

BODY / PATTERN

The Body as a Method in Fashion Design

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THE BODY AS A DESIGN PROBLEM

Every day, we wear clothes without almost ever stopping to think about everything that lies behind this simple act. We choose a T-shirt, a jacket or a pair of trousers according to the temperature, the occasion, or simply what we find in our wardrobe. Getting dressed therefore seems like a natural, almost automatic action. And yet, before reaching our body, every garment has gone through a long design process. Someone has decided how wide a shoulder should be, where to place a seam, how much distance to leave between fabric and skin, and how much space the body should have to move within the garment.

Behind every line drawn on a pattern lies a decision. A sleeve is not simply a piece of fabric sewn around an arm. A pocket is not simply an added space on a surface. A seam does not necessarily have to be placed where we are used to seeing it. Even an apparently simple volume is the result of a series of previous decisions.

All of these decisions can be traced back to one fundamental question: what is this garment supposed to do once it is worn?

It is precisely from this question that pattern cutting begins.

When we think about pattern cutting, the first image that often comes to mind is a set of technical rules: measurements, proportions, lines and geometric constructions. Pattern cutting does indeed include all of these elements, but reducing it to technique alone would mean overlooking its most interesting aspect.

Pattern cutting is the moment in which the body is interpreted and transformed into a design.

The initial problem appears simple, yet it contains a fundamental contradiction. The human body is three-dimensional, complex and constantly in motion. A pattern, just like fabric, instead begins as a two-dimensional structure made of lines and surfaces.

The pattern cutter's task is therefore to create a connection between two different realities: a flat surface and a three-dimensional volume.

Conversely, how can a complex form such as the human body be transformed into a series of paper pieces?

ANATOMY AND GARMENT CONSTRUCTION

The answer cannot be found in measurement alone.

Taking the measurements of a body allows us to identify distances and circumferences, but this information does not yet explain how a surface should behave once it is placed around that body. The real design process begins when measurements are interpreted and translated into volume.

One of the clearest examples of this transformation is the dart. On a pattern, a dart often appears as a triangular shape, a portion of the surface that is removed or closed. Once its two sides are brought together, however, that two-dimensional subtraction produces a three-dimensional effect: the fabric changes direction and begins to form volume.

The same principle can be achieved through seams, cuts, curves and different distributions of fullness. A pattern does not reproduce the body as though it were a flat image. Instead, it creates a system of surfaces that, once assembled, are capable of generating form.

Pattern cutting constantly moves between these two dimensions.

On the table, there are lines.

On the body, those lines become space.

This transformation helps explain why a seam should not be understood simply as the point where two pieces of fabric are joined. Every time a surface is divided, the designer also gains greater control over its form.

A seam can absorb volume, modify a curve, redirect the fabric or redistribute tension. It can follow an anatomical feature, or move away from it entirely.

The position of a seam therefore becomes a design decision.

We are used, for example, to imagining the side seam of a pair of trousers running vertically along the side of the body. Its position is so familiar that it almost seems inevitable. Yet there is no anatomical rule that requires that line to remain perfectly vertical along the leg.

It can shift.

It can curve.

It can rotate around the leg.

It can be replaced by an entirely different organisation of panels.

Once this principle is understood, the pattern stops appearing as a fixed structure and begins to reveal itself as a system of possibilities.

The same is true of the space that exists between the body and the garment.

A garment rarely reproduces the exact anatomical measurements of the person wearing it. Between the surface of the body and the surface of the fabric there is a deliberately designed space. In pattern cutting, this relationship is defined through the concept

of ease.

Ease can be minimal when a garment is intended to follow the body closely, or it can increase in order to allow movement, comfort, layering, or the construction of a particular silhouette.

The space between body and fabric should therefore not be seen as an empty gap, but as an active part of the design.

A close-fitting pair of trousers and a wide pair of trousers may cover exactly the same anatomical area, yet they establish two completely different relationships with the body.

Designing a garment therefore also means designing the space that exists within it.

Anatomical form, however, is only one part of the problem. A body does not remain still in the position in which it is measured.

It bends, rotates, extends, compresses and constantly changes the relationship between its different parts.

To understand this, it is enough to consider an apparently simple element: the sleeve.

At first glance, a sleeve might appear to be little more than a tubular form designed to cover the arm. But if this were all it needed to do, there would not be so many different ways of constructing one.

A sleeve designed for a tailored jacket establishes a different relationship with the body from the sleeve of a sports jacket or a workwear garment. In every case, the sleeve must contain an arm. What changes is what that arm needs to be able to do.

The arm can be raised, brought forward, bent or rotated. Each of these movements temporarily changes the distance between different points of the body and creates different tensions across the surface of the fabric.

A construction that works perfectly on a static body can therefore behave very differently once that same body begins to move.

This introduces a fundamental distinction between anatomical position and position of use: the actual configuration of the body during a specific function or activity.

The body used as a reference when constructing a basic block is generally imagined in a relatively neutral condition: standing upright, symmetrical, with weight evenly distributed and the limbs held in a controlled position. This condition is necessary in order to measure the body and construct a coherent system.

In everyday life, however, the body spends very little time in this position.

The neutral position allows us to describe the body, but

not necessarily to describe how it behaves.

It is within this difference that pattern cutting encounters its first major design challenge: movement.

A garment must not only have the correct shape when the body is still. It must also find a balance between that form and the temporary transformations produced by movement.

When a knee bends, for example, the amount of surface required at the back of the leg changes in relation to the front. When the arm moves forward, the relationship between the back, shoulder and sleeve changes. When a person squats, the pelvis shifts in relation to the legs and certain areas of the trousers are placed under greater tension.

Design must therefore anticipate actions that have not yet taken place.

From this perspective, the pattern can be understood as a form of prediction.

It does not simply describe the body in front of it. It attempts to anticipate what that body may need to do once the garment is worn.

This also changes the way fit can be understood.

A garment may correspond correctly to a person's measurements and still restrict certain movements. At the same time, a garment may sit far away from the anatomical surface and perform extremely well in motion.

Fit therefore depends on more than the correspondence between body measurements and pattern measurements. It depends on the relationship between body, space, material and activity.

The material itself is also directly involved in this relationship.

A pattern does not produce the same result regardless of the material in which it is made. A rigid fabric holds the form imposed by the construction more strongly. An elastic material can adapt through deformation. A heavy fabric responds to gravity differently from a lightweight one.

Pattern cutting therefore cannot be separated entirely from material.

Pattern and material always work together.

In some cases, movement is made possible through the space built into the pattern. In others, it is the material itself that deforms. In others still, both strategies are combined.

This relationship becomes particularly evident when a garment is designed for a specific activity.

A body working in a factory, a body running, a body carrying military equipment or a body spending many hours seated all share essentially the same human

anatomy, yet they require very different design responses.

The body does not change. What changes is the way that body is used.

As a result, the questions addressed through pattern cutting also change.

How much space is needed?

Where should that space be concentrated?

Which areas are subjected to greater tension?

Which parts of the body need protection?

Which joints need to remain free to move?

Where can a seam be positioned without interfering with an action?

The form of the garment gradually emerges from the answers to these questions.

This allows pattern cutting to be understood not only as a system for constructing garments, but also as a method for interpreting human behaviour.

Pattern cutting does not simply describe a body.

It describes the relationship between a body and what that body needs to do.

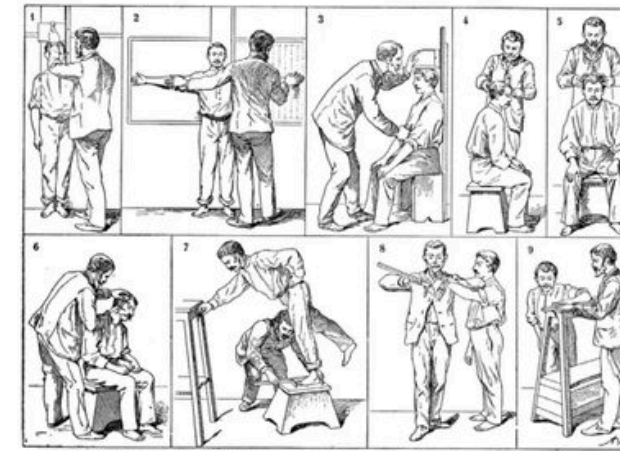
Before this relationship can become a product intended to be worn by many different people, however, a second problem emerges.

A designer can observe a specific body, understand its proportions and adapt the pattern directly to it. Industry, on the other hand, must design for a body it does not yet know.

How can a discipline built around the body function when the real body is not present?

It is from this contradiction that the problem of standardisation emerges.

STANDARDISATION OF THE BODY



Before industrial production, the relationship between body and garment could be extremely direct. In the tailoring system, a garment is constructed through the encounter between a specific person and the person designing it. The tailor can observe the client, take measurements, identify possible asymmetries and modify the pattern through successive fittings.

The process can therefore move from the body towards the pattern.

First, there is the person.

Then, the garment is made.

Industrial production introduces a fundamental reversal of this relationship.

A ready-to-wear garment must be designed and produced before the person who will buy it is known. The pattern cutter cannot know exactly what posture the future customer will have, how sloped their shoulders will be, or what the precise relationship between waist and hips will be.

The garment must exist before its body.

The question therefore becomes completely different: how is it possible to design for someone we do not yet know?

Industrial production needs to predict the body.

With the development of mass production, this need becomes increasingly important. Producing large quantities of the same garment means replacing individual adaptation with a system capable of working sufficiently well for a much larger number of people.

The solution is not to find the perfect body.

It is to construct a reference.

It is within this process that anthropometry, sizing systems and basic pattern construction become important.

By collecting body measurements, it is possible to identify frequencies, relationships and variations within a given population. Chest, waist and hip circumferences, height, limb length and many other measurements can be analysed in order to build systems capable of representing groups of individuals.

The result, however, is not the discovery of a universal body.

It is the construction of a design body.

The word "base" is particularly interesting for this reason. It seems to indicate something natural, almost as though there were an original body from which all others derive.

But a base body is not a real individual in its entirety.

It is a tool.

It makes it possible to transform the potentially infinite variety of bodies into a structure that can be used to design, modify and produce.

This transition can be understood as a form of translation.

The anatomical body is transformed into data.

The data are organised into measurements.

The measurements become a base.

The base becomes a pattern.

The pattern is developed into a series of sizes.

The final product ultimately returns to the real body.

The process therefore follows a kind of circular path: from the real body, an abstract system is constructed which must eventually function again on the real body.

It is precisely within this transition that some of the most interesting contradictions of industrial pattern cutting emerge.

A measurement, in fact, does not necessarily describe a form.

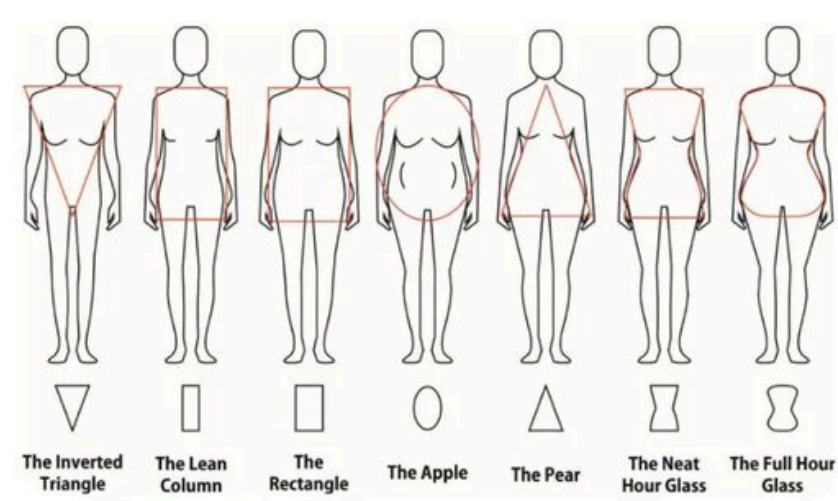
Two people may have the same chest circumference while still having very different body structures. The same measurement can be distributed differently between the front and back; the shoulders may have different slopes; the torso may be longer or shorter.

Similarly, two people with the same waist circumference may have completely different relationships between the waist, hips, thighs and leg length.

The number is the same.

The body is not.

This means that every sizing system must necessarily decide which information should be given priority.



When we say that a garment is a size 48 or a size M, we are not fully describing a person. We are using a code that associates specific measurements and proportions considered sufficiently representative to construct that product.

A size is therefore a prediction.

It assumes that a given primary measurement will correspond, with a certain degree of probability, to other bodily characteristics.

From this perspective, standardisation does not eliminate the complexity of the body.

It organises it.

One of the tools through which this organisation becomes possible is grading.

Once a pattern has been developed in a base size, it must be transformed into the other sizes included within the range. Grading makes this transformation possible by shifting different points of the pattern according to established increments.

