Glove80

An Ergonomic Keyboard
Designed for Life

To meet the exacting requirements of a truly ergonomic keyboard, we have made significant innovations in the landscape of keyboard design.

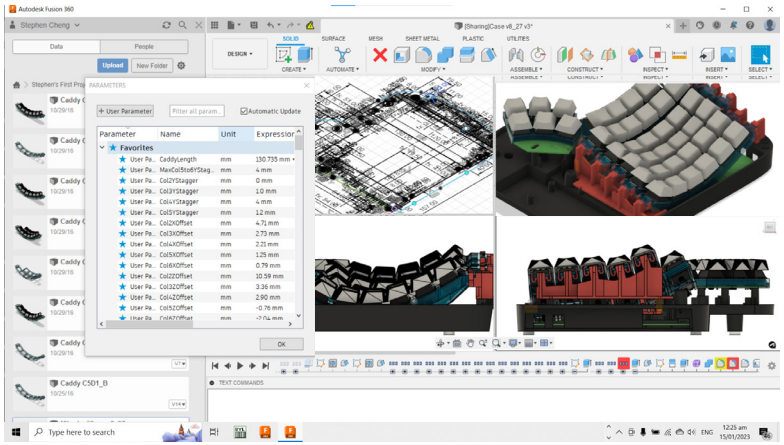
Innovations

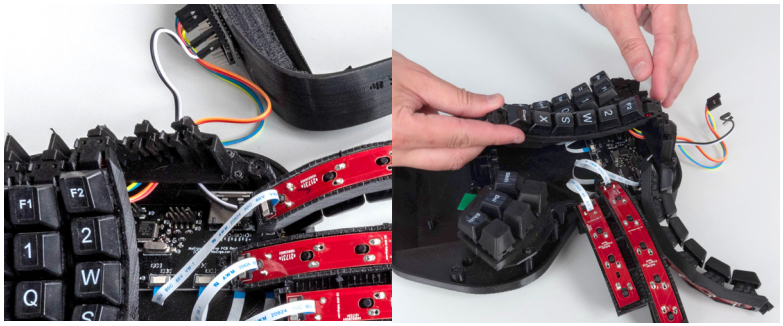
moergo

Enabling Continuous Iteration

Hundreds of variations on ergonomic design in a short amount of time

To design ergonomics that would work for as many people as possible, we wanted to be able to test the slightest change of shape and angle for every key to test how it affected our users' typing on a fully functional prototype. We developed a completely modular prototype based on a parametrically controlled CAD model to do this. The model had over a hundred different parameters that allowed us to quickly and precisely modify every aspect of the position and angle of each key. This meant that in as little as ten minutes, we could change a parameter or two and print a replacement module, ready to test with real-life typing.





We designed the prototype around modular key columns and column-holding end-plates. The columns snapped into the end-plates, giving fine control over the height, angle and position of each column. By reprinting the end-plates, we could make rapid changes to the position of one or more columns and functionally test it by snapping it into place. By reprinting a column, we could quickly change the positioning of each individual key, rewire only that column, and be ready to type.

Our innovative modular prototype meant we were able to experiment with over 500 prototypes, which allowed us to complete extensive A/B testing to find the most ergonomic form for the most people.

