New Horizons

A new paradigm of collaborative research
One of the immediate and complex challenges facing industry, business and government in Australia today is a need to increase exports, foreign investment and jobs. One strategy – outlined in the Australian Government’s most recent Industry and Innovation Paper – is to build the scale and quality of the manufacturing industry. New Horizons has been built to answer those needs.

New Horizons is a purpose-built collaborative environment, uniquely placed to create new opportunities for industry, scientists, researchers and government. The initiative is an exciting collaboration between Monash, CSIRO and government. A cutting-edge, multi-disciplinary research facility, New Horizons leverages the combined strengths of the University and CSIRO in research and manufacturing technology. It is allowing science and industry to address the big challenges that require expertise at the intersection of engineering, IT, biology, chemistry, mathematics and physics.

The scope of the initiative is beyond anything that exists in Australia. New Horizons puts an incredible array of state-of-the-art equipment and specialised infrastructure in the hands of over 500 creative and gifted scientists, researchers and PhD students. As a result, new ideas are being generated across disciplines, allowing partners to address the challenges facing industry and creating economy transforming technological advances.

New Horizons is helping answer the economic and technological challenges facing industry and business. From the creation, control and understanding emergent states of quantum matter, to delivering bespoke solutions for manufacturing to collaborating on large-scale projects that can redefine entire industries. We are already seeing some incredible successes: solar cells so thin they can be printed onto plastic in a reel-to-reel printing process, materials that allow the human body to regenerate worn or diseased bones and organs, and the development of entirely new states of matter.

Professor Frieder Seible
Vice President (Academic) and Dean, Faculty of Engineering and Faculty of Information Technology Monash University

New ways of thinking
- Designing new materials
- Enabling the creation of new devices
- Manufacturing new opportunities

- Tomorrows materials
  - for energy conversion, storage and systems sustainability
- Next generation computer aided virtual environment
- World leading visualisation facilities
- Medical engineering
  - Biomedical materials, devices and systems
- Manufacturing
  - Materials and processes for advanced manufacturing

a new way forward
From investigating the potential of new quantum states of matter to fostering interdisciplinary teams to providing new connections and new directions for industry partnerships, New Horizons is an extraordinary fusion of thinking and impact.

New Horizons is a unique collaborative space. The building has been purpose designed to encourage and facilitate composite thinking. At all levels. From investigating the potential of new quantum states of matter to fostering interdisciplinary teams to providing new connections and new directions for industry partnerships, New Horizons is an extraordinary fusion of thinking and impact.

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The expertise of CSIRO

CSIRO is a leading provider of innovative manufacturing technologies and solutions, focused firmly on the needs of industry. Their depth of expertise means they can draw on over 500 researchers to deliver sustainable, productive and agile solutions for SMEs, national and multinational firms.

CSIRO’s manufacturing-focused expertise includes:
- Advanced materials – proven high-performance polymers and biodegradable green materials
- Additive manufacturing – cutting-edge facilities and expertise in titanium processing and 3D printing
- Intelligent systems – advanced ICT systems and robotics focused on productivity
- Biomedical solutions – novel biomaterials, drug design, therapeutic delivery and personal care
- Processing – advanced manufacturing process design and delivery, including flow chemistry

CSIRO develops advanced materials and processes for applications in aerospace, defence, health, infrastructure and mining, facilitating business growth and supporting industry supply chains.

The expertise of Monash

Monash University is a recognised global leader in innovative, multidisciplinary research.

Monash’s expertise in materials research and advanced manufacturing is already providing game-changing solutions for industry around the region and around the world. This includes expertise in:
- Light metals – including proven capability in alloy design, characterisation and processing
- Industrial design, with specialist skills in public transport and user-centred design
- Modelling and simulation
- Graphene – nature’s thin, wonder material – with applications such as supercapacitors, membranes, coatings and biomaterials to name a few
- Additive manufacturing – which is leading the next generation of aerospace engineering
- Nano-structured materials – covering a range of capabilities from nanotechnology to advanced ceramic materials to optoelectronics

Monash researchers are providing world-leading research in medical engineering and renewable energy. Projects include:
- Tissue engineering – to replace and repair organs
- The development of die sensitive solar cells fabricated by high throughput processes

Researchers are also pushing the boundaries at the intellectual frontier of physics – the new quantum revolution.
New Horizons is hard-wired to one of Australia’s premier research precincts. Visualisation capabilities are the most advanced of their type. The $1.8m immersive hybrid 2D and 3D virtual reality environment CAVE2, showcases our leadership in this domain. A unique research instrument in Australia, it will power research across a range of disciplines including engineering, science and medicine.