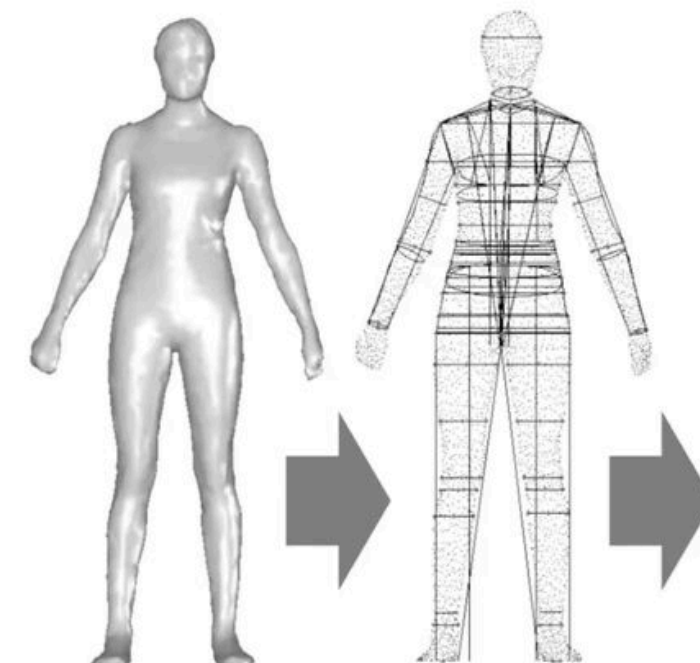
It is not simply a matter of proportionally enlarging or reducing the entire pattern.

When moving from one size to another, widths and lengths must be adjusted according to different relationships. The shoulder point, chest circumference, armhole depth, waist, hips and lengths do not necessarily increase by the same amount.

Grading can therefore be understood as a series of assumptions about the way bodies change.

The system determines how much and where the pattern must grow in order to construct a new size while maintaining a coherent balance.

This ability makes mass production possible, while at the same time revealing a limitation: the variety of real bodies is far more complex than the progression defined by a size range.



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1 Shoulder Slope Right: 24.649
1 OverArm Circumference: 44.554
1 Chest / Bust Circumference: 34.821
1 Bust Girth With Drop: 32.927
1 Underbust Circumference: 30.899
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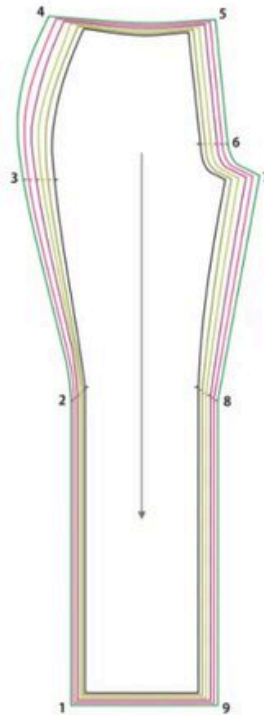
The problem can also be observed through real anthropometric data. In a study conducted on 2,000 women, Pirjo Elbrecht examines the relationship between two measurements that are fundamental to trouser construction: waist and hip circumference. The regression line obtained from the data represents an average relationship between these two measurements, but a significant number of subjects fall outside it. The same waist measurement can therefore correspond to different hip measurements, just as the same hip measurement can correspond to different waist measurements.

This makes it clear why size progression cannot fully describe variations in the body. A person may require more space in one specific area without needing it elsewhere: individual proportions do not necessarily increase or decrease according to the same relationship used in grading.

This leads to an important distinction between size and fit. Size identifies the position of a garment within a predetermined sizing system. Fit, by contrast, describes how the volume, proportions and construction of the garment are actually distributed across the body.

The two do not necessarily coincide.

A person may technically be wearing the correct size and still experience localised tension, excess fabric, unwanted folds or displaced seams. These signs indicate that fit does not depend solely on whether a garment can be worn or fastened around the body, but on the balance between its different parts and on how the construction responds to the proportions of the body wearing it.



A particularly interesting example of how the industry has attempted to manage variations in the body is the measurement system commonly used in denim.

On many pairs of jeans, we find combinations such as W30 L32, W32 L32 or W32 L34. The first value indicates the waist measurement associated with the trousers, while the second identifies the inseam length.

Separating these two dimensions makes it possible to create more combinations without having to develop an entirely new size for every possible body proportion.

Two people may have a similar waist measurement but different leg lengths.

Or they may have the same inseam length while requiring different measurements in the upper part of the trousers.

The W/L system therefore demonstrates an important strategy in industrial production: rather than relying on a single measurement to describe the entire body, certain variables can be separated in order to increase the number of possible combinations.

However, even this system does not fully describe the body.

Two pairs of trousers with the same waist and inseam measurements can have radically different fits.

The rise, thigh width, relationship between waist and hips, leg shape and amount of ease can all vary.

This once again demonstrates that size and fit are not synonymous.

Measurements establish certain parameters.

Construction determines how those parameters are distributed in space.

An attempt to address the same limitation through a more individualised form of production was developed by Levi Strauss & Co. with Personal Pair, introduced in 1994. The system began with four measurements – waist, hips, inseam and rise – entered into a computer that identified a prototype for the customer to try on. After the fitting, the fit could be adjusted by making the trousers tighter or looser and modifying the lengths; the final information was then sent to the factory for production of the jeans.

In 1997, the programme evolved into Original Spin, expanding the possibilities for customisation and later introducing body scanning as well: in August 1998, in one of its stores, a body scanner was used to collect measurements and match the customer with different fits and styles.

In this case, the industrial sizing system is not eliminated through the creation of a new type of trousers. What changes instead is the way the product is assigned and adapted to the body: rather than asking the individual to fit exclusively within a predetermined dimensional combination, certain information from their body is used to modify the product intended for them.

At this point, it is possible to distinguish three different ways of observing the body within pattern cutting.

The first is the anatomical body.

It is the real, three-dimensional body, composed of bones, joints, muscles and volumes. It is the physical starting point of the design process.

The second is the standardised body.

It is the body transformed into a system of measurements, proportions, sizes and grading rules. It does not represent a single individual, but allows the industry to design for groups of people.

There is, however, a third body.

The functional body.

It is the body in action.

When a person runs, the problem is no longer simply the circumference of the thigh. It is the space required for the hip to flex and the leg to extend.

When a person works while kneeling, the problem is not only the length of the trousers. Knee flexion, the pressure placed on the fabric and the abrasion caused by contact with a surface also become important.

When an individual carries tools, a pocket is no longer simply a shape applied to the garment. It must be accessible, support weight and avoid restricting movement.

The functional body therefore introduces a variable into the design process that measurements alone cannot fully describe: action.

And it is precisely here that one of the most interesting limitations of standardisation emerges.

A sizing system can predict with a certain degree of effectiveness how much space is required around specific areas of the body.

It is far more difficult to predict all the transformations that the body will undergo while in action.

Pattern cutting must therefore rely on other tools.

It can add volume, reposition it, alter the placement of seams, or introduce panels, pleats, inserts and articulated constructions.

It can select different materials according to the way they need to deform, resist or protect.

Construction therefore begins to be determined not only by anatomical form, but by function.

This transition is fundamental to understanding certain categories of clothing in which the relationship between body and action becomes particularly evident.

In military wear, the body must move together with a system of equipment.

In workwear, it must repeat specific actions, carry tools and withstand abrasion.

In sportswear, it must achieve ranges and speeds of movement that everyday clothing does not necessarily need to allow.

The final form of the garment therefore becomes a visible consequence of the actions anticipated during the design process.

But something particularly interesting happens when the activity for which a garment was originally designed is no longer the main reason why that garment is worn.

Many garments originally developed as workwear, military wear or sportswear have gradually entered everyday clothing.

The conditions of use change.

The constructions, however, often remain.

A detail originally created to solve a functional problem can survive the need that generated it and gradually become a recognisable element of the garment's identity.

The solution becomes convention, language, fashion.

At that point, a new design question emerges.

If the original function has changed, does the construction necessarily have to remain the same?

It is from this question that the next stage of the research begins.

FUNCTION AND CONSTRUCTION

In the previous chapters, the body was first examined as a structure to be interpreted through the pattern and later as an element to be translated within an industrial system of measurements, sizes and proportions.

These tools make it possible to describe and organise the body, but they are not sufficient to anticipate all the conditions in which a garment will be used.

When clothing is designed for a specific activity, the design process must also consider information that does not belong directly to anatomy: the objects the body needs to carry, the positions it must assume, the environment in which it must move, the frequency of certain gestures and the stresses to which the material will be subjected.

It is in these situations that function becomes particularly visible within the construction of the garment.

Military wear, workwear and sportswear make it possible to observe this process from different perspectives. Not because they are the only examples of functional clothing, but because in these categories the relationship between a specific need and the solution adopted in the garment can be identified with particular clarity.

MILITARY WEAR

Military wear provides a first significant example because the uniform is designed not only in relation to the soldier's body, but also to the actions that body must perform and the equipment it must use.

An interesting example is the British Battledress Pattern 1937, introduced on the eve of the Second World War. Alongside the standard side and back pockets, the trousers include two elements with already defined purposes: a map pocket, positioned on the upper part of the left leg, and a smaller shell-dressing pocket intended to hold an individual field dressing.

What is particularly significant is not simply the presence of additional pockets, but the fact that part of the pattern is assigned in advance to a specific object.

A traditional pocket can be designed as a relatively generic storage space. In this case, however, its contents are already anticipated before the garment is constructed: the map and the dressing differ in size, use and accessibility requirements, and therefore occupy specific areas of the trouser surface.



Equipment therefore begins to organise the pattern.

The surface of the body is no longer divided exclusively according to anatomical or construction criteria. Certain areas are assigned to the objects that must accompany the soldier during action.

This relationship between activity and construction becomes even more evident in the clothing developed for the British Airborne Forces during the Second World War.

The Denison Smock was a camouflage oversmock worn over the standard Battledress. Its construction included a particularly specific feature: the back extended into a long tailpiece, often referred to as a beavertail, which could be brought between the legs and fastened at the front. This extension helped keep the smock more stable on the body and reduced the risk of the hem riding up during a parachute jump.

From a pattern-cutting perspective, the intervention is relatively simple, but it alters a precise convention of the jacket. The back hem no longer ends at a point determined solely by torso length or silhouette. Part of the back is extended because the intended activity makes a traditional construction insufficient.

The same activity produces a different solution in the Parachutists' Oversmock, 1942 Pattern.



This garment was worn over the Denison and over part of the equipment before the jump. Its function was to contain the material carried by the paratrooper, reducing the risk of straps or equipment components becoming caught in the parachute lines.

In this case, the pattern is no longer based solely on the anatomical body. The outer volume must simultaneously contain the body, the layers of clothing underneath and the equipment. The final silhouette is therefore also determined by elements that do not belong to the body itself, but that must be temporarily incorporated within the volume of the garment. The Denison Smock and the Parachutists' Oversmock therefore respond to the same activity through two different strategies.

In the first case, the shape of the garment is modified locally. In the second, a new volume is constructed to contain the body-clothing-equipment system.

Another form of transformation can be observed in the Tropical Combat Uniform developed by the U.S. Army for the conditions of the Vietnam War.

With the deployment of troops in tropical environments during the 1960s, the U.S. Army introduced a uniform specifically developed for that context. Early versions included large cargo pockets, shoulder loops, waist adjustment tabs and exposed buttons.

The construction, however, was modified over the course of its use.

Later versions removed some of the original elements, including shoulder loops, waist tabs and exposed buttons, while developments in materials also led to the introduction of ripstop fabrics in subsequent tropical combat uniforms.

This example presents a different condition from the previous cases.

In the Battledress, the function of an object determines the position of an element within the pattern.

In the Denison, an anticipated action directly modifies the shape of the garment.

In the Tropical Combat Uniform, by contrast, the construction is corrected after being tested through real use.

The design therefore becomes an iterative process.

The first solution is not necessarily treated as definitive: the garment is used, certain elements reveal limitations or prove unnecessary, and the construction is modified.

It is significant that some of these transformations occur through subtraction.

Removing a waist tab, a shoulder loop or modifying the fastening system means reducing the number of components and operations required to construct the garment.



Function therefore does not necessarily produce greater complexity.

It may require the addition of an element, as in the case of the Denison tailpiece, or its removal when experience shows that it is no longer necessary or effective.

These examples reveal three different ways in which activity can influence pattern cutting.

In the Battledress, the object being carried affects the distribution of elements across the surface of the body.

In the airborne system, a specific action modifies the geometry and volume of the garment.

In the Tropical Combat Uniform, experience gained through use modifies an existing construction.

In all three cases, information that could not be derived from anatomical measurements alone enters directly into the design process.

A similar logic can be found in workwear, but under different conditions. Here, the problem is determined less by a specific military operation and more by the daily repetition of movements, constant contact with tools and surfaces, and the progressive wear of the garment.



WORKWEAR

In workwear, the construction of the garment develops directly from the conditions in which it is intended to be used. This does not mean, however, that a work garment must necessarily have a complex pattern. In some cases, function leads to the addition of reinforcements, panels or specialised pockets; in others, it leads instead to the removal of anything unnecessary. The complexity of the design therefore does not necessarily correspond to the visible complexity of the garment.

A particularly clear example is the bleu de travail, the traditional French work jacket worn mainly by craftsmen, farmers and industrial workers.

Its construction appears extremely simple. The body of the jacket is relatively straight, the fit is loose, the fastening is positioned at the front and the pockets are generally applied directly to the outer surface. It does not necessarily include the number of cuts, darts or panels that characterise a tailored garment designed to follow the anatomical form precisely.

This simplicity, however, does not correspond to an absence of design.

It is itself a functional response.

A work jacket must be suitable for being worn for many hours and, often, over other garments. A construction that is too close-fitting would force the body to move constantly against the limits of the fabric. A relatively straight line and a greater amount of ease instead create space without requiring the pattern to be articulated through numerous panels.

In this case, freedom of movement is achieved primarily through the overall volume of the garment rather than through a complex anatomical construction.

The pockets reveal the same logic.

