



Designing Inclusive Kitchen Tools



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*Technical Design and Technology is a new course at the University of Malta, and **Andrea Gerada** is a recent graduate from its second intake of students. Having previously worked preparing food in a kiosk, Gerada chose to combine his interests in product design and the culinary arts when selecting the subject of his dissertation.*

Imagine you are preparing a simple, healthy meal. Let's take a chicken salad as an example. You will need onions, tomatoes, carrots, chicken, and lettuce, amongst other things. Now imagine yourself chopping, shredding, peeling, slicing, and cutting all the ingredients. However, there is a twist. Imagine you have to do these tasks with one of your hands tied behind your back. In a few words, Gerada demonstrates how these simple daily tasks suddenly become something far more complicated for those who suffer from a physical hand condition.

For most, it may not be healthy or economical to order food every day. There is also the issue of independence, as one might not want to always have to depend on others to prepare one's food. Gerada points out that it is not just one-handed people who might suffer, as there could also be people affected by problems such as carpal tunnel syndrome or arthritis.

It was this thought process that got Gerada through the first steps of designing an 'Assistive Multifunctional Kitchen Tool for One-Handed Users', providing them with a convenient way to prepare food at home. To get started in the long process of designing the tool, Gerada circulated a questionnaire to see how hand immobility affects meal preparation. Using the online questionnaire, he was able to identify a significant decline in home meal preparation amongst those who had been injured, identifying a wider potential market for the product he was about to begin designing.

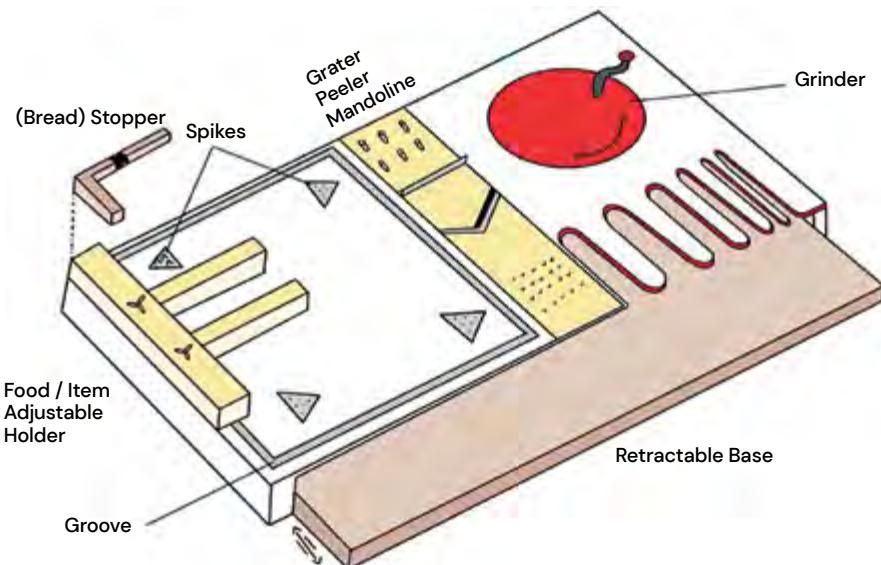
PRODUCT DEVELOPMENT

Gerada's creative process began with identifying the design problem. This is the issue and need which the product would address. Having identified the challenge to one-handed users in the kitchen, Gerada was then able to move on to the next step of the process, asking a design question:

'Can individuals who suffer from a medical condition affecting one of the upper extremities prepare their own meal in an affordable fashion?'

Gerada then carried out market research and a literature review, looking at what other products were on the market to address this problem. Having gathered all the data he needed, Gerada was able to use a Quality Function Deployment (QFD) model. This is a model for product development and production and was originally popularised in Japan in the 1960s. It aids in translating customer needs and expectations into technical requirements by putting the customers at the forefront of the design process. Customer requirements, requests, demands, and preferences are itemised and ranked in importance in the model. Gerada was thus able to get an idea of what kind of product would genuinely be useful to customers.

'During the design thinking process, I made use of design tools, and one ➔



Winning Concept I
Image courtesy of Andrea Gerada

of the first was the QFD. From the market research and questionnaire, I could transform my data into customer requirements, and these could be turned into product design specifications. With more research and thinking, I could come up with design parameters. These parameters took me to the next design stage.'

FUNCTION-MEANS TREE

Gerada explains that in the next stage of the process, he applied the function-means tree model. This helps break down an overarching function into different parts – for example, whether one chops by hand or with a machine. If it is hand-powered, then one moves to the next step in the creative process.

'For a creative solution to be achieved, there are a number of steps and stages that should be followed. The function-means tree allows one to break down a large problem into a smaller one and then provides different means or options to solve it. The designer is not constrained at this stage, as such constraints may inhibit the development of an innovative idea.'

As his next step, Gerada used the morphological matrix. 'The matrix helps one to identify the various products on the market for different functions. For example, under the activity of peeling, one can look at all the peeling devices in one place. Just by looking at all these devices, one can imagine different combinations and thus picture new design opportunities.'

Gerada explains that from this stage of the process, he developed nine design concepts. Eight concepts were generated at an early stage of the conceptual design stage, whereas the ninth concept was developed later on in the process.

