



Product
Manufacturing
Incubator

**DEVELOPING YOUR
CONCEPT INTO REALITY**



Welcome to the MTC's Product Manufacturing Incubator (PMI)

A de-risked environment for SMEs, start-ups and entrepreneurs

The MTC's Product Manufacturing Incubator (PMI) is a hub of innovation set up to support businesses from all sectors bring ideas to market.

PMI works collaboratively with companies and individuals to evaluate ideas, determine the feasibility, and support the journey to develop the concept into a manufacturable product.

Through PMI, SMEs can also potentially access up to 50% REACH match funding to support the project and ensure PMI can help you drive the sustained, profitable growth of your business.

In this showcase, we'll show you how we've been able to support a number of businesses, SMEs, start-ups and entrepreneurs with different capabilities and routes to market that are available by accessing the knowledge, skills and facilities that the MTC has to offer.



Start your journey

If you would like to discuss your requirements in more detail or arrange a meeting with one of our dedicated consultants, please email pmi@the-mtc.org

The PMI Product Design Pathway

Once engaged with our team, we provide access to the MTC's world class advanced manufacturing and research facilities, as well as its team of engineering and manufacturing experts.

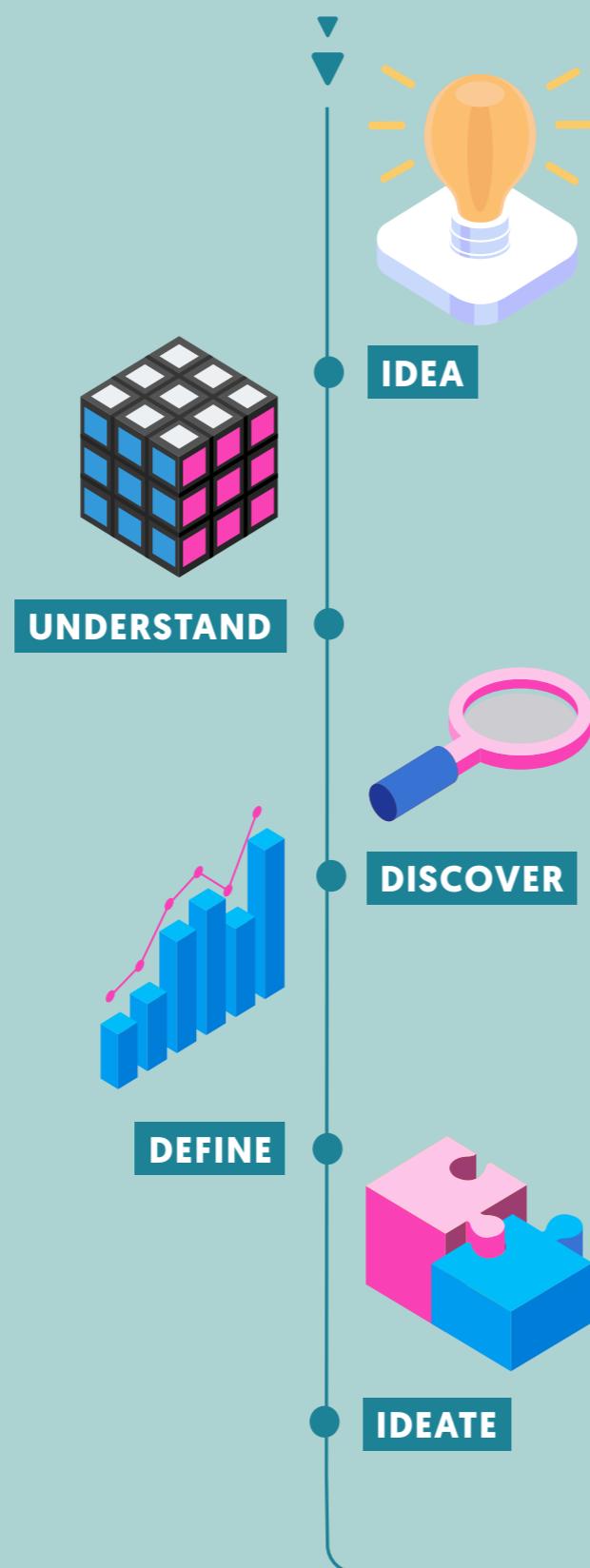
We use Design Thinking methodology to support your journey from start to finish through the three stages of the PMI Product Design Pathway:

1. The Discovery Phase
2. The Iterative Phase
3. The Launch Phase

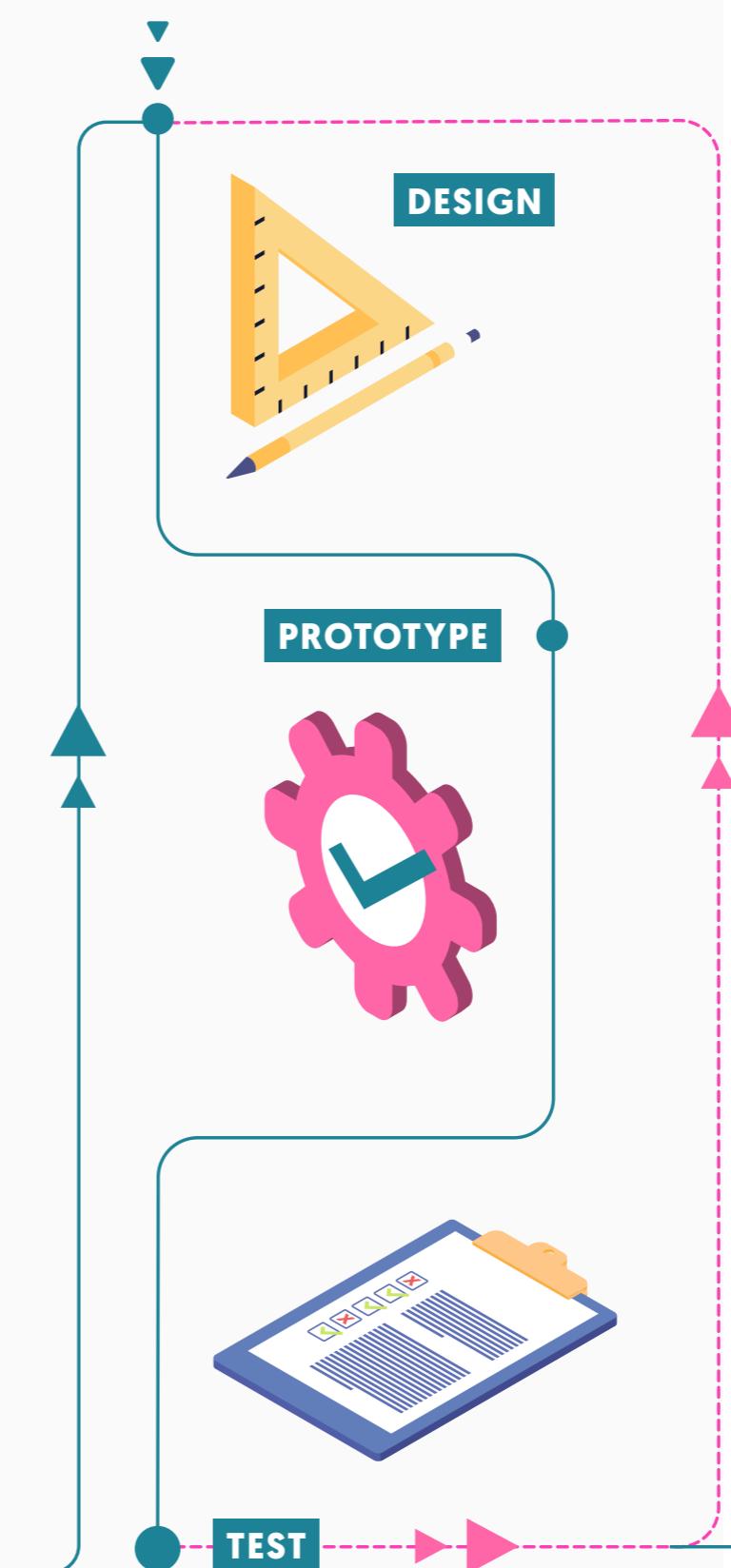
This approach enables us to work collaboratively with you, utilising the capabilities of our Product Design team at the MTC to de-risk your product's development and support the manufacture of your market seeding product.

From concepting and ideation to product design and virtual prototype builds, at each stage of the process, we'll leverage our expertise and contextual thinking to ensure that together we create the best possible product for your target audience.