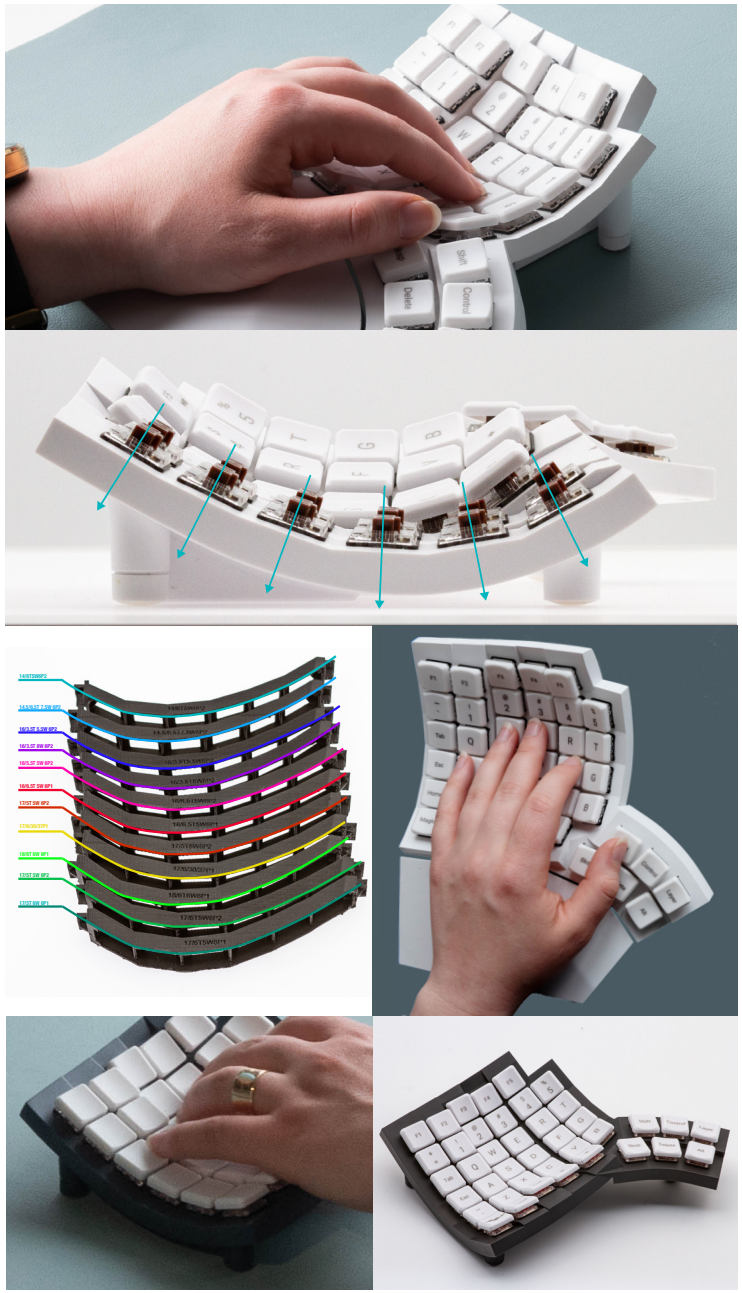
Precision Keywell

Crafted Position and Movement

Ergonomic Shape

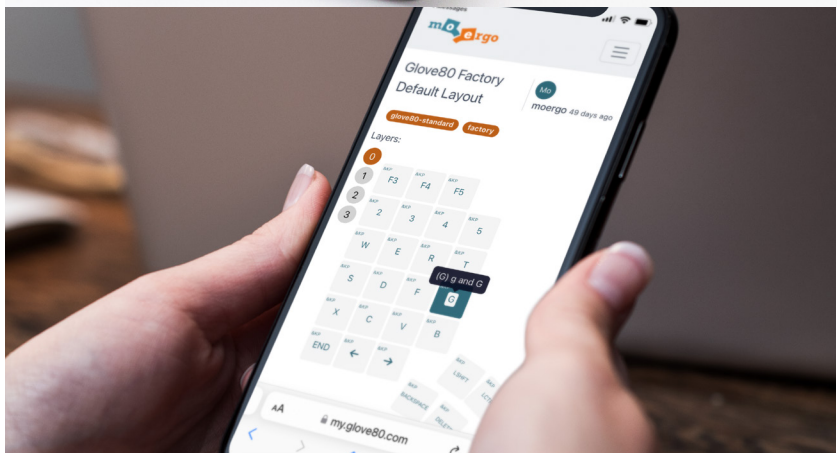
The Glove80 keywell is uniquely refined to be suitable for a wide range of hand sizes and shapes. The keys are easier to reach than competing keyboards because we were able to rapidly and extensively test variations in the placement and angle of each individual key across a pool of users with different hand shapes. Glove80's keys are arranged according to the fingers' biomechanics. Unlike some competing keyboards whose curved columns follow a circular arc, the arc shape of Glove80's columns more closely resembles the golden ratio spiral: a shape which results from the fingertip's natural movement through three separate joints.

