))

10 October 2024

Archer signs agreement with foundry to manufacture TMR sensors for industrial applications

Highlights

- Archer has signed an agreement with magnetic sensor manufacturer, MultiDimension Technology (“MDT”), to develop a tunnel magnetoresistance (“TMR”) sensor for commercial use in industrial applications.
 - TMR sensors detect and measure currents leveraging quantum phenomena to provide a performance edge over classical incumbents, and are ideal for many industrial applications including artificial intelligence, data centres, automotive, and internet-of-things.
 - Part of Archer’s ¹²CQ project, and leveraging its expertise in quantum mechanics, the Company will finalise its TMR sensor design in the coming weeks, with the final design to be sent to MDT for the manufacture of the first prototypes before the end of the year.
 - Early next calendar year, Archer will commence work to optimise the TMR sensor design and engage with potential customers, potentially bringing forward revenue opportunities while it continues ¹²CQ quantum development.
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Archer Materials Limited (“Archer”, the “Company”, “ASX: AXE”), a semiconductor company advancing the quantum technology and medical diagnostics industries, has entered an agreement with China-based MultiDimension Technology (“MDT”) to manufacture quantum-based TMR sensors for potential commercial use in industrial applications, as part of the ¹²CQ project.

TMR sensors are magnetic sensors that are highly sensitive, have high bandwidth, and low power consumption compared to the traditional Hall effect sensors, which are currently industry standard. Archer will use its expertise in quantum mechanics to create a first prototype expected to be delivered by MDT the end of the calendar year.

The work will provide Archer with an opportunity to potentially generate revenue in the next one to two years and establish a market presence sooner, while maintaining its focus on long-term quantum computing development for the ¹²CQ quantum devices. Together, this builds a diversified product line that includes quantum technologies relevant to both sensors and quantum computing.

TMR sensors get their high sensitivity and efficiency through magnetic tunnelling junction (MTJ) devices. An MTJ element is a multilayer, thin-film stack composed of a sandwiched structure with a free magnetic, tunnelling spacer, and magnetic pinned layer (Image 1). TMR sensors also have a separate complementary metal-oxide semiconductor (“CMOS”) circuitry that allows signal processing, amplification and interface compatibility.

Archer has engaged MDT to initially manufacture a TMR sensor without CMOS circuitry. The Company will then work with potential customers to refine the design and identify commercial applications for the sensor.

Archer will now use its expertise in integrating CMOS technology with graphene sensors (see ASX announcement 18 Aug 2024) to design the TMR sensor and CMOS integration.

Archer will utilise research findings from its quantum computing ¹²CQ project by using fundamental quantum principles like quantum tunnelling for the TMR sensors. Like quantum computing, where quantum particles (qubits) exist in superpositions and interact in complex ways, TMR sensors rely on the quantum mechanical behaviour of electrons. The sensor's functionality depends on detecting the effects of this quantum behaviour at the nanoscale.

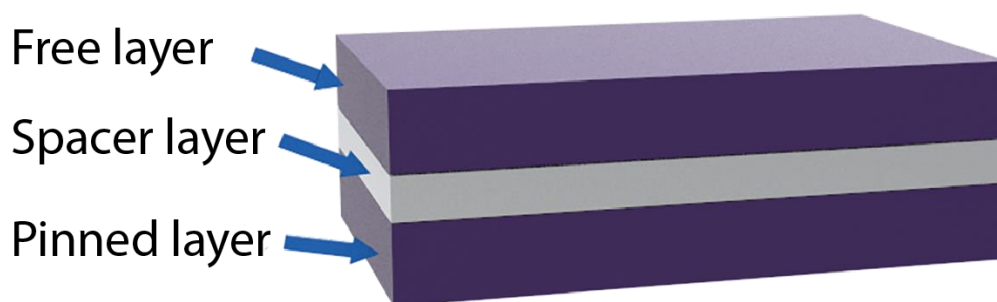


Image 1: Example magnetic tunnelling junction. Quantum tunnelling allows electrons to move between two ferromagnetic layers (free and pinned layers) separated by an insulating barrier (spacer layer). The sensor detects resistance changes, corresponding to changes in the magnetic field. The ability of electrons to quantum tunnel between layers based on their magnetic alignment gives the TMR sensor its high sensitivity and efficiency.

TMR sensor market

The TMR sensor market is experiencing rapid growth due to the sensor's high sensitivity, low power consumption, and small size. These characteristics make TMR sensors increasingly attractive for a range of applications, including:

- **Data centres:** TMR technology is the ideal solution to handle the challenges faced in data centres. The high-bandwidth, fast-response, ultra-low noise, integrated contact current sensors deliver highly accurate current measurements for power applications.
- **Automotive Industry:** TMR sensors are being integrated into electric vehicles and autonomous driving systems for precise position sensing, enhancing safety and performance.
- **IoT and Consumer Electronics:** TMR sensors are used in wearable devices, smart home technologies, and smartphones for gesture recognition, navigation, and environmental sensing.
- **Medical Devices:** TMR sensors have the potential to improve diagnostic accuracy and monitoring in healthcare, making them critical for next-generation medical technologies.

The global TMR sensor market is projected to grow at a compound annual growth rate (CAGR) of 8 - 11% over the next five years¹, with applications expanding across multiple industries.

Commenting on the TMR sensor development, Greg English, Executive Chair of Archer, said,

“Archer’s competitive edge in the TMR sensor market is rooted in its deep quantum expertise. Unlike traditional sensor manufacturers, Archer will harness the progress made in our ¹²CQ project to develop TMR sensors from a quantum-first perspective, allowing it to innovate faster and develop more efficient, cutting-edge products.

“At Archer, we are building a company that will lead the future of quantum technology, and developing TMR sensors is a critical step in that journey. The TMR sensors provide an opportunity to apply quantum mechanics to create value, while Archer prepares the groundwork for breakthroughs in the rest of its ¹²CQ project.”

The Board of Archer authorised this announcement to be given to ASX.

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About Archer

Archer is a technology company that operates within the semiconductor industry. The Company is developing advanced semiconductor devices, including chips relevant to quantum computing and medical diagnostics. Archer utilises its global partnerships to develop these technologies for potential deployment and use across multiple industries.
www.archerx.com.au