A patch pocket consists of an additional panel applied directly to the surface of the garment. Compared with more elaborate constructions, it allows a large and easily accessible storage space to be created quickly.

In workwear, even an apparently simple element can therefore respond to several problems at the same time.

The bleu de travail is particularly interesting precisely because it shows how functional pattern cutting can operate through subtraction.

It is not necessary to add a technical solution to every part of the garment. An effective piece of clothing can be achieved through a limited number of pattern pieces, a sufficient distribution of volume and components that are easily accessible and replaceable.

A particularly representative historical example of this type is Le Mont St Michel, a French brand closely associated with the production of workwear.

Its traditional vestes de travail reproduce many of the elements that define the bleu de travail: straight construction, front fastening, large patch pockets and durable fabrics, often in heavy cotton or moleskin.

Observed through pattern cutting, the jacket reveals a logic very different from that of a garment constructed to shape the body.



The shape does not attempt to emphasise the waist or follow the chest precisely.

On the contrary, it maintains a certain distance from the body. This distance allows the jacket to be worn over other layers and leaves room for the changes produced by movement.

The construction of the shoulder and sleeve also remains relatively direct. The aim is not to create a particularly precise tailored line, but to allow the arm to move within a sufficient volume.

The same logic can be found in the pockets.

The large lower patch pockets are positioned in areas that are easily reached by the hands and provide a significant amount of storage space without requiring elaborate internal structures. The chest pocket adds another point of storage while maintaining the same construction logic.

The material is equally important.

The cotton moleskin used in many historical examples of French workwear has a compact surface and a durable structure. The choice of a fabric of this kind also affects the way the pattern is conceived.

A robust and relatively structured material does not necessarily require the same type of shaping as a soft, lightweight fabric.

A simple and sufficiently generous construction allows the fabric to maintain its resistance without forcing it to follow every curve of the body too closely.

When a loose fit and accessible pockets are sufficient, the pattern can remain relatively simple.

When the body is subjected to more localised stress, however, the construction must intervene more precisely. It is in these cases that workwear begins to accumulate reinforcements, panels and specialised details.

A clear example is the double knee.

In trousers designed for jobs that require frequent kneeling, the knee area is exposed to far greater abrasion than the rest of the leg.

The solution does not necessarily consist in using two layers of fabric throughout the entire pair of trousers.

Material is added only where the greatest wear occurs.

The second panel therefore creates a localised reinforcement.

The position of a pocket also depends not only on where space is available on the trousers, but on which object it must contain and on the movement the hand must make to reach it.

A hammer loop, for example, creates a specific point on the garment intended for an object with a precise shape, weight and mode of use.

The trousers therefore begin to be designed together with the worker's tools.

The same applies to the gusset.

When a person squats or spreads their legs, the crotch area undergoes a significant geometric change. Several seams converge in an area where movement can create tension.

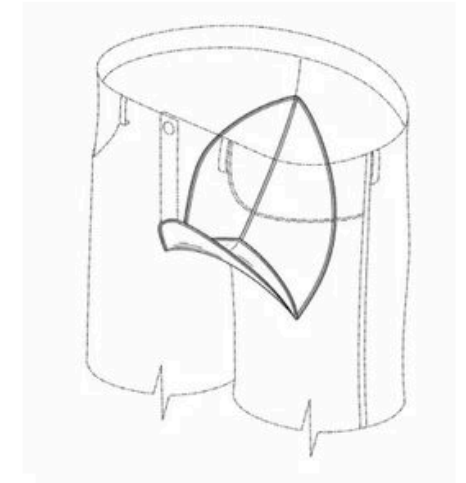
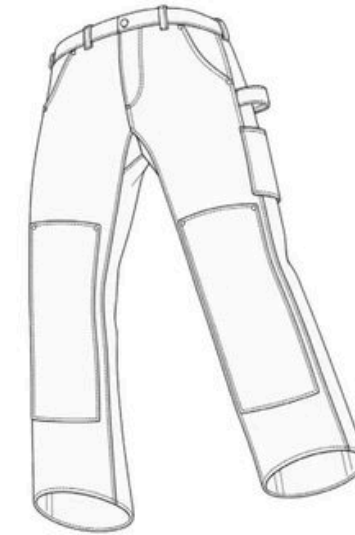
Inserting an additional panel between the legs alters this geometry.

The gusset does not simply add "more fabric" to the trousers. It redistributes the seam lines and creates an additional surface precisely where the body requires greater mobility.

It is important to observe the difference between these examples.

In the bleu de travail, freedom of movement is achieved mainly through a loose and relatively simple construction.

In trousers with a gusset, mobility is instead achieved through a very precise intervention on the pattern.



In the double knee, material is added where abrasion occurs.

In tool pockets, the construction is modified according to the objects being carried.

Function, therefore, does not produce a single solution.

It produces different solutions in response to different problems.

In European workwear, we find materials such as moleskin and cotton drill; in American workwear, denim and duck canvas become particularly important; in industrial work uniforms, different types of twill are commonly used.

These materials are not interchangeable simply because they are durable.

They differ in weight, rigidity, surface and behaviour during movement.

Material therefore also influences the pattern.

A very rigid fabric may require a greater amount of ease, while a more flexible material can accommodate certain movements through its own deformation.

Pattern and fabric solve the problem together.

This observation leads to one of the most important examples of American workwear: Levi's jeans.

Here too, many of the elements now perceived as visual characteristics of jeans originally emerged from practical problems.

The case of rivets is particularly clear.

When Jacob Davis and Levi Strauss developed and patented the system of riveting work trousers, the aim was to reinforce specific points exposed to heavy stress.

The intervention is extremely localised.

The entire pair of trousers is not modified.

An element is added only where the fabric and seams are most likely to fail.

This logic is similar to that seen in the double knee.

The problem is identified.

The construction intervenes precisely in that area.



Over time, however, something different happens.

Jeans gradually move beyond an exclusively work-related context and begin to be worn in a much wider range of situations.

Their use changes, but much of their construction remains recognisable.

Rivets, pockets, yokes, seams and proportions continue to be reproduced even when the trousers are no longer purchased primarily as workwear.

It is within this transition that workwear reveals a particularly interesting phenomenon.

A solution originally developed to solve a practical problem can be repeated for so long that it becomes part of the garment's identity itself.

In the bleu de travail, the large patch pockets and straight cut continue to make the veste de travail recognisable even when it is worn outside the working environment.

In jeans, rivets and the five-pocket construction continue to communicate the identity of the product even when their meaning no longer depends exclusively on their original function.

This does not mean that these elements completely lose their function.

A rivet still reinforces a pocket, and a patch pocket still holds objects.

What changes, however, is the reason why these features are retained.

Practical necessity is joined by recognisability, tradition and identity.

It is precisely this transition that makes the Levi's 501 particularly important to this research.

Over time, its construction becomes so recognisable that it can be used as a system of reference.

At this point, the problem of pattern cutting changes once again.

It is no longer only a matter of understanding why a certain element was introduced.

It becomes possible to observe what happens when that same element is shifted, enlarged, rotated or reinterpreted.

Does the side seam necessarily have to remain along the side of the body?

Does the yoke always have to maintain the same proportion?

Does a pocket have to occupy the position in which we are used to finding it?

Does the leg of a pair of jeans have to be constructed through the same relationship between front, side and back?

It is these questions, applied to a construction that has become highly codified, that open the way towards the experiments of Levi's RED and Levi's Engineered Jeans.

LEVI'S RED

By the end of the 1990s, Levi's already possessed an extremely recognisable construction system. The five-pocket layout, back yoke, rivets, button fly, Red Tab, rear patch and proportions of the 501 had become part of a consolidated language, developed over more than a century and progressively separated from the working context in which many of these elements had originally emerged.

It is precisely this stability that makes the experiment of Levi's RED possible. Launched in 1999 under the direction of Danish designer Rikke Korff, the project was conceived as a laboratory for the future development of jeans and worked in close relation to the knowledge contained within the Levi's historical archive. The starting point, therefore, was not to reject traditional construction, but to understand it well enough to question it.

The central question concerns jeans as a contemporary product: which characteristics of the five-pocket still remain relevant, which can be modified, and which new solutions can be introduced when considering a body, a way of dressing and a context different from those in which riveted trousers were originally developed.

For this reason, the experimentation involves the entire product. The pattern, distribution of volume, seams, pockets, hardware, denim and even some of the codes through which a Levi's product is normally recognised are reconsidered. The 1st Standard, one of the models from the first RED generation of 1999, offers a particularly clear example of this process.

501 VS 1st STANDARD 1999

The three-dimensional form is constructed mainly through the geometry of the panels and the displacement of the seams.

In the 501, the outer seam acts as a relatively stable reference along the side of the leg and maintains a clear separation between front and back. In the 1st Standard, this line no longer remains in the same position. As it runs down the leg, the seam shifts towards the front, while other lines at the back move towards the rear of the leg. This shift should not be understood simply as a visual effect. By changing the shape of the panels and the points at which they are assembled, the amount of fabric distributed around the leg also changes. The seam therefore becomes one of the tools through which volume is constructed.

The knee is the clearest point of this transformation. The front surface is already projected forward, while the back of the trousers curves inward. As a result, even without a body inside, the leg does not naturally fall completely straight.

The same curvature continues all the way to the hem. In the 501, the front and back end at roughly the same height, creating a regular hemline. In the 1st Standard, by contrast, the front is longer and the back shorter, producing an angled and shaped hem.

Seam placement, the distribution of volume at the knee and the hem therefore belong to the same system. The angled hem is not a detail added at the end of the design process, but the consequence of the curvature constructed along the entire leg.



Once the overall geometry of the trousers has been defined, the comparison can be extended to the individual elements that make up the traditional language of the 501.

	501	1 ST STANDARD
RESTING FORM / PROFILE	It lies essentially flat; the leg maintains a predominantly vertical axis, readable as an I.	It maintains a three-dimensional form even when unworn; the leg follows an S-shaped profile from the hips through the knee to the hem.
VOLUME / KNEE / SEAM	The volume is distributed evenly between front and back; the side seam remains stable along the side of the leg.	Greater surface area is distributed in front of the knee, while the back curves inward; the side seam rotates towards the front and contributes directly to the construction of volume.
HEM	The front and back end at approximately the same height, creating a regular hemline.	The front is longer and the back shorter; the curvature of the leg ends in an angled, shaped hemline.
BACK POCKETS	Two symmetrical back patch pockets.	A single patch pocket on the right side, larger, lower and closed with a buttoned flap; no pocket on the left side.
WATCH POCKET	A small watch pocket inserted inside the right front pocket.	The watch pocket is enlarged and moved upwards, much closer to the waistband.
WAIST-HIP SHAPING	Traditional shaped back yoke.	The back yoke is removed and replaced by two darts that shape the hips.
RIVETS / STITCHING	Rivets at the main stress points; frequent parallel double topstitching.	Visible rivets concentrated at the upper corners of the front pockets; greater use of single stitching, heavy thread and prominent bartacks.



One of the most evident changes concerns the pocket system.

The 501 uses the five-pocket configuration: two front pockets, a small watch pocket inserted into the right pocket, and two back pockets. In the 1st Standard, the left back pocket is removed. Only the right one remains, enlarged, positioned lower and closed with a buttoned flap. This modification completely alters the composition of the back. In the 501, the two back pockets organise the hip area in an almost symmetrical way; in the RED, the left side remains free, while the right pocket takes on greater visual weight. Its lower position also changes the relationship between pocket and hand, making it accessible in a different area compared with the standard configuration. The watch pocket is also retained but redesigned. It is larger and positioned higher than on the 501. The change is significant enough that, in some cases, the pocket opening sits very close to the waistband when worn.



The system used to shape the transition between waist and hips also changes at the back. In the 501, this function is performed by the traditional back yoke, the shaped band positioned above the back pockets. In the 1st Standard, the standard yoke is replaced by a much narrower solution, described as a half-riser or dart, which acts locally on the curvature of the back.

The need therefore remains the same – to transform a two-dimensional surface into a volume capable of following the hips – but the way in which it is achieved changes.



The use of rivets is also reconsidered. In the earliest 1st Standard models, visible rivets are concentrated mainly at the upper corners of the front pockets, while the watch pocket on early versions may have none. Some later versions instead introduce rivets in this area as well.

The differences between production runs can therefore also be identified through small hardware details, making it possible to distinguish some of the variants developed after the initial release.



The stitching system is modified just as visibly. On the 501, many areas are emphasised by parallel double rows of topstitching. In the 1st Standard, single stitching is used more frequently, accompanied instead by relatively heavy thread and highly visible bartacks.

The aim is therefore not simply to remove stitching, but to alter its visual presence and its role within the trousers.



Another transformation concerns the back patch. On the 501, the patch is a physical element applied to the waistband and represents one of the product's most immediately recognisable details. In the 1st Standard, it is removed, but a rectangle outlined in red stitching remains on the waistband in the position where the patch would normally be placed.

The component disappears, while its position continues to be indicated on the garment.



The Red Tab is also reduced graphically. In the first-generation examples analysed, only the ® symbol appears, without the usual Levi's lettering.

The button fly, by contrast, is retained. The buttons preserve the engraving associated with the Levi's visual language, but receive a different finish from the one normally associated with the 501. The hardware is therefore updated without completely removing the reference to the historical product.



The experimentation of the 1st Standard also extends to the denim.

For the first RED generation, a denim produced on shuttle looms was developed in Japan. These looms weave a narrower fabric than many modern industrial looms and create a compact finish directly along the longitudinal edges, preventing the fabric from fraying. This edge is known as the selvedge.