Although we started with designs based on anatomical models, we found the models are far too limited. The only way to accommodate the variation between people was through iterative refinement. For example, the solution for the pinky finger, which is remarkably varied in length and has two dedicated rows on the keyboard, required significant refinement to allow for both long and short pinkies.



Perpendicular Movement

Each switch is positioned at a precise angle to match the fingertip's position and direction of movement in the hand's curling motion. Importantly, by angling the switches themselves rather than the keycap surface, we could make the key press action perpendicular to the key surface, unlike any other contoured keyboard. A perpendicular action is much smoother, aligns better with users' intuition of the motion, and optimises the finger's movements. This is particularly important for the keys closest to the palm, where the fingers are most curled. In this position, a downward press is particularly difficult.



Precision Keywell

Full Customisation

Interchangeable Keys

By creating the arc with the position of the switches rather than by using angled keycap surfaces, we were able to make all our keycaps fully interchangeable, allowing users to position and reposition their key layout as needed. This is important because visual feedback is an essential part of typing for most people. Competing keyboards achieve their ergonomic form through the shapes of the keycaps themselves, meaning rearranging the keys is highly limited.

Web-configuration

To support users in customising their key layouts, we created a web application that allows users to configure their layouts and share them with others, a desirable feature for the ergonomic keyboard community. The customised layouts can be easily applied directly to the keyboard. The app also allows users to create layouts with multiple layers that can be switched between with a key press, making it easy to create application-specific layouts with dedicated key locations and shortcuts. For example, custom layouts can make it easier to use workflows that heavily use the mouse and keyboard at the same time by concentrating important functionality on one hand of the keyboard, leaving the other hand free to use the mouse.

Tenting and Mounting

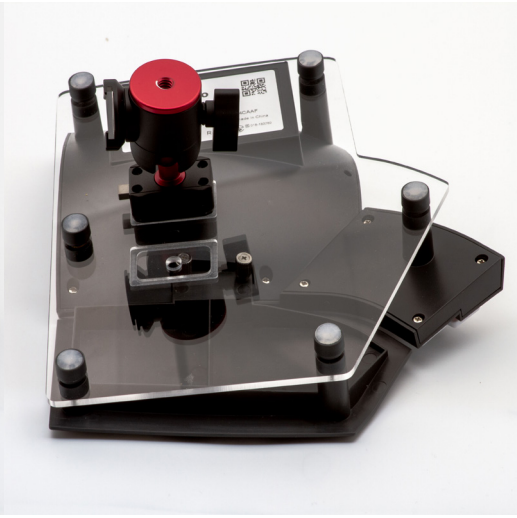
Innovative leg system that supports both tenting and custom mounting

We created an innovative leg system based on threaded rods that allows Glove80 to support both tenting and custom mounting without adding any additional height or bulk to the keyboard.

Tenting

To achieve an ergonomic typing position, the hands should not be held directly parallel to the desk but instead be slightly rotated, so the thumb is pointing into the air. Everyone has a slightly different preference for what angle of rotation is most comfortable. Ideally, a keyboard should be able to be positioned to match that angle of maximum comfort.

To achieve this, we have designed a built-in tenting system that is unique. Users can smoothly adjust Glove80 to any angle using the threaded rods embedded in the keyboard's legs, rather than merely selecting between a few predetermined positions. For even steeper angles up to 30 degrees, longer threaded rods are included with the keyboard. This is the steepest built-in tenting angle offered by any keyboard on the market. Glove80's tenting system adds no extra height when not being used, in contrast to other tenting stands which add height even at the lowest setting. Moreover, unlike most keyboards on the market Glove80 can be used with the palm rest while in a tented position.