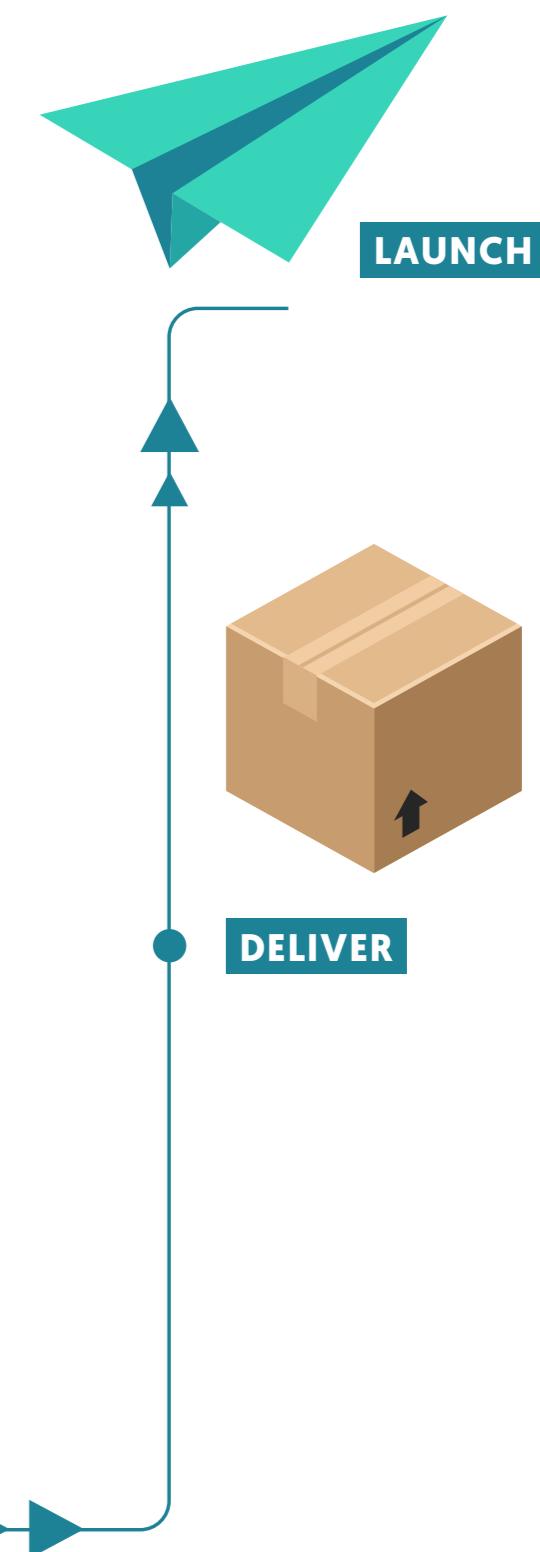
Phase One: The Discovery Phase



Phase Two: The Iterative Phase



Phase Three: The Launch Phase





Our Capabilities

The MTC's Product Design Team brings a wealth of industry experience and expertise which allows us to provide you with a complete product development solution and enables us to engage with our customers at any level.

Our collaborative approach means we will work with you throughout the process, deploying a number of our capabilities to support you on the journey to a commercially viable product.

Animation

Utilising the concepts and ideas discussed, our team will create a series of animations to help us begin the procedure of manufacturing and explore how we can achieve the intended outcome.

Concepting

This is the process of taking an idea discussed and expanding on it to create a number of variations for review in order to narrow down the choice to take forward to production.

Design for Assembly (DfA)

Taking your product and the chosen design, we'll look to simplify the product structure and reduce the number of required parts to make assembly more efficient.

Design for Manufacture (DfM)

DfM allows us to concentrate on optimising a product's development to ensure smooth prototyping and ensure it can be manufactured efficiently.

End Effector Design Work

As a critical part of the design and the manufacturing process of your product, we'll work with you to decipher what is the optimal task for the end effector to perform.

Ideation

This is crucial to the success of any product and refers to the whole creative process of generating ideas to take forward for exploration in the design process.

Machining Support

Through our design analysis, we can identify any difficult to machine features before the design gets sent for manufacture to save costly re-designs.

On-Site Build Support

At the MTC, we have access to on-site build support team that can help us throughout the build process.

Physical Prototype Build

Once a design is agreed upon and refined, we'll look to create a physical prototype for you to review and test on your target audience in order to obtain vital feedback.

Physical Representative Build

We can create a physical model of what your prototype could look like to further analyse and improve the product as well as to support in other factors including to secure support and funding.

Process Evaluation

This process enables us to analyse whether the intended outcomes were achieved for your product or concept in the Iterative Phase and encourage the discovery of other, more efficient methods if required.

Production Support

Once a product has gone for production, we'll support you through this process, fixing any issues that arise and ensuring the process is as smooth as possible.

Product Design

We'll support you to turn your concept or idea into a product that is viable for manufacture.

Product Testing

Throughout the process detailed testing is conducted on each iteration of the product to ensure it is right and to identify if any further improvements could be made to the production process.

Supplier Down Selection

At MTC, we are vendor agnostic so once you have a design that is commercially viable, we'll help you to find the right suppliers to support your route to market.

Supplier Liaison

Once you have selected the suppliers that will assist you to manufacture your product, we'll liaise with them on all aspects and remain on-hand to advise where required.

Virtual Prototype Build

Alongside building physical prototypes, we can also create virtual prototypes which allow us to test your concept virtually and make design adjustments, cutting both time and costs of development.

Get in touch

To find out more about how we could support you to productionise your design utilising the capabilities available, please do not hesitate to contact us on pmi@the-mtc.org.

Groundbreaking Mobile Router Developed At MTC

A ground-breaking compact and secure bonded router which solves connectivity and cyber security issues associated with mobile routers is being developed at the Manufacturing Technology Centre in Coventry.

The AlbeePro smart router has been developed by Cheshire-based communications business Albeego. Engineers from Albeego have been working with experts from the MTC to develop the router and are now preparing to commercialise the innovation and bring it to market.