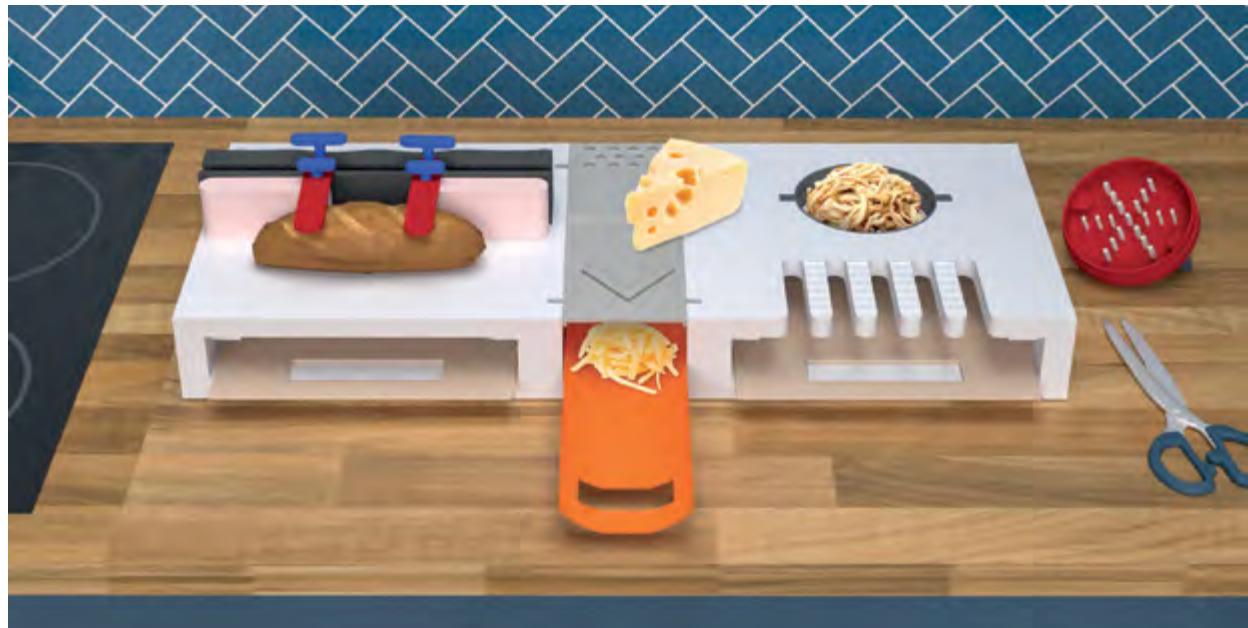
Having produced a number of concepts by running his data and market research through various design models, Gerada moved on to the concept evaluation stage. The purpose of concept evaluation is to assess each concept according to a common set of criteria. This is done in order to shortlist the concept that will ultimately be further developed. The concept evaluation is composed of two stages: concept screening and concept scoring. This strategy prevents designers from investing too much energy on detailed work.'

The next two phases Gerada carried out, namely screening and scoring, are designed to narrow down the concepts by using criteria such as grip or safety. Other criteria which were flagged as important included the ease of setting up the device and the practicality of cleaning, assembling, and disassembling it. Having used these criteria and scored his various designs, Gerada settled on his final concept: Concept I.

EMBODIMENT DESIGN STAGE

'With the key concept decided upon, the embodiment design stage is where further detail, decisions, and considerations are studied and applied.' Gerada elaborates that the next challenge was to refine his concept, and ergonomics was one of the chief focuses at this point. Ergonomics emphasises that designs must fit the needs of the operator, not the other way around. The goal is to eliminate discomfort and risk of injury. Therefore, Gerada applied ergonomic principles and set about making his design as symmetrical as possible, as this is one of the best practices in the field.

For example, symmetrical design means that the consumer benefits from less confusing product marketing, such as not having to worry about whether the product is left or right



Prototype render

Image courtesy of Andrea Gerada

handed. At the same time, however, the manufacturer also benefits, as the process to create the product is simplified, shortened, and thus, cheaper. Even the choice of colours was considered in terms of potential impact upon emotions, with Gerada noting a link between colours, appetite, and mental health.

Another example of ergonomics in practice in Gerada's design was creating a board underneath a shelf to collect anything that dropped when chopping ingredients. The retractable tray could then be used to empty ingredients into a pot or a pan.

One of the chief considerations in designing and then refining the product was its ability to be assembled and disassembled into various neatly fitting parts and modules. This would also help with recycling and cost-effectiveness.

Gerada explains that he used prototyping software to build 3D models of the product throughout the process, helping him to visualise, spot, and make changes as necessary. Towards the end of the project, he carried out physical prototyping, building a model of his design using cardboard. He revised his work at the end of the process through a Failure Modes Effects Analysis: a systematic tool to determine the different ways in which his product might physically fail. It looked at components such as rotating parts and ensuring a sufficient level of friction to prevent the product from sliding on a kitchen counter. Gerada points out how, due to the various materials which kitchen counters are made of, it was difficult to anticipate this aspect.

Having designed the product, Gerada emphasises the importance of communicating effectively with the manufacturer. To this end, detailed design drawings of

every component must be made available along with the selected list and bill of materials. The key, therefore, is to ensure proper communication with the manufacturer via detailed schematics.

No product is complete, however, without its marketing aspect. Gerada developed his own brand for the product and emphasised the need for this choice to be unique in order to establish communication between the company and the customer. Gerada underlines that his product is one ultimately aimed at providing a public service, and thus service was emphasised in the brand identity. Concluding his discussion on the design of the product, Gerada mentions how the design aims to leave a significant positive impact on the consumer's life, offering it as a contribution to the well-being of others.

Asking Gerada what the next step for him is, he expresses interest in a career in product design in manufacturing. Having learned key design concepts and put them into practice, Gerada will surely find his place in Malta's diverse manufacturing sector. When asked what was next for his kitchen concept, Gerada is coy – rather than registering for the patent, he much prefers to publicise his work through other mediums. One hopes that his work ethic and skills will get the notice they deserve. 

Further Reading:

Gerada, A., 2022. *Design of an Assistive Multifunctional Kitchen Tool for One-Handed Users*. Undergraduate dissertation. University of Malta.