Tenting and Mounting

Innovative leg system that supports both tenting and custom mounting

Custom Mounting

In addition to tenting, the threaded-rod leg system also provides a simple means of custom-mounting the keyboard without making modifications. Because each foot of the keyboard includes a threaded insert, the feet themselves can be used as a built-in mounting system. This allows the keyboard to be easily mounted to surfaces simply by using the feet as bolts. We offer a plate adapter that makes these mounting points compatible with standard photographic tripod fittings, which gives users a simple way to use common and robust off-the-shelf equipment to make custom mounted solutions such as vertical or chair-mounted keyboards.

Thumb Cluster

Designing for the Thumb's Biomechanics

We also developed the thumb key arrangement through extensive testing. Thumbs are the strongest digit of the hand, and are remarkably underused when typing on a standard keyboard. Several contoured keyboards have thumb keys arranged in a cluster. However, none are designed around natural thumb movements, and typically require users to move their palms to reach some of the keys.

The joint at the base of the thumb (carpometacarpal joint) lets the thumb move outwards from the palm in a wide arc even when the wrists are in a fixed resting position. Because this movement is the most comfortable and widest reaching for most people, we designed the form of the thumb key cluster around this arc. For users to be able to reach all the keys without lifting their palms, we had to design to a significant number of constraints. We wanted to place six keys following the arc of the thumb's movement, using two rows of keys. Each key needed to be individually reachable and able to be pressed without interfering with surrounding keys.

We refined not only the horizontal arc of each row, but the downward curvature and tilt of the arc, the height of the rows, the spacing, the staggering and the 3-axis angle of each key. The resulting arrangement showed a big improvement when our users compared their typing movements with existing contoured keyboards. We have a patent pending on our thumb cluster layout.

Low Profile

A keyboard that doesn't require a whole new desk

The low profile of Glove80 is a big factor in its ergonomic success. Glove80's lowest key is only 20mm from the surface of the desk: this is around 12mm lower than the leading competing keyboard, Kinesis Advantage.

Contoured keyboards are typically tall to accommodate the shape of the contouring. This is a problem when using a standard desk as it raises the typing surface too high, resulting in users raising their shoulders and hands and typing under tension. Other contoured keyboards attempt to address this issue by tilting the keyboard towards the user, thereby lowering the palm position. Unfortunately, this means that the user's wrists are bent backwards, which is not a good ergonomic position. We created Glove80 to be low enough to support a neutral wrist position on a standard desk. We achieved this by working with extremely tight tolerances, low-profile, nonstandard mechanical switches and thin flexible circuit boards. (Mechanical switches are non-negotiable in the ergonomic keyboard community.)

Contoured keyboards are visually dominant. Taking advantage of the low profile, we aimed to reduce the visual weight of Glove80 by keeping the form as close to the components as possible and reducing the thickness of the edges. We wanted Glove80 to fit visually in a professional environment, providing people with an ergonomic keyboard they don't want to hide. Additionally, Glove80's low profile and split design makes it the most portable contoured keyboard available.