In the 1st Standard, the selvedge is recognisable by a distinctive green line rather than the more common red line associated with many vintage Levi's denims. The fabric also has a slightly greenish tone.

The development of these denims is linked to the Japanese manufacturers Nisshinbo and Nihon Menpu.

The first production of the 1st Standard is described as using a composition of 60% cotton and 40% hemp, while later versions also use 100% cotton denim. The first version was produced in Spain; later examples were manufactured in both Spain and Tunisia.

	1999	2000
COUNTRY OF PRODUCTION	Spain	Spain / Tunisia
DENIM COMPOSITION	60% cotton 40% hemp	100% cotton
SPECIAL VERSIONS / FINISHINNG	Raw	Blueprint



The selvedge becomes particularly interesting when observed from a pattern-cutting perspective.

The edge of the fabric is necessarily straight. Pattern pieces are also placed on the fabric according to the grainline, maintaining the intended warp direction for each component. The construction of the 1st Standard, however, produces a seam that does not remain straight along the entire leg.

As a result, the selvedge can only be used along the section where the straight edge of the fabric coincides with the geometry of the panel. In the 1st Standard, it remains visible mainly from the hem up to approximately the knee area; beyond that point, the curvature of the pattern forces the construction line away from the edge of the fabric.

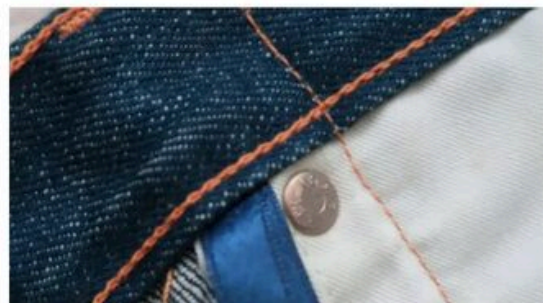
This detail makes a practical consequence of the three-dimensional construction particularly clear. The pattern continues to respect the grain direction of the fabric, but it cannot simultaneously maintain the selvedge along a seam whose trajectory progressively changes.

2007	2009	2019
Japan	Turkey	non-specified
100% cotton	81% cotton 19% hemp	81% cottone 19% hemp
Raw	Raw / Vintage Wash / black tint	Washed / Wash Selvedge

The inside of the 1st Standard also features several specific solutions.

The Levi's RED branding and size information are printed directly inside the trousers, reducing the use of some applied elements.

Inside the waistband there are also three blue tapes used to hang the garment: one is positioned at the centre back, while the other two are located at the front ends of the waistband, allowing the trousers to be suspended sideways. The system is consistent with their three-dimensional construction: the 1st Standard does not naturally lie flat from the front, whereas when hung sideways it can maintain the curvature defined by the pattern without flattening the volume at the knee.



BLUEPRINT

In 2000, the comparison between the 1st Standard and the 501 was made explicit through a version known as the 501 Blueprint.

The model retains the three-dimensional construction of the 1st Standard, but blue lines are applied to the surface of the denim to graphically reproduce some of the references belonging to the construction of the 501. The pigment is designed to gradually wear away through use.

The treatment makes it possible to observe directly on the trousers the distance between the two constructions. The blue lines cross the areas in which RED modified the position and proportions of pockets, seams and other elements.



The comparison is particularly evident at the hem: the actual construction of the 1st Standard maintains its angled hemline, while the graphic reference makes it possible to read the difference from the more regular geometry of the 501.

The same principle is visible in the upper part of the trousers, where the lines associated with the traditional construction coexist with the actual position of the RED pockets and seams.



The Blueprint therefore does not substantially alter the pattern of the 1st Standard, but uses the surface of the garment to make the comparison with the model from which the project originated directly visible.

In the 1999 1st Standard, this comparison has to be reconstructed by observing the two pairs of trousers separately; in the Blueprint, it is traced directly onto the garment.



SPORTSWEAR

If in workwear the construction of the garment responds to the actions required by work, in sportswear these demands become even more specific. Each discipline subjects the body to a different combination of movements, postures, speeds and environmental conditions, and therefore requires different solutions. A garment designed for running does not need to solve the same problems as one used for swimming or cycling. The design process must consider not only the measurements of the body, but also the position it assumes during the activity, the range of movement and the areas in which the fabric is most stretched, compressed or subjected to friction.

These requirements have influenced both the choice of materials and the construction of patterns. In particular, the spread of elastic fibres has made it possible to develop closer-fitting garments without restricting movement, allowing the stretch of the fabric itself to become part of the construction of fit. In this way, material and pattern cutting are no longer considered separately, but work together in shaping the fit of the garment.

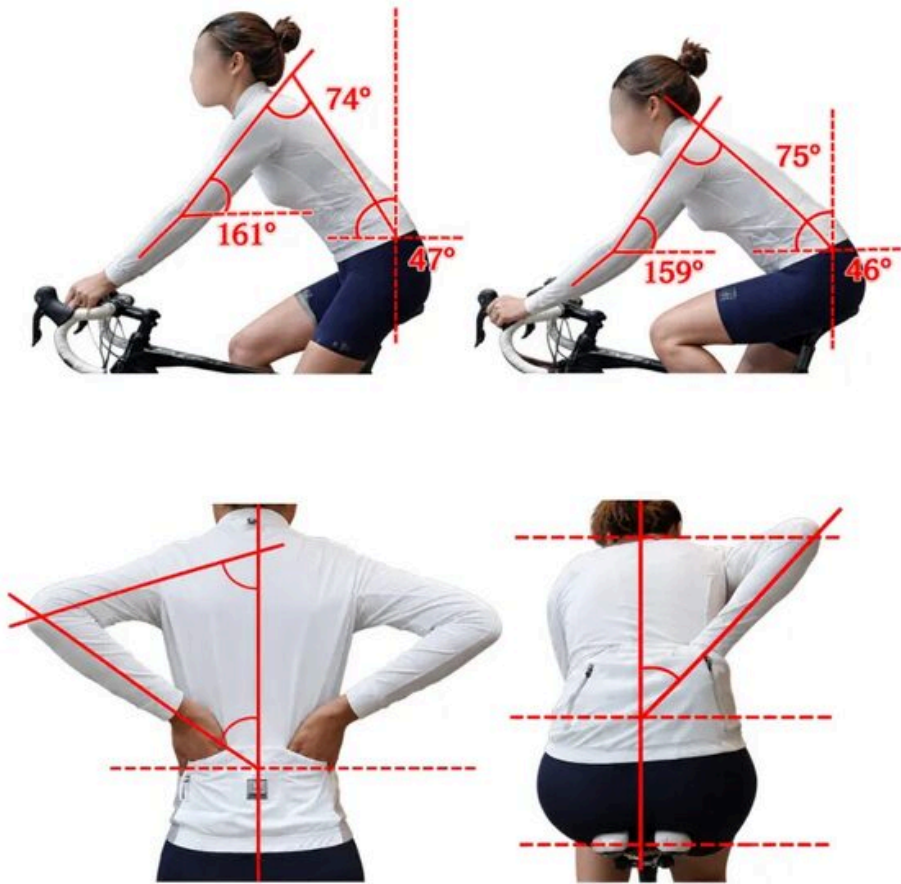
CYCLING

Cycling provides a clear example of this relationship. The posture assumed while riding is very different from the upright position normally used to take measurements and assess the fit of a garment. The torso leans forward, the arms extend towards the handlebars, the back curves and the hips remain flexed while the legs continuously repeat the same movement.

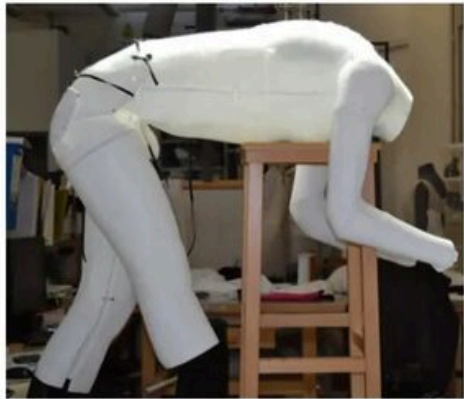
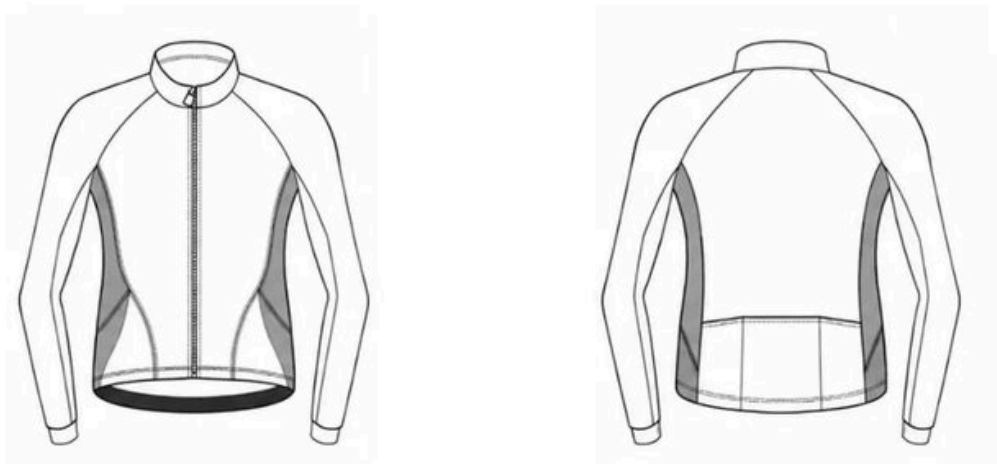
As a result, a garment that fits correctly on an upright body can change significantly once the cycling position is assumed. The pattern construction of a cycling jersey responds first of all to these changes. The front can be shortened to prevent excess fabric from gathering around the abdomen when the torso bends, while the back is extended to keep the lower back covered. The shoulder and sleeve areas must also take into account the forward position of the arms.

Studies focusing on the development of cycling garments have directly compared the pressure exerted by clothing under static and dynamic conditions, using these differences to adjust the pattern.

Even simpler details respond to the same position of use. Pockets are placed on the back of the jersey, where they remain accessible even when the torso is inclined and allow small objects to be carried without interfering with leg movement or hip flexion. Their position, the greater length of the back and the different construction of the front are therefore not isolated modifications, but consequences of the same requirement: to construct the garment according to the position and conditions in which it will be used.



The same logic becomes even more evident in the lower body. During cycling, the hips, knees and thighs continuously move through phases of flexion and extension, while the pelvis remains in contact with the saddle. The shorts must therefore stay close to the body without shifting during movement and without creating excess material in the areas of flexion. A multi-panel construction helps distribute the shape around the thighs, glutes and pelvis, while seam placement is also designed to reduce friction in areas subjected to continuous movement. This construction is combined with the chamois, positioned in the area where the body comes into contact with the saddle. Developed from the need to protect an area simultaneously exposed to pressure, friction and repeated movement, the chamois shows how a functional element can be incorporated directly into the structure of the garment. Its construction has also changed with the evolution of materials: earlier natural leather chamois have gradually been replaced by synthetic materials, while the spread of elastic fibres has allowed cycling shorts to fit more closely to the body and remain more stable during movement.



The elasticity of the material therefore plays a direct role in pattern cutting. In close-fitting garments, negative ease can be used by constructing certain pattern circumferences smaller than those of the body. Once worn, the fabric stretches to reach the required dimensions, and the resulting tension helps keep the garment stable during movement. The amount of reduction, however, cannot be uniform: it depends on the elastic properties of the material and on the deformation of different parts of the body during cycling. More recent studies on compressive cycling garments have measured changes in the body surface of the torso and thighs during movement precisely in order to determine more accurately where and by how much the pattern should be reduced. Cycling therefore shows how sportswear design can intervene simultaneously through both pattern and material. Posture alters the proportions of the garment; movement determines the distribution of volume and seams; the elasticity of the fabric makes it possible to control fit and stability.

SWIMWEAR

In swimming, the presence of water introduces an additional problem into the construction of the garment. Every surface moving through the water encounters resistance, generally defined as drag, caused both by friction between the water and the surface and by the shape presented by the body as it moves forward. For clothing, this means that elements that might normally seem insignificant – a fold, an edge or a gap between fabric and skin – can contribute to increasing resistance. A competition swimsuit must therefore remain close to the body and allow movement while at the same time creating a surface that is as continuous and controlled as possible. Fluid-dynamic research used in the development of racing swimsuits has focused precisely on these aspects, studying materials, seams and the shape of the body in water separately.

One of the most extreme examples of this research was the Speedo LZR Racer, introduced in 2008. Its development did not simply begin with the modification of an existing swimsuit. In the three years leading up to its launch, data were collected from physiological testing and body scans of hundreds of international swimmers.