The router is the first mobile, compact, affordable, and business-secure router, able to provide fast, stable, and secure connectivity, free of the problems of unstable, insecure, and poor connections on the move. More than 60 of the units are being produced for beta testing with a wide variety of companies and organisations, with production planned later this year.

The new router is aimed at a range of market sectors, but particularly those where reliability and security is paramount including the emergency services, defence, medical services, and banks, as well as other sectors where secure, resilient, mobile communication is paramount.

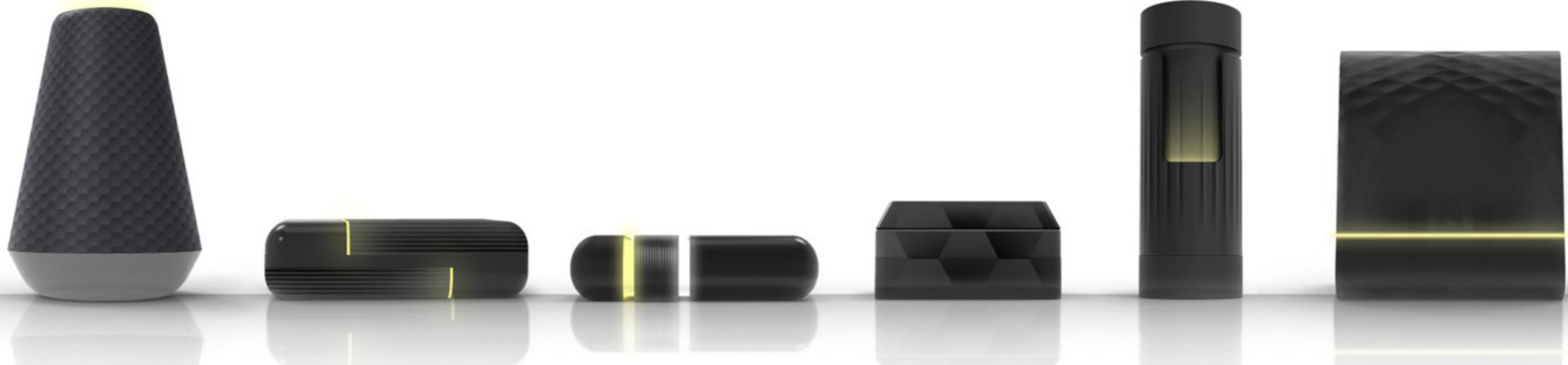
The MTC's Product Manufacturing Incubator has been working with Albeego engineers to develop processes which will allow the routers to reach production stage. This has included design, technical specification, reduction of size and weight, testing, production-readiness, materials supply and regulatory processes.

“ Early on we felt we were a unified team and our experience of the MTC exceeded our expectations. As well as seeing our ideas come to life through each step of the project, the knowledge and experience we have gained is immeasurable. When the prototype was unveiled, we were massively excited, seeing the concept come to life. We are extremely optimistic about the future of the product, and we look forward to further co-operation with the MTC team as we continue to develop products.

Simon Precious, Director, Albeego

“ Albeego has brought innovative and disruptive technology to their sector and we are delighted to be helping them bring their router to market. We are able to provide a de-risked environment for start-ups and entrepreneurs with the support of our product development team from concept to manufacture. The MTC's Product Manufacturing Incubator gives companies the opportunity to draw on the wider manufacturing community to create a successful and sustainable business. Our knowledgeable team offers an end-to-end service to reduce the stress of bringing a product to market.

Gabrielle England, Business Development Manager, PMI



Albeego

Sector
Telecommunications

Capabilities Used

- Concepting
- DfA
- DfM
- Ideation
- Process Evaluation
- Product Design
- Physical Prototype Build
- Virtual Prototype Build

Manufacturing Process Design To Introduce Automation To Production Of Snap-Fit Roof Tiles

Carapace Slate approached the MTC to support the development of a manufacturing process to produce snap-fit roof tiles. Having seen the MTC's Factory in a Box concept, the team at Carapace Slate wanted to explore viable automated solutions to improve productivity, speed of manufacture, and quality of output.

Carapace Slate uses waste slate material to manufacture composite snap-fit roof tiles. Its unique system, where tiles self-align and interlock without nails or screws, has been designed to significantly improve speed of installation, subsequently reducing resource levels, as well as production and labour costs.

Initially each roof tile was being made by hand, so Carapace Slate wanted to introduce automation to the manufacturing process to significantly improve productivity and reduce the need for manual intervention, whilst still retaining the key components of the tile design.

At the start of the project, the PMI and Design and Build teams at the MTC, in partnership with Innovate UK, spent time onsite at Carapace Slate to understand the processes and potential challenges with implementing an automated manufacturing process.