Functional Aesthetics

An ergonomic keyboard you don't want to hide

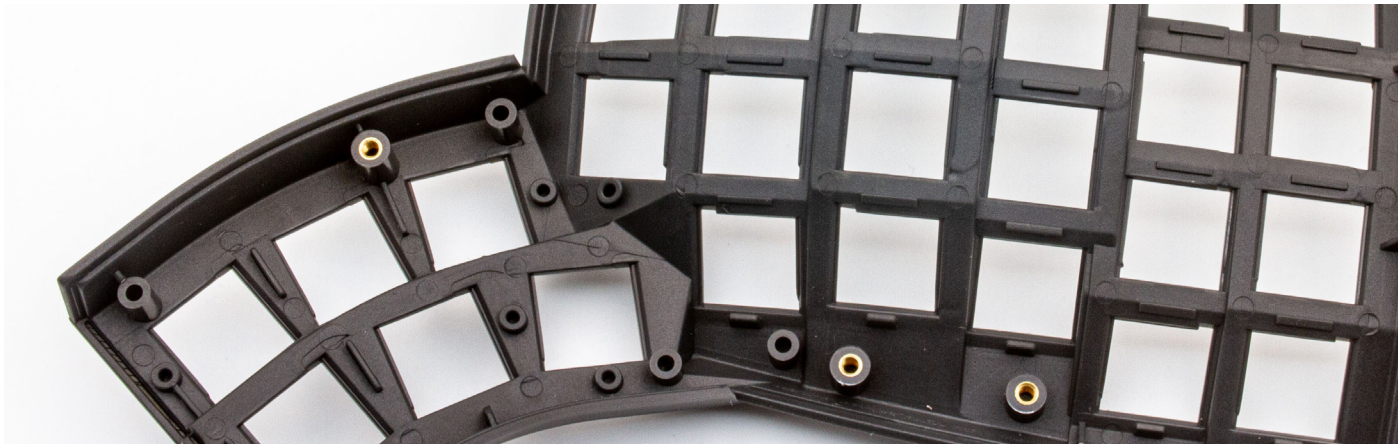
The Glove80 keyboard is designed to be both ergonomic and visually appealing. Many other ergonomic keyboards have not prioritised their aesthetic language. By approaching their aesthetics as an afterthought, they make the same mistake as many products designed for disabilities or medical needs. Because they focus on meeting a specific physiological need, they ignore the need for the product to be visually compelling, resulting in products that are embarrassing to own and stigmatising.

We wanted Glove80 to be a desirable product that people would want to own. We achieved this by incorporating a repetition and extension of vertical lines in the design which emphasises the underlying coherence and structure based on the movement of the fingers, creating a visual rhythm in the design that reflects the aesthetics of typing.

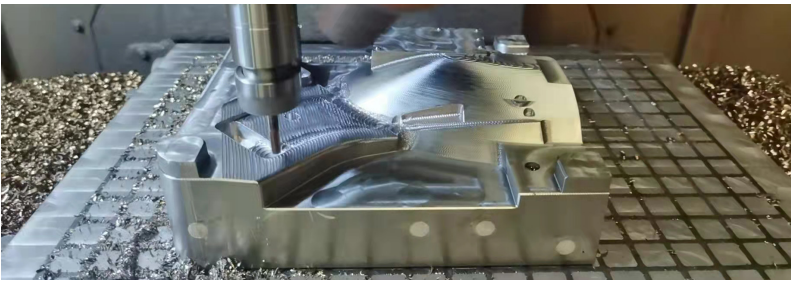
We put significant effort into designing the keycaps. Instead of using pre-mixed plastics, we developed our own blend of POM (polyoxymethylene) plastic to create keycaps that are durable, can be laser etched, have a buttery tactile texture, and appear opaque in natural light but when backlit reveal a gentle translucency which softly diffuses the light. It took us 30 iterations to find the perfect blend. We enhanced the tactile aesthetics with our custom-shaped keycap surface, designed specifically for typing on columns. The surface is carefully crafted to allow your finger to smoothly glide along a column of keys without interruption.

The resulting texture of the keycaps, the tactile feedback from the switches, and the way your hands fall onto the keys make typing on Glove80 a pleasure. The design is not only beautiful but also practical for extended ergonomic use, adapting with you over time, making it an excellent blend of form and function. Glove80 is a product that is designed to be displayed, not hidden away.

Uncompromising Manufacture



Pushing manufacturing limits to never compromise on ergonomics



Glove80 has an exact and complex 3D form which we were able to realise with only two pieces of plastic. To make this possible, the tooling required carefully designed non-parallel parting planes to eliminate undercuts. This was particularly challenging because the hole for every switch is pointing in a different direction, which required cleverly designed cut-outs around each hole to avoid undercuts. We were able to create moulds with only one side action (for the USB connector panel).

Because the clearances and tolerances required to achieve our low-profile design were so tight, the parts were highly sensitive to any warping and imperfection in the moulding process. Compounding this, the complexity of the shape made the direction of the warping unpredictable. We worked closely with the manufacturer and made a series of 12 modifications to the moulds to design in compensation for the resultant warping without making the form any thicker.

By pushing the boundaries of manufacturing we were able to achieve the requirements of production without making compromises to the form or resorting to expensive methods that would make the product too costly for our customers.