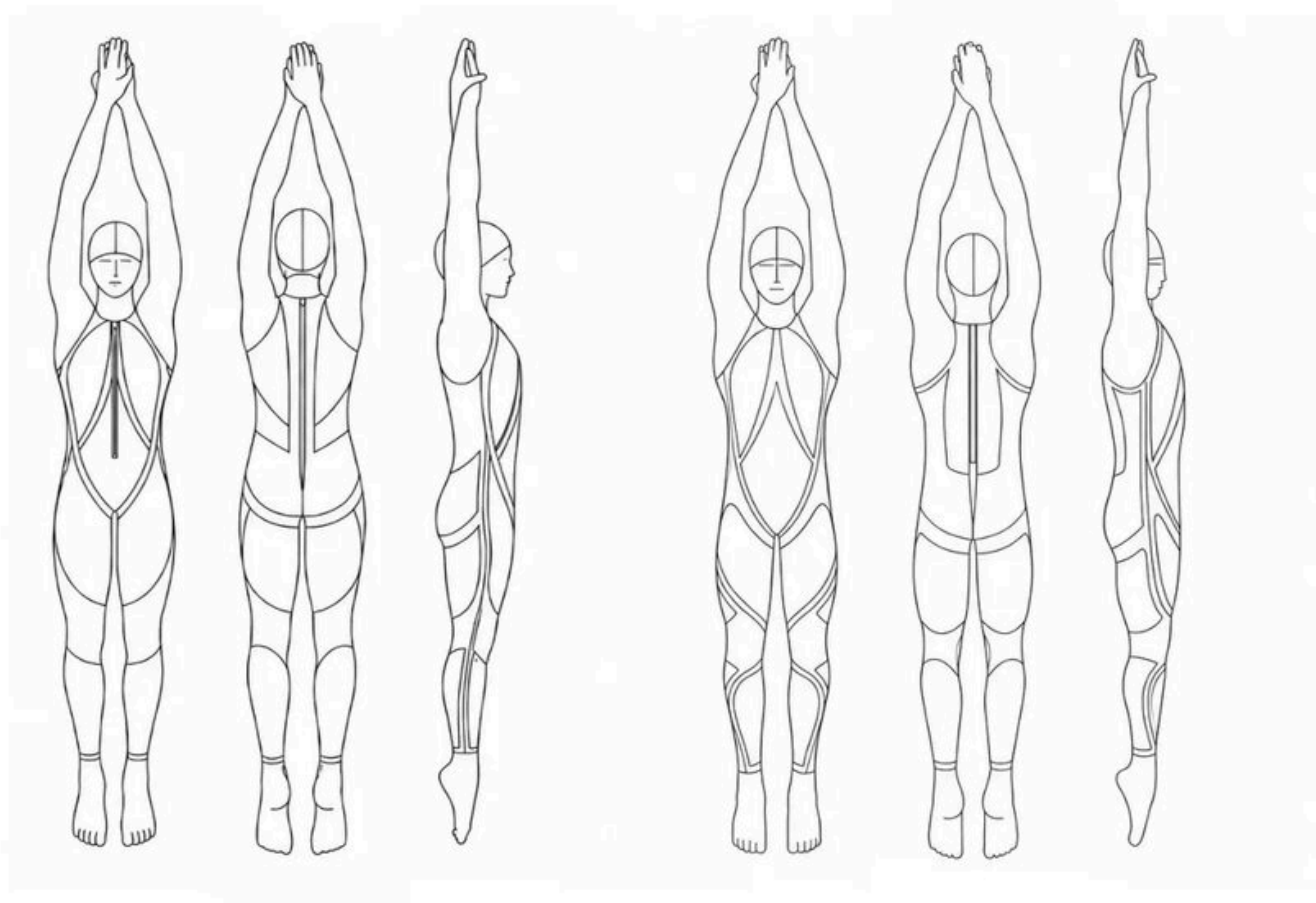
In parallel, Speedo collaborated with NASA's Langley Research Center to study the surface drag of different materials. Around one hundred fabrics and coatings were evaluated throughout the development process, while NASA's low-speed wind tunnels were used to compare materials and different seam systems in order to assess how much each solution interfered with flow.

The result was not a swimsuit made from a uniform surface. A water-repellent elastic base material, known as LZR Pulse, was combined with laminated panels placed on selected areas of the body and with a more supportive structure around the waist and hips. The panels increased compression locally and created a smoother profile across areas such as the abdomen, lower back, glutes and thighs. The construction therefore aimed to control not only the fabric, but also the shape assumed by the body beneath it.

The distribution of this compression, however, could not be uniform. A material rigid enough to stabilise the hips or compress a muscle mass could become counterproductive if placed over a joint or in an area that needed to expand freely.



In Speedo's patented technical drawings, for example, the knees are left free from the more rigid panels in order to preserve flexion; around the chest, tension must be controlled so as not to restrict breathing; in freestyle, certain areas around the shoulder blade remain free from lamination to allow rotation of the shoulder and torso. The design therefore consists in distributing zones with different properties across the body, deciding where to compress, where to support and where instead to allow greater freedom. The patent filed by Speedo during the development of this generation of swimsuits takes this logic even further, showing configurations designed for different swimming movements. The base of the garment can remain similar, while the shape and position of the panels change according to the stroke.

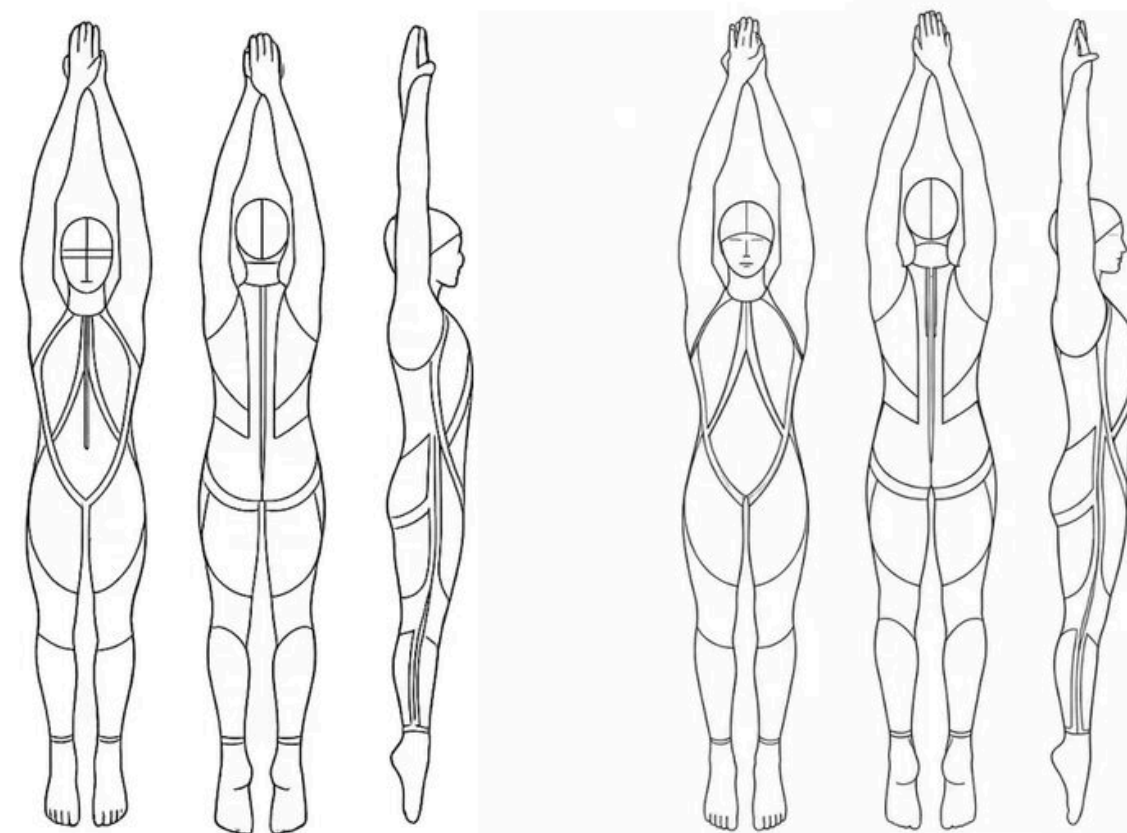


FREESTYLE

BREASTSTROKE

In the version developed for freestyle, the rear panels rise diagonally from the lower back towards the shoulders, supporting the upper back without restricting its rotation. The lateral areas beneath the arms remain freer to allow movement of the shoulder girdle and rotation of the torso during the crawl.

In the configuration designed for breaststroke, a wide central area of the back remains free to allow extension of the spine. The panel over the quadriceps extends lower than in the freestyle version so as not to restrict the greater range of motion at the hip, while the shape of the panels around the knee is adapted to the movement of the kick.



BACKSTROKE

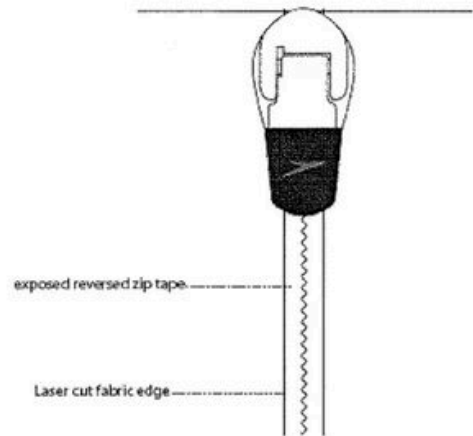
BUTTERFLY

For backstroke, the distribution of the panels remains very similar to that used for freestyle, since this stroke also requires rotation of the torso. The position of the fastening changes, however, and is moved to the front in order to avoid interference with the rear surface, which is more exposed to the water.

In the configuration designed for butterfly, the panels across the abdomen, chest and legs follow the logic used for freestyle, while the lower-back and rear areas are closer to the breaststroke configuration. The central part of the back therefore remains freer, allowing spinal extension during the undulating movement.

Seams are also treated as a design problem. In a traditional construction, two fabric edges are overlapped and stitched, creating a slight raised area on the surface. In the LZR Racer, the different pieces were instead joined through ultrasonic welding, bonding the edges together and producing much flatter seams. Tests carried out with NASA directly compared seamless fabric, traditional seams and welded joints; the latter behaved more similarly to the continuous surface of the fabric. The same principle was applied to the zip, which was designed with a reduced profile and attached to the fabric without conventional external stitching. The patent also explores precisely cut edges and finishes applied to the inside of openings in order to avoid additional thickness on the outer surface.

The LZR Racer made particularly visible how much clothing could influence performance, but it did not mark the end of this research.



In 2009, other manufacturers pushed the principle even further by introducing swimsuits made entirely or almost entirely from polyurethane. The increase in performance and the rapid succession of records consequently turned the swimsuit into a regulatory issue.

From 1 January 2010, the international federation introduced far more restrictive requirements: competition swimsuits had to be made exclusively from textile materials; the surface area covered by the garment was limited; maximum material thickness was set at 0.8 millimetres and buoyancy at 0.5 Newtons. Zips and other fastening systems were also prohibited. The new rules therefore intervened directly in the material, surface area, thickness and construction of the garment, establishing how far clothing could contribute to an athlete's performance.

If in cycling pattern cutting had adapted mainly to posture and the repeated movement of pedalling, in swimming the problem extends to the surface of the body itself. Panel distribution, compression, joint placement, seams and material properties are designed together to control the way the body moves through the water.

RUNNING – NIKE x UNDERCOVER GYAKUSOU



The GYAKUSOU collaboration, launched in 2010 between Nike and Jun Takahashi, is particularly interesting because it brings together the technical expertise of a sportswear brand with the direct experience of a designer who personally inhabits the world of running. Takahashi therefore enters the project not simply to reinterpret Nike products visually, but to start from problems observed while running and translate them into the construction of the garment. From the very first collection, the stated aim was to develop a genuine performance product from the runner's point of view, intervening in materials, ventilation, storage and the distribution of different functions across the body.

The *Light Weight Stretch Jacket* from the first collection already shows a construction in which the different parts of the garment are not treated in the same way. The jacket integrates ventilation systems and pockets within the shell, while the ends of the sleeves use a different material, also intended to allow the runner to wipe away sweat without interrupting the run.

From a construction perspective, the most interesting aspect is precisely this separation of functions. The garment is not designed as a continuous surface to which technical details are added afterwards; instead, it is divided into zones that respond to different needs. The torso must provide protection while also allowing heat to escape, the pockets must remain accessible during movement, while the wrist area also takes on a function of contact with the face. The visible panelling therefore makes it possible to read the jacket as a system of functional areas, each constructed in relation to what the body needs to do while running.



In the same year, the Ripstop Short addresses an even more specific problem. Takahashi needed to carry small objects while running, but coins and keys placed in the same pocket could move and repeatedly knock against each other. The shorts therefore introduce separate internal pockets to organise these objects and reduce their movement and noise; Dri-FIT stretch is also inserted around the hips to allow greater freedom in the area of the body most involved in the running stride.

Here, the construction of the pocket becomes part of the pattern-cutting problem. It is no longer simply a space applied to the shorts, but an element that must control the behaviour of what it contains as the body accelerates and decelerates. The decision to concentrate the elastic material around the hips follows the same logic: rather than making the entire garment uniformly stretch, greater deformability is placed where movement requires it most. The garment is therefore differentiated according to both the movement of the body and the movement of the objects being carried.



In the following collection, the relationship between body and construction becomes even more evident with the Inside Out Jacket. During a long run, the continuous repetition of the same movement can turn even a conventional internal seam into a potential area of friction against the skin. Takahashi begins precisely from this problem and modifies the structure of the garment from the inside: joins and seams are moved towards the exterior, while the internal surface is kept smoother. Nike describes the design as being constructed literally “inside out”, with stretch panels and cuts developed to follow the movement of the runner.

From a pattern-cutting perspective, this is one of the most interesting aspects of GYAKUSOU, because seam placement is no longer treated as a neutral consequence of assembling the pieces. The seam is understood as an element that comes into direct contact with the skin and can therefore be repositioned. The pattern changes not simply to create a different silhouette, but to alter the way the garment is experienced by the body during a movement repeated thousands of times. The visible external lines of the jacket therefore arise from a construction need before becoming a graphic one.