Upon understanding the technical specifications, the MTC created concepts specifically addressing the key areas of development with regards to both the machinery and the process, including:

- Tile transportation and storage
- Mould tool actuation
- Process timings
- Size and weight constraints

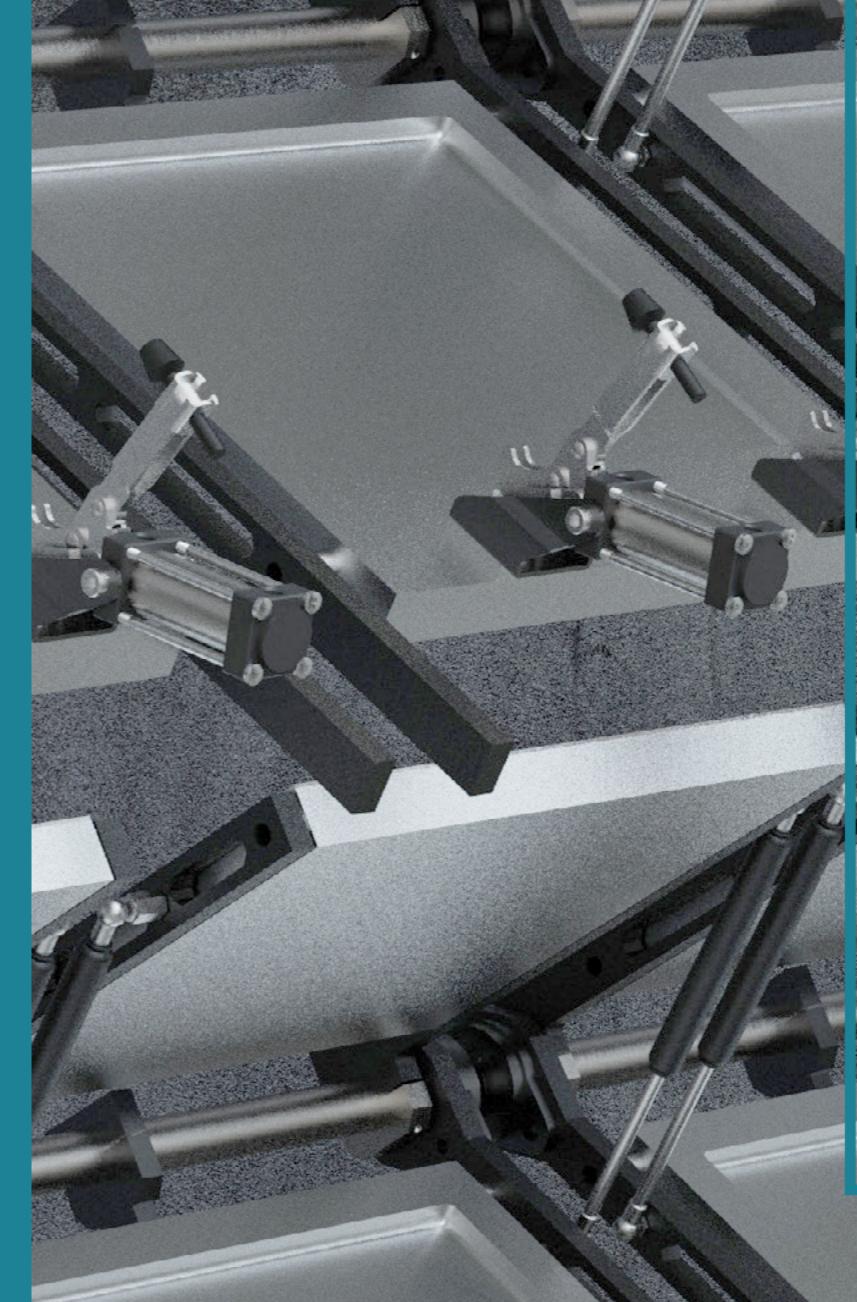
The next phase of the project modelled the impact and feasibility of a different number of mould tool units and end effector variants to meet production targets and potential solutions to automate the clip insertion process

A CAD model animation was created to simulate robot movement and to help determine the position and height of the robot. The tile design was reviewed throughout the project phases and the mould tool design updated accordingly. A controls system architecture was also scoped out.

One of the primary features of the final mould tool design is modularity - this was a requirement outlined early in the concept phase.

In delivering against this, the final design achieves the following benefits:

- Improved scalability and cost efficiency
- Easily interchangeable tooling (approx. 10 minutes), therefore reducing machinery downtime
- Simple hinge mechanism means limited requirement for moving parts and therefore cheaper to manufacture and maintain
- Lightweight and compact footprint



“ We've loved every minute of working with the MTC. The unique dynamic of multi-skilled technical-led governance from the MTC alongside the commercially focused, agile approach of a start-up, resulted in a highly productive and enjoyable partnership. It's a fantastic example of how cross industry collaboration between an HVM Catapult and micro-SME can achieve technological ambition and growth whilst remaining inherently commercially driven.