The infrastructure and equipment supporting high quality research, research training and collaboration also includes:

- Test rigs for mixers and cyclones
- Classifiers
- Electron microscopy and molecular beam epitaxy facilities
- High brightness rotating anode X-ray generator and triple axis diffractometer
- Neutral helium atom microscope
- Laser trapping and cooling laboratories
- Two ultra-high-vacuum scanning probe microscopy systems
- Growth chamber
- Transient adsorption spectroscopy
- Laser micro patterning facility
- Dark/near field microscopes for single molecule spectroscopy
- Nanoscale corrosion measurement
- Mechanical and fatigue testing
- Confocal Raman system
- Spark plasma sinterer
- Equal channel angular extrusion
- Electrospinning of nanofibres
- Large scale graphene CVD synthesis

These include:

- Future manufacturing: including a range of important materials synthesis, processing and proof-of-concept facilities as well as access to the Monash Centre for Electron Microscopy, Materials Characterisation Centre, the Melbourne Centre for Nanofabrication, Green Chemical Futures, Victorian Centre for Sustainable Chemical Manufacture and the Australian Synchrotron.
- Modelling and simulation: New Horizons’ capabilities allow multi-scale modeling and design of materials from the scale of the atom to production system level. This has deep relevance to chemical, mechanical, and aerospace engineering, medicine, mineral exploration and other vital areas of Australian industry.
- Medical engineering: Micro-nano scale technology is allowing innovations such as the manufacture of nanoparticles for drug delivery into cells, miniaturised implantable microsensors for medical diagnostics and microengineered robots for on-board tissue repairs.
- Renewable energy: New Horizons will provide a range of sophisticated processing techniques for producing the next generation of photovoltaic, solar hydrogen, fuel cell and hydrogen storage technologies in Australia.

By finding new ways to combine the capabilities within the precinct – in modelling and simulation, in biomedical engineering and in renewable energy – Monash and CSIRO are working with visionary industries to create materials, technology and techniques that will have genuine impact.

Individual standing in the CAVE2™ System interactively fly around a 3D representation of Mars, originally created by Robert Kooima with data from the NASA Mars Global Surveyor and Viking missions and star data from the European Space Agency Hipparcos mission. The CAVE2™ System was developed by the Electronic Visualization Laboratory (EVL) at the University of Illinois at Chicago. CAVE2 is a trademark of the University of Illinois Board of Trustees. (Photo: Lance Long, EVL).
Monash and CSIRO have proven capability in working with industry and government to develop innovative solutions for the manufacturing sector. This includes:

**Licensing**
We are recognised for success in developing new products and services with our commercial partners including the development of intellectual property and the commercialisation of inventions.

**Consultancy**
Monash Consulting Services connects organisations seeking to resolve specific problems or to gain competitive advantage in their markets with our experts.

**Contract research**
We assist organisations interested in undertaking research by:
- Identifying capabilities relevant to your specific business needs
- Coordinating research partnerships and contract negotiations
- Ongoing account and project management

**Funding**
We can also help you leverage government funding to support research collaboration and access to infrastructure through a range of state and federal government funding schemes.

To discover how we can help you turn new solutions into new markets, please contact us.

For further information please contact:

**Frieder Seible**, Vice President (Academic), Monash University
Tel: +61 3 9905 3419
Email: frieder.seible@monash.edu

**Damien Thomas**, Group Director Business Development, CSIRO Manufacturing, Materials and Minerals
Tel: +61 3 9545 2896
Email: damien.thomas@csiro.au

Contact us

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supporting new initiatives

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