With the Laser Light TOPO Jacket, this principle is taken even further: the construction no longer responds only to the movement of the body, but also to the way the environment acts upon it. Nike uses rain-mapping data to analyse the areas most exposed to rain while running and increases protection mainly across the chest and shoulders. The garment uses a very lightweight water-repellent microfibre and, in the areas most exposed, the material is layered to provide greater protection.

From a pattern-cutting perspective, the distinctive feature is that the large curved shapes visible on the front do not function simply as decorative panelling. Their position derives from the distribution of rain across the surface of the body. The construction line therefore begins with external data: first, the areas in which the runner requires greater protection are identified; these zones are then translated into additional surfaces and finally into a concrete form within the garment. In this way, the pattern records not only anatomy and movement, but also the interaction between body and environment.

This makes clear how far the GYAKUSOU project has moved away from a conventional division of the garment into front, back and sleeves. Instead, the surface is divided into areas corresponding to different conditions, each receiving a different treatment according to the function required.

FOOTBALL - AITOR THROUP X UMBRO

In cycling, the body is designed primarily in relation to a defined posture; in swimming, the construction must also respond to the resistance of water. Football introduces a different problem. During play, the body does not maintain a constant configuration: the player runs, accelerates, changes direction, rotates the torso, bends the arms, jumps and continuously alternates between phases of extension and contraction. The garment therefore cannot be constructed around a single position, but must function across a range of movements.

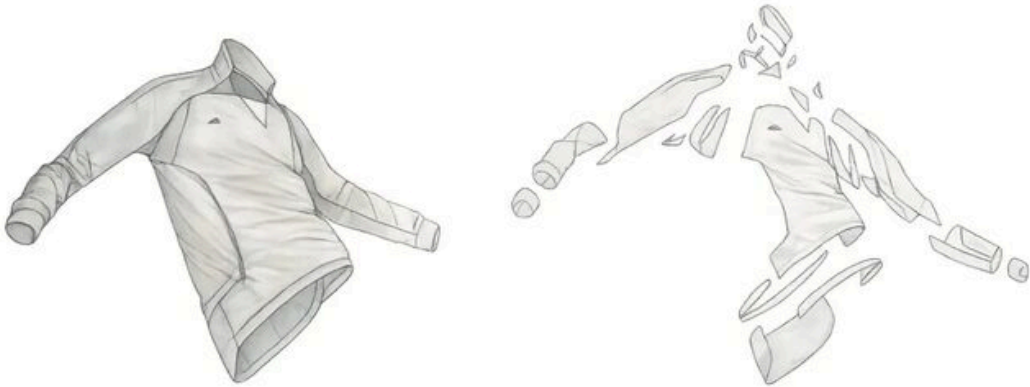


This problem is particularly evident in the work developed by Aitor Throup for Umbro on the England national team kits between 2009 and 2010. Throup did not use the conventional upright mannequin as his only reference, but developed articulated sculptures representing the body in the postures assumed during play. When describing the design of the 2010 away kit, he emphasised how the footballer's torso is frequently inclined forward and how the arms are rarely fully extended. The sculptures were therefore used to study the range of motion of the joints and to assess the behaviour of the garment under conditions closer to those of actual play.

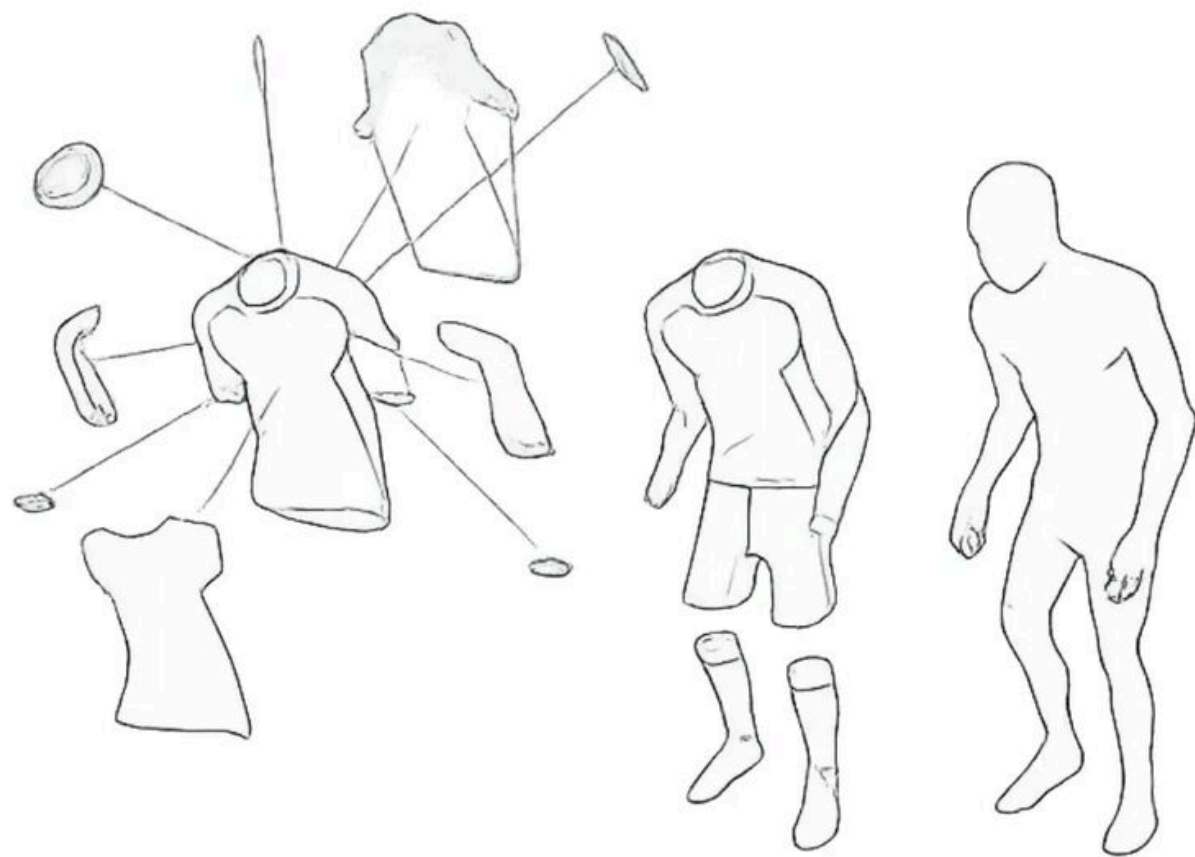


The distribution of materials followed the same logic. In the 2010 away kit, a single fabric was not used with the same function across the entire body: the front, back and sleeves responded to different requirements. The back prioritised ventilation and heat dissipation, while the front comfort and durability, while in the sleeves the priority became mobility at the shoulder and elbow. The construction was therefore divided into zones according to what each part of the body needed to do, rather than simply according to the aesthetic form the shirt was intended to take.

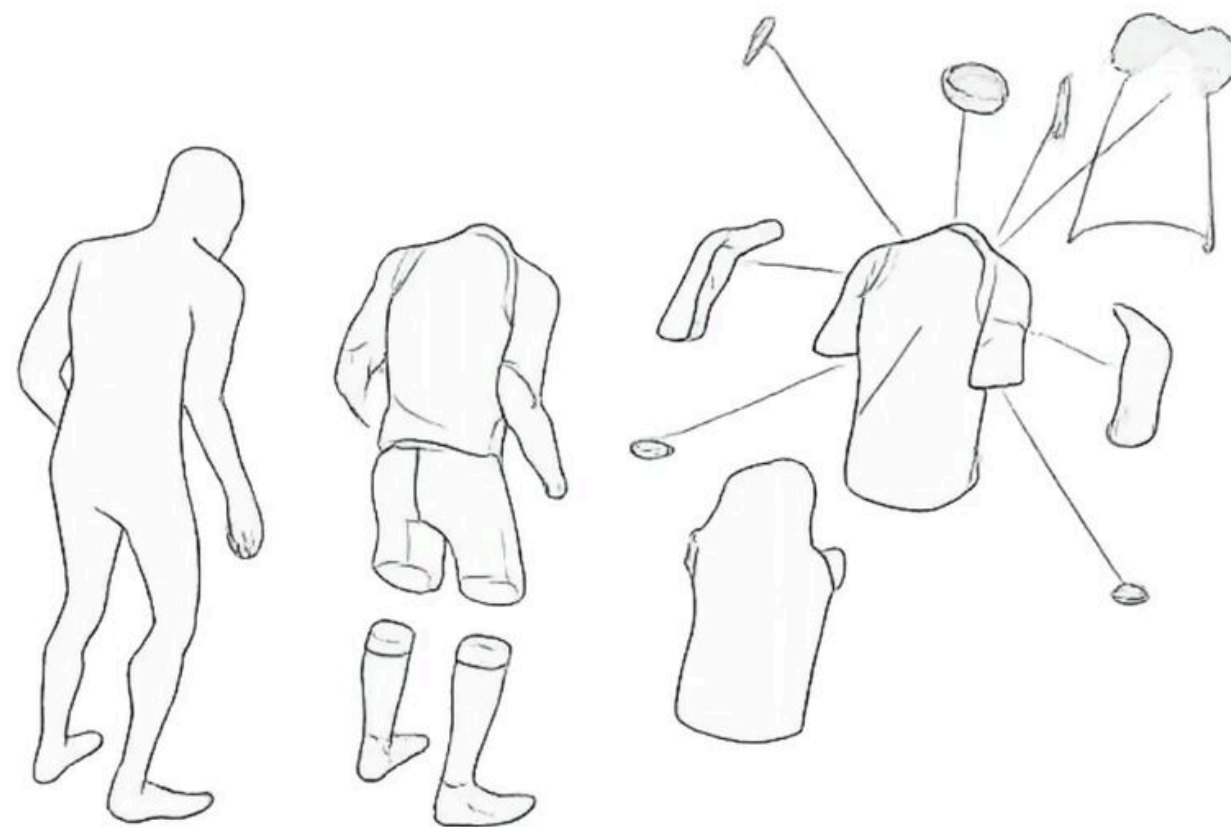
This marks an important shift from the previous examples. In sportswear, it is no longer simply a matter of leaving enough space for the body to move. Throup seeks to construct a surface capable of moving with the articulation itself. In the materials relating to the Umbro project, he describes the aim as making the kit move together with the player, rather than requiring the player to move within a relatively static form.



The research developed with Umbro is significant because it makes visible a principle that runs through much of Aitor Throup's work. Movement is not considered only during the final fitting stage of the garment, but can become one of the initial pieces of information from which the construction is developed. As the position of the body changes, so do the surfaces required to cover it, the areas that need greater mobility and, consequently, the structure of the pattern itself.



This method, however, did not begin with Umbro and is not confined to sportswear. In his independent projects and earlier collaborations, Throup had already applied the same approach to trousers, jackets and accessories, using anatomy, posture and sculpture as tools through which to question construction solutions that are usually considered conventional.



THE BODY AS A DESIGN METHOD

In Aitor Throup's work, the starting point is not necessarily a predefined basic block. The designer himself has explained that he prefers to begin with the body rather than with standardised blocks or existing construction systems. A block already contains a series of established decisions: seam placement, proportions, the relationship between torso and sleeve, or between hips and leg. Observing the body directly instead makes it possible to gather information before those decisions have been made.

Sculpture therefore takes on a design function. Throup builds three-dimensional figures positioned according to the specific conditions of the project and uses these forms as a basis for studying the surface of the garment. The posture can be fixed, observed and modified; the position of the joints remains present throughout the development of the fabric, and the surfaces are constructed directly around the volume.

This process produces patterns that, when viewed flat, can appear very distant from the conventional geometry of a sleeve or a trouser leg. The panels may be strongly curved, angled or rotated, but they make sense once assembled and reconstruct the volume for which they were developed. When analysing Throup's patterns, it therefore becomes important to consider not only the perimeter of the pieces, but also the orientation of the grainline and the relationship between one surface and the next.

AITOR THROUP



The same principle applies to seams. In some cases, Throup has developed joining systems that eliminate the conventional overlapping seam allowance, describing this research through the concept of Branding Through Construction: the identity of the product should be recognisable through the way it is built, rather than through details applied afterwards. If several pieces are required to generate a specific form, the aim is not to hide those lines, but to understand which ones are truly necessary and what role they play within the construction.

It is precisely in trousers that this method becomes particularly clear.

LEGS: trousers as a construction laboratory

In 2010, Throup brought together the trousers developed between 2004 and 2010 in LEGS: A Retrospective of Trousers, completing the archive with three new models: Trumpet, Calf Pocket and Anatomy.

Rather than a seasonal collection, LEGS makes it possible to observe several years of research focused almost entirely on a single type of garment. The functions, materials and reference postures change, but the trousers remain the starting point.

One of the first distinctive features concerns the division of the leg. In conventional trousers, a significant part of the volume is created by joining large front and back surfaces along the inner and outer leg. In Throup's trousers, this organisation can be replaced or supplemented by a greater number of panels, while seams are used to control where the volume changes direction. Throup himself, when discussing his construction methods, explains that the seams of his trousers can begin from the front, thereby questioning the conventional distribution of construction lines.

The seam no longer necessarily coincides with the simplest point at which to separate front and back. It can cross the thigh, rotate around the leg or divide the knee area into multiple surfaces. When panels with different curvatures are joined together, their connection contributes to the formation of volume. The assembly line therefore takes on both a structural and a shaping function.