**Amy Sheldrake, Founder & Director
Carapace Slate**

Carapace

Sector
Construction

Capabilities Used

- Animation
- Concepting
- DfA
- DfM
- End Effector Design Work
- Ideation
- Machining Support
- On-Site Build Support
- Physical Prototype Build
- Product Testing

“ Working with Carapace Slate to materialise their ideas has been an exciting journey to say the least. Helping SME's to develop and grow is at the heart of what we do in the MTC's Product Manufacturing Incubator and this project has been testament to such a great collaboration.

**Will Hankins, Research Engineer -
Design & Build Machines, MTC**

Halo

Sector
Medical

Capabilities Used

- Concepting
- Down-Selection
- Ideation
- Physical Prototype Build
- Product Design



New dental aerosol protection equipment to safeguard against unwanted aerosol contaminants

Named 'Halo', the equipment provides up to 99% protection when used in conjunction with standard dental high-volume extraction equipment.

The project, which has been funded by the MTC, is a collaboration between BLC, PMI and the MTC's design and simulation teams. It is also the latest in a series of projects led by PMI which have been focused on the launch of new medical devices.

With Halo, MTC engineers developed the high-volume extraction unit using simulation techniques, to allow for changes to the design of the device during the concept phase. A prototype was then produced using 3D printing.

Halo, the name given to the device which sits over the mouth during procedures, is ergonomically designed to be comfortable for the patient. It is attached to a hose, which is connected to a pump that fits beneath or to the side of a dentist's chair. Using suction, the aerosol particles are fed through a high-efficiency particulate air (HEPA) filtration system and collected in a disposable bag within the pump; this is removed after every use using a handle, so staff do not come into contact with the bag. The Halo device has also been designed for single use.

Halo is just one in a series of MTC projects concerning the development of medical devices to help the fight against COVID-19. In 2020, in partnership with Rolls-Royce and leading medical practitioners, the MTC developed aerosol generating procedure (AGP) shields to protect frontline NHS staff when carrying out intubation procedures for COVID-19 patients. A new face visor, designed using laser cutting technology, was also developed, and an open-source technical pack was made available for free download to manufacturers.

“ The risk of COVID-19 transmission via airborne particles has resulted, in some cases, in appointment capacity reduced to 15-20% versus pre-pandemic, due to the time required for equipment and room sanitisation and changing of PPE. So, in working with a number of dentist practices, we wanted to develop a solution that not only helped to maximise appointment time, but also protected staff and patients, as well as mitigated concerns regarding the safety of dentistry procedures in light of COVID-19.

Dean Baker, BLC Director, MTC

“ We went through a number of design iterations when developing Halo, and so being able to simulate the device at each stage meant that we could adapt the specification more easily, and then measure the effect of design changes ahead of manufacturing the prototype. We also explored different forms of suction and worked closely with dentists to understand what would be required from this type of device to help futureproof it and safeguard against other airborne diseases.

Reiss Harvey, Advanced Research Engineer, MTC

Concept development and design of adapted standing frame to support patients with cerebral palsy

The Orthotic Research & Locomotor Assessment Unit (ORLAU) based at the Robert Jones and Agnes Hunt Orthopaedic Hospital NHS Foundation Trust, Oswestry, approached the MTC's Product Manufacturing Incubator (PMI) to see if the MTC could support in the design and production of a new standing frame for patients with cerebral palsy. PMI, along with the MTC's Design and Build team, took up the challenge.

The frames, which help individuals to stand supported for periods of time, are used to aid rehabilitation, and can bring about important health benefits that can't be achieved in seated positions. However, the current standing frames have a number of limitations.

Each frame is bespoke to the user, with limited ability to re-adapt for another patient; consequently, the product lifespan is relatively short and therefore less cost effective. The cost to manufacture is also a factor to address, as is the ease of use by a medical professional and/or carer to support patients getting in and out of the frame.

A lot of standing frame users are also children, and anecdotal feedback is that the frames look 'intimidating' and 'too industrial', and that once in the frames, patients are unable to carry out activities that would help distract and entertain whilst standing e.g. arts and crafts, playing with toys, baking etc.

In working with the MTC, ORLAU set out a series of objectives for the new design concept:

- Greater comfort and more aesthetically pleasing for the user
- Improved ease of use for medical professionals / carers
- Reduced production cost to support low volume manufacture
- Improved ease of assembly

The process all started with a Discovery Workshop to define the requirements of what was needed to start addressing these challenges.

Central to this was understanding how medical professionals and patients would like to use the frame, which would then inform the next phase, concept generation.

Following agreement of the project scope, the Design and Build team came up with a series of design concepts, each addressing key specifications identified from the discovery workshop.

These concepts were shared with the ORLAU team, who identified their preferred concept to take forwards to prototype which was the aluminium extrusion concept with modular design. The key benefits included: infinite adjustability and modularity, enabling simple assembly and set-up for each patient.

Upon completion of this concept development phase, the product has been reviewed by both ORLAU and the Design & Build technical governance teams. The Design and Build team then sought to produce a first off prototype to present to ORLAU and showcase at the MTC.