A second recurring element is articulation. The knee and ankle are not treated as simple points along a straight leg, but as areas with different behaviours. In the trousers presented in LEGS, for example, ribbed sections appear in flexion areas, alongside articulated folds, pockets positioned on the lower leg and extensions that continue beyond the ankle.

In the Anatomy Trouser, the construction features three-dimensional shaping concentrated around the knee, seat and calf, while a more deformable ribbed surface is inserted behind the knee. The principle is simple: an area that must continuously compress and extend does not necessarily need to be treated in the same way as a surface that must remain more stable.

The use of different materials within the same garment follows the same logic. A more stable material can control a specific surface; a more elastic one can be placed around a joint; a reinforcement can appear only where there is specific contact or stress. Material is therefore not chosen only for the garment as a whole, but can be distributed according to the behaviour required in its different areas.



ANATOMY

2010 – Paris
Worsted wool
Ribbed jersey insert behind the
knee and calf
3D shaping: knee / seat / calf
Edge-to-edge seams
Kevlar-reinforced foot-cover sole



CALF POCKET

2010 – Paris
Worsted wool
2 zipped calf pockets per leg
Military thigh pockets
Articulated knee pleats
Hidden zips in the footguard



TRUMPET

2010 – Paris
Worsted wool
Pleated upper section
Rear welt pockets
Integrated foot extension



In the Calf Pocket Trouser, the problem changes again. The pockets are moved towards the calf, while the knee is treated through articulated pleats. The distinctive aspect is not simply the presence of a pocket in an unusual position, but the fact that the storage volume must be integrated into a surface already organised to follow the movement of the leg. Pocket, articulation and panel division are therefore resolved within the same system.

Another recurring characteristic is the continuity of the garment beyond its traditional boundaries. In several trousers, the construction does not end at the ankle but continues over the foot through integrated coverings. Throup has explicitly explored the idea that trousers could end at the toes rather than at the ankle, just as a sleeve could extend to the fingertips. The conventional limit of the archetype is therefore reconsidered in relation to the required function.

Assembly systems als

o form part of the same research. Throup has experimented with methods that allow surfaces to be joined without the conventional overlap of the seam allowance. The intervention therefore concerns not only the shape of the pattern, but also the physical way in which its pieces are recomposed.

Panelling, articulation, differentiated materials, integrated pockets, extensions over the foot and joining systems thus form a construction vocabulary. They are not elements added to make the trousers appear technically complex, but tools used to modify the structure of the garment when the problem being addressed requires it.



In LEGS, these solutions can be observed across numerous models. In The Funeral of New Orleans, however, it becomes possible to understand more clearly where some of these decisions originate.

The Funeral of New Orleans: from posture to construction

The Funeral of New Orleans draws on the tradition of New Orleans funeral marching bands and assigns different instruments to its various characters.

From a pattern-cutting perspective, however, the most interesting aspect is not the narrative theme itself, but the way in which it is translated into a design condition.

Throup does not use the same neutral figure to develop every garment. Instead, he constructs body sculptures in the specific postures required to play the different instruments.

This changes the point at which action enters the construction process. In a conventional procedure, a garment can first be developed on an upright figure, then tested during movement and corrected in the areas where the fabric pulls, compresses or creates excess material.

Throup instead brings action to the beginning of the process: the figure on which the garment is constructed already has a specific distribution of weight, a particular flexion of the joints and a precise orientation of the torso.

Posture is therefore not compensated for simply through a general increase in volume. It can directly determine where a surface needs to be divided, where a pleat can be introduced, how the lower leg should be oriented and which areas must be able to change configuration more freely.

The Saxophone Trouser makes this process particularly clear. In the technical material presented within the LEGS film, the trousers are described through a multi-panel construction in which a traditional pocket is incorporated into a pleat. A diagonal pleat also appears below the mid-thigh, while the construction of the lower leg gradually rotates towards the ankle. The trousers then continue into the foot guard, with an extension running beneath the foot and a lateral opening.

These elements should not be read as a sequence of independent details. The pocket is incorporated into a pleat that already participates in the construction of the leg; the pleat alters the organisation of the surface; the lower section rotates in relation to the upper section and continues into the construction around the foot.

Function and structure are therefore developed simultaneously.

It is precisely this aspect that distinguishes Throup's work from the simple application of technical features to an already defined garment. A pocket does not necessarily have to be added at the end of the process; it can be developed within a line that already performs a shaping function. In the same way, articulation does not need to appear as an element added over the knee, but can directly alter the number, shape and orientation of the panels that construct the leg.

Within The Funeral of New Orleans, a second line of research also appears, focused on the behaviour of the material. Throup develops several stages of the same pair of trousers through the progressive shrinking of wool, keeping certain construction elements constant while systematically altering another variable. The experiment is interesting because it reveals another aspect of his method: a transformation can be isolated and controlled in order to observe its effects on the object.

Above all, however, it is the relationship between instrument, gesture, posture, sculpture and construction that makes The Funeral of New Orleans particularly significant. The body is not interpreted as an abstract form to be dressed, but as a body already performing the action for which the garment is being designed.



The process observed in these projects finds a more precise formulation in the concept Throup defines as Negative Space Anatomy. The starting point is not the external silhouette that the garment should assume, but the volume required to contain the body.

Throup describes the method through a concrete sequence: he creates a sculpture of the body, covers its surface with fabric and then removes the body itself. What remains is an empty three-dimensional structure, a kind of skin that preserves the volume previously occupied by the figure. This surface can then be divided into the pieces required to make it flat and subsequently reconstructed through assembly.

This process helps explain the unusual placement of many of the seams found in his work. If the starting point is a three-dimensional surface, the pattern lines are also determined by the need to divide that surface into pieces that can be cut flat and later reassembled. The seam therefore becomes one of the operations through which volume is constructed, rather than a line necessarily inherited from the conventional structure of the garment.

In this sense, Throup designs not only the final result, but above all the process through which that result is generated.

The research into articulation continues through the collaborations with Stone Island, first with Modular Anatomy and later with Articulated Anatomy. The title of the latter project already indicates a shift in attention towards the relationship between the different parts of the garment and the movement of the body.



Articulated Anatomy is significant precisely because it confirms a principle already observed in LEGS and The Funeral of New Orleans: freedom of movement is not necessarily achieved by adding space throughout the entire garment; it can be constructed locally in the areas where the body changes configuration.



The collaboration with C.P. Company for the reinterpretation of the 1000M Goggle Jacket makes this process particularly clear because, in this case, the reference body is fixed in a very specific condition: the driving position.

The original Goggle Jacket, designed by Massimo Osti in relation to the Mille Miglia, already contained elements directly connected to driving, including goggles integrated into the hood and a window on the sleeve through which the driver could check the time.

For the reinterpretation of the model, Throup developed the jacket directly on a sculpture of the body seated in a driving position. This choice produces an apparently unusual consequence: the garment does not necessarily fall in a conventional way when viewed on a perfectly upright person, because that is not the position for which it was constructed.



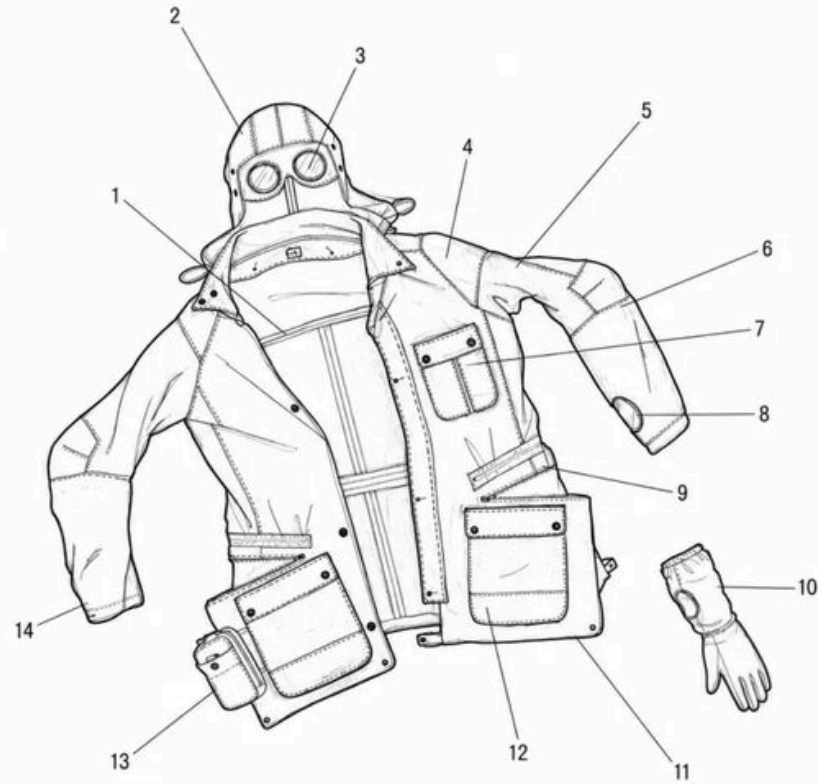
Posture also determines several details of the jacket. The lower section can be connected to the legs so that, when the driver sits down, the hem is kept away from the abdomen, reducing the accumulation of material in the flexed area. The watch viewer is moved towards the inner wrist, making it easier to see when the hands are positioned on the steering wheel. The hood is also developed in relation to the volume of a racing helmet.

What makes the project significant is therefore not the number of functions it contains, but the fact that they all derive from the same initial condition. What happens to the hem of the jacket when the body sits down? Where is the wrist positioned while driving? What volume must the hood contain?

The answers to these questions progressively determine the construction.

The case of the Goggle Jacket also makes one aspect of Throup's method particularly clear: a garment designed correctly for a specific action does not necessarily need to appear perfectly balanced once that action is removed. If the reference position changes, lengths, tensions and the distribution of volume can change as well.





- 1- Waterproof GORE-SEAM® seam taping
- 2- New removable ergonomic hood with goggles
- 3- New circular goggles
- 4- 3-layer GORE-TEX® Performance Shell fabric
- 5- Ergonomic shoulder construction for driving
- 6- Ergonomic elbow articulation
- 7- New waterproof chest-pocket construction
- 8- New ergonomic positioning of the watch viewer
- 9- Hidden internal zipped pockets, accessible while driving
- 10- Driving gloves attachable to the jacket
- 11- Articulated convertible flap / leg cover
- 12- Traditionally shaped front pockets, made waterproof
- 13- Removable driving pouch with two compartments
- 14- Adjustable cuffs with zip closure



Observed together, these projects reveal a method in which the solution is reconstructed each time from the problem itself.

If the action changes, the reference body changes first. A figure running during a match does not assume the same configuration as a musician holding an instrument or a driver seated at the wheel. As that configuration changes, so can the distribution of material, the position of the joints, the construction lines, the shape and number of panels and the placement of functional elements.

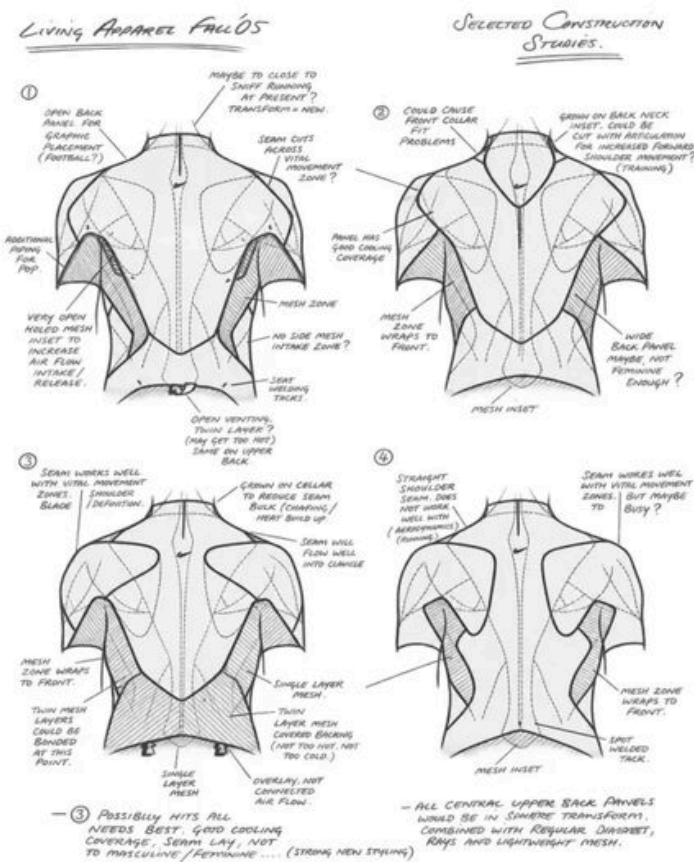
This logic explains why Throup's work can appear formally complex without necessarily beginning from the pursuit of a complex form. The process develops from the inside out: an initial condition is defined, the problems it generates are identified, and each is addressed through construction, material and pattern cutting.

The pattern is no longer simply the means through which a previously defined form is made producible. It can become the result of a series of observations about the body: where it articulates, which posture it assumes, which surfaces need to move, which need to remain stable and where a function needs to be positioned.

The most significant contribution of Throup's method to pattern cutting is therefore not a new block to be replicated, but the possibility of reconsidering the block itself every time the conditions for which the garment is designed change.