“ We were amazed with the discovery workshop and very impressed by the professionalism and energy that was brought by the team. We found it extremely valuable and that was testament to the manner with which the MTC team interacted and fuelled the discussions on the day. The non-engineers amongst us were blown away by the whole process and amazing facilities. we came away with more in that one day than we hoped for; it was way above our expectations.

Keith Miller CEng MIMechE Clin Sci, Rehabilitation Engineer, the RJAH Orthopaedic Hospital NHS Foundation Trust

“ We undertook this challenge for a variety of reasons; not only does it support growth and knowledge for UK manufacturing, it is wider than that, as it also provides help for generations of society in their everyday needs to become more mobile, improving their health and wellbeing.

Gabrielle England, Business Development Manager, PMI



Orthotic Research & Locomotor Assessment Unit (ORLAU)

Sector
Medical

Capabilities Used

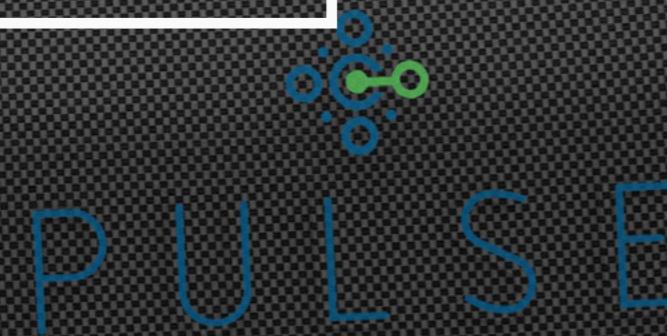
- Concepting
- DfA
- DfM
- Ideation
- Product Design
- Physical Prototype Build
- Virtual Prototype Build

Build Test Solutions

Sector
Construction

Capabilities Used

- Concepting
- Ideation
- Down-Selection
- DfA
- DfM
- Ideation
- Physical Prototype Build
- Physical Representative Build
- Production Support
- Virtual Prototype Build



Product design capability drives improved portability and reduction in production costs.

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“ Our work with the MTC to realise an updated version of the Pulse product that both responds to customer feedback whilst ensuring the commercial viability of UK based production and assembly has been extremely rewarding. This redesign from the ground up will prove vital as we advance with scaling up production and supply into the UK market and beyond.

**Luke Smith, Managing Director
Build Test Solutions**

“ The Pulse project has been one of the most interesting projects for the MTC's Product Manufacturing Incubator (PMI) as its evolved through each stage of its development, from its initial discovery phases through to the delivery of a functional prototype. Collaboratively we have developed a product that is disruptive, innovative and conceptually unique, it's been an absolute pleasure to work alongside Build Test Solutions and the MTC's Product Design team.

Gabrielle England, Business Development Manager, PMI

Redefining product design and assembly methods to revolutionise durable sports earbuds

Tzuka was founded by Tom Jelliffe, a keen sportsman and gym goer. In his final year of university, with nine pairs of broken earphones between him and his gym partner, Tom discovered this was a far-reaching problem. Market research revealed that 10.4m pairs are broken in the UK during sport every year, with £192m spent on replacement sets.

With most sports earphones targeted towards runners and aerobic sports, Tom spotted an opportunity to design and manufacture durable sports earbuds that are engineered to withstand use in challenging conditions. Investigations found that product assembly methods across various brands differed very little, regardless of price, and that these methods were not resistant to impact or exposure to water.

Armed with ideas and in the early stages of concept design, Tom established Tzuka, and sought to procure support for product design and assembly. A former student of Loughborough University, Tom was introduced to the MTC's Product Manufacturing Incubator (PMI) by the university's graduate enterprise hub, The Studio.

Tom approached the MTC with a brief to design and manufacture durable wireless sports earbuds, capable of taking impact as well as being totally shock, dust and waterproof to enable use during water sports, without compromising high-quality sound output.

At the start of the project, the PMI team conducted a series of ideation workshops which included a detailed analysis and review of other products on the market. This helped formed the basis of the project's development plan.

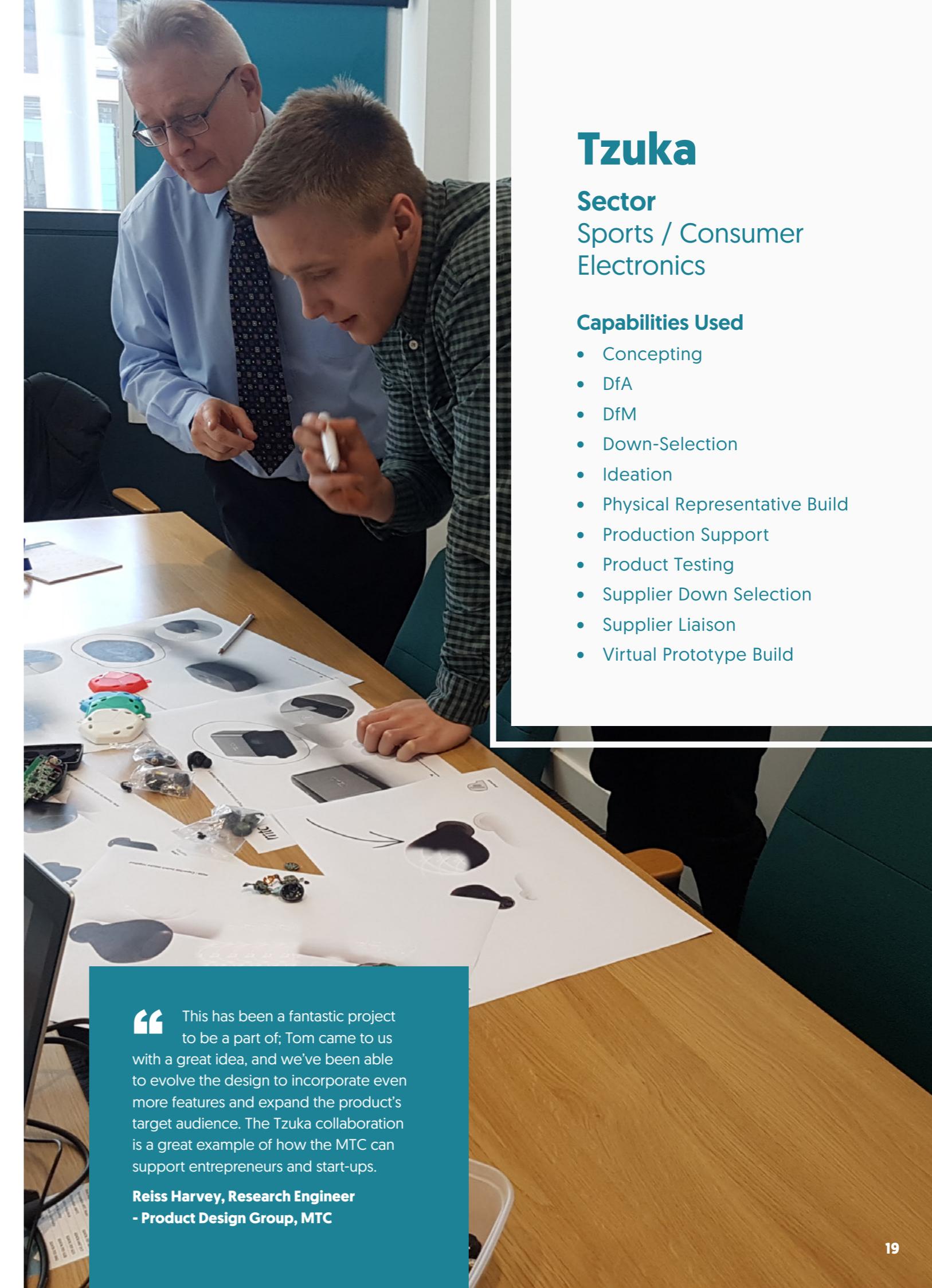
“ From our first meeting, the MTC were very engaged and passionate about the project – when it's your own ideas being presented, this is really important. They have been instrumental in the product design and engineering and have helped us improve and refine our product, which has enabled us to incorporate functionality that we didn't believe would be possible.

**Tom Jelliffe, Founder and Managing Director
Tzuka**

The MTC's Product Design team were tasked with designing the casing and used 3D printing techniques to produce prototypes. With durability a key USP for the earbuds, the product designs targeted an IK Rating [Impact Protection Rating] typically associated with larger products, and therefore had to adapt the design accordingly. In doing so, the MTC worked in collaboration with Newbury Electronics who are responsible for the electronic layout.

The product was also originally designed with a capacitive button to reduce the requirement for mechanical movement within the casing. However, feedback from the first round of user testing found that this was difficult to use in conditions where the button's responsiveness was compromised e.g. underwater or in sports where chalk is used for grip e.g. weightlifting/climbing. This resulted in the requirement for a mechanical switch, so the product design was adapted ahead of a second testing phase.

The project is now in its final phases and the product, the TZ7 Armour, is set to launch in 2022. The collaboration between Tzuka, the MTC, and Newbury Electronics, is set to result in the design and production of the first earbuds ever to have an impact resistance certification.



Tzuka

Sector
Sports / Consumer Electronics

Capabilities Used

- Concepting
- DfA
- DfM
- Down-Selection
- Ideation
- Physical Representative Build
- Production Support
- Product Testing
- Supplier Down Selection
- Supplier Liaison
- Virtual Prototype Build

“ This has been a fantastic project to be a part of; Tom came to us with a great idea, and we've been able to evolve the design to incorporate even more features and expand the product's target audience. The Tzuka collaboration is a great example of how the MTC can support entrepreneurs and start-ups.

**Reiss Harvey, Research Engineer
- Product Design Group, MTC**



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Start your journey

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