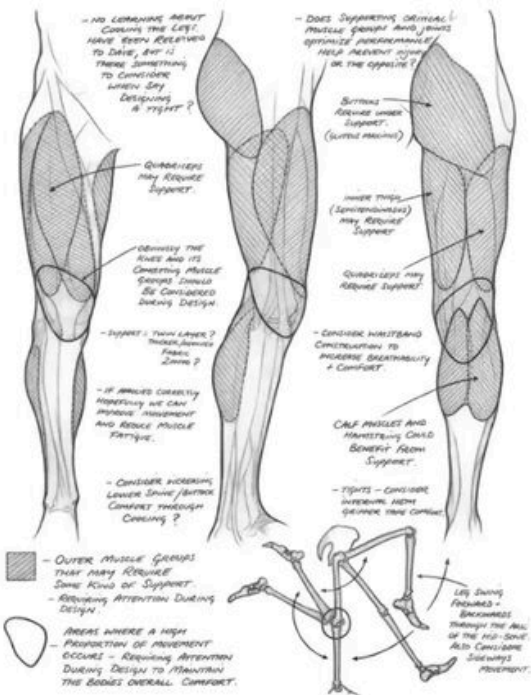
TONY SPACKMAN

While Throup often uses posture and three-dimensional sculpture to construct the garment around a specific anatomical configuration, Tony Spackman tends to break down the body and its movement into zones with different behaviours, subsequently translating them into panels, articulations, openings and variations in material.



Spackman’s research is visible in the drawings developed for Living Apparel / Nike React. In these studies, the design process does not begin with the representation of a finished garment. Instead, the body is graphically broken down into muscle groups, joints and “critical areas”.

The drawings therefore become an intermediate stage between anatomical observation and product development. An area identified as critical can translate into a change of material, an opening, an elastic panel or a different construction; a part that requires ventilation does not necessarily call for the same solution as an area intended to provide support. The body is thus transformed into a map of different requirements, which then determines the organisation of the textile surface.



The Code Mastercraft Jacket represents the most complex application of this principle. The jacket is not treated as a continuous surface, but divided into dozens of panels. Many of these are elasticated and constructed so that they can shift in relation to the adjacent panels. Mobility therefore does not depend exclusively on the overall elasticity of the fabric: it is distributed through the structure of the garment itself. The intersections around the underarm, elbow and back become points where the different sections can respond independently to changes in position.

This organisation makes the transition to the pattern particularly complex. It is necessary to define not only the shape of each panel, but also how it behaves in relation to the surrounding ones during movement. Stewart Horner, then a designer at Nike, recalls Code as one of the most difficult pattern-cutting projects of his career and explains that Spackman involved a specialist pattern cutter to develop its construction.



The project proved expensive and difficult to manufacture precisely because of the high number of components and the complexity of their assembly.

The panelling is also used to integrate other performance features directly into the structure. The Mastercraft included ventilation openings, water-diversion systems, hand warmers, internal layering and a very high collar containing a removable gel insert.

For the project, Spackman also collaborated with YKK on the development of an invisible open-ended zip, required to achieve a closure compatible with the jacket's construction system. In the winter version, the same structure was also produced in Loro Piana wool, demonstrating that its function was not tied exclusively to the synthetic materials generally associated with activewear.



The same principle is visible in the Mastercraft Pants. One documented original example features a main Cordura structure combined with locally placed stretch panels, articulated knees paired with ventilation openings, a single waistband panel extending around the entrances of the side pockets, and concealed adjustments at the hem. Inside, a cotton layer separates the stiffer Cordura from the skin. In this case, materials with different behaviours are therefore kept within the same garment rather than relying on a single fabric to perform every function.



Code was followed by Mobius, or MB1, conceived as a more accessible version of the same system. The reduction in cost involved less expensive materials and simpler patterns, but did not eliminate the articulation and modularity developed previously. Some jackets use stretch panels at key movement points, overlapping or removable components, and internal structures that can also be developed as independent elements. One particularly significant model features a triangular mesh closure on the back, a zip oriented in the opposite direction to conventional construction, and proportions that are longer at the front and shorter at the back. Mobius therefore also demonstrates the process of rationalising a complex experiment: the Code system is simplified in order to become more producible and practical.

In Spackman's work, the body is therefore not treated as a uniform form, but as a system of areas with different requirements. Movement, support, ventilation and protection become design information that directly determines panels, materials and construction systems. The garment thus emerges from the translation of a functional map of the body into an articulated textile structure.

VEXED GENERATION



Vexed Generation emerged in London in the early 1990s through the work of Adam Thorpe and Joe Hunter, at a time when a series of changes within the city were directly altering the relationship between the individual and public space. The expansion of CCTV surveillance made the possibility of being observed and identified increasingly present; air pollution introduced a growing concern around air quality; and the protests surrounding the 1994 Criminal Justice and Public Order Act made the relationship between civil liberties, control and police intervention particularly visible.

These elements, however, did not remain narrative references applied to clothing afterwards. Thorpe reconstructs the project through an actual design brief, in which issues such as air quality, surveillance and civil liberties are translated into requirements including respiratory and physical protection, concealment of identity, adaptability and the ability to carry objects securely. The design process therefore proceeds by transforming a condition observed in the city into a concrete consequence for the construction of the garment.

The Vexed Parka, designed in 1994, concentrates this method within a single garment. The main material is a high-tenacity ballistic nylon produced to Ministry of Defence specifications, previously used primarily in protective applications such as bulletproof vests and blast curtains. Vexed initially applied a fire-resistant neoprene coating to the fabric, later replaced in some versions by a waterproof and breathable polyurethane treatment.

The choice of a protective material does not, however, result in a uniform armour. Padding is concentrated on the top of the head, along the spine, around the kidneys and at the groin. Thorpe explicitly links this distribution to the areas in which a person could be struck by a baton during a confrontation. The protective intervention is therefore localised across the surface of the garment according to an identified risk.

A second problem concerns surveillance. The hood and collar can close across the face, reducing the possibility of identifying the wearer.

The construction does not, however, completely remove the ability to see the surrounding environment, and the facial covering simultaneously performs another function:

it can contain a filtered respiratory mask, stored in a dedicated pocket on the sleeve. The same transformation of the upper part of the pattern therefore responds to two different conditions: anonymity in relation to surveillance and protection from air pollution.

The hem of the Parka also extends beyond the conventional ending of a jacket. The front and back sections continue downwards and can be connected between the legs, creating localised protection around the groin and keeping the garment more stable during use.



The construction therefore directly alters one of the conventional boundaries of the archetype: the hem does not simply end around the hips, but continues because the identified condition makes that form insufficient.

The Parka therefore makes it possible to understand the starting point of Vexed Generation. Anonymity, air quality and protection are not represented graphically on the garment: they modify its material, thickness, length, openings, volume and distribution of components.

In later projects, Vexed progressively shifts its attention from individual protective elements to the way the surface of the garment itself is organised.

An early example is the research known as Stretch Seam. Vexed frequently worked with Cordura and other relatively stable technical materials. A surface of this kind can provide protection and durability but, when cut very close to the body, it increases stress in the areas where the garment needs to change its geometry. The solution developed was to retain non-stretch material across most of the jacket while introducing stretch Cordura through the shoulder-blade area and along the sides.

Thorpe and Hunter explain that the system was not intended only for sporting movements: even the continuous transition between sitting and standing places stress on the seams. Deformability is therefore concentrated in the connection zones rather than distributed uniformly across the entire fabric.

From a pattern-cutting perspective, this changes the meaning of the seam itself: it is no longer simply the point at which two surfaces are assembled, but can become the area through which those surfaces alter their relationship.

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With the Fan Pleat Biker Jacket, Vexed addresses the same problem of freedom of movement through a purely construction-based solution, without relying on the elasticity of the material.

The pattern directly incorporates additional surface area through a series of pleats concentrated along the arm and elbow. In a neutral position, these remain folded and keep the garment close to the body; when the arm bends, they can progressively open, providing more fabric precisely where a greater range of movement is required.

The pleat therefore functions as a reserve of surface: it does not create a fixed volume, but stores material within the construction and makes it available only when needed.

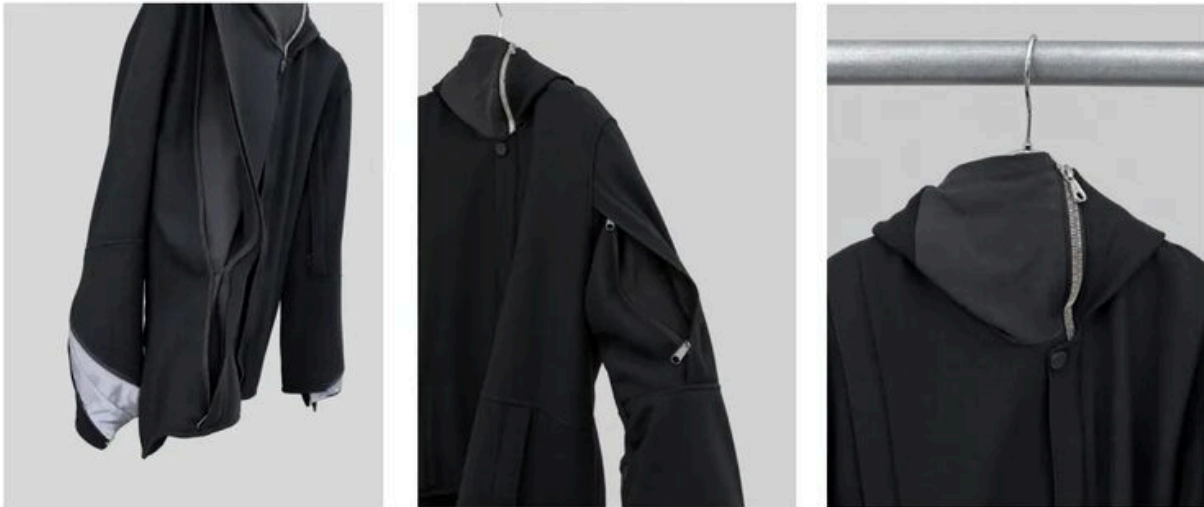
The comparison with the Tectonic Jacket makes the difference between the two systems clear: in the Tectonic, the panels alter their relationship to one another, while in the Fan Pleat the surface of the garment itself temporarily increases through the opening of the pleats.



The SABS Parka from 2001 represents one of the most complete examples of Vexed Generation's research, because it brings together apparently opposing requirements within the same garment. The name, See And Be Seen, encapsulates the relationship between anonymity and visibility that determines its construction.



The hood extends the surface of the garment to cover much of the face, reducing the recognisability of the wearer. This condition of anonymity does not, however, compromise awareness of the surrounding environment: a transparent strip positioned at eye level preserves peripheral vision, which is particularly important when cycling.



In traffic, the requirement is reversed. If in some situations the garment must allow the wearer to remain concealed, while cycling the user must instead become easily visible. For this reason, the Parka integrates 3M reflective surfaces hidden within the construction, which are revealed through openings positioned at the wrists and along the centre back. The reflective component therefore does not remain constantly visible, but appears only when the garment is worn in a specific configuration.

The central back zip simultaneously performs a volumetric function. When the arms are brought forward, as in a riding position, the surface required across the shoulder blades and back increases. By opening the zip, the rear panel can expand laterally, providing greater freedom of movement while simultaneously revealing the reflective material.

A single transformation therefore produces two simultaneous effects:

opening the centre back = greater surface area across the back + greater visibility in traffic.

When this configuration is no longer necessary, the zip can be closed again and the garment returns to a more compact silhouette.



The SABS Parka therefore shows how Vexed does not use technical detail as something added to an already defined form. Instead, the construction itself allows the garment to shift between different conditions of use, modifying surface, volume and visibility in relation to context.

MANDARINA DUCK

If in Vexed Generation the construction of the garment is modified in response to the conditions of the urban environment, with Mandarinina Duck the design field expands even further. The garment is considered not only in relation to the body and its surroundings, but as part of a system in which protection, storage, materials, components and modes of use all operate simultaneously.

Mandarina Duck was founded in Bologna in 1977 by Paolo Trento and Pietro Mannato, initially as a brand dedicated to luggage and travel products. This origin remains central to the later development of its clothing: designing a bag means organising capacity, access, weight distribution and changes in volume in relation to what needs to be carried. With the introduction of apparel, many of these same issues were transferred directly onto the garment.

It is within this phase that the work of British designer Jeff Griffin becomes particularly relevant, as his research for Mandarinina Duck played a significant role in developing the outermost and most technical layer of the brand's clothing system. His background, already rooted in military wear, outerwear and functional construction, made it possible to translate principles derived from luggage into solutions applied directly to the body and the pattern.

In 1997, Mandarinina Duck organised its clothing through three layers: Exowear, intended as the outermost layer; Mesowear, as an intermediate layer; and Endowear, worn closest to the body. Within this structure, Exowear became the area in which Griffin's design research was most clearly expressed.

The garment was therefore not conceived as an isolated object, but as part of a layered system in which protection, storage, accessibility and material behaviour could be distributed across different levels. Closures, pockets, rigid components and added volumes were not treated as secondary elements, but participated directly in the construction and function of the garment.

One of the central aspects of Jeff Griffin's work for Mandarinina Duck Exowear concerns the relationship between construction and material. Textile selection does not take place only within categories traditionally associated with clothing: materials from other industrial sectors are also examined and selected according to the performance they can offer within the product.

One example is Fiberduck, derived from a lightweight fibre used in the automotive industry for seat padding and later transferred into clothing. The material combines lightness, flexibility, abrasion and tear resistance, and protection from external conditions. Among other applications, it is used in the Cell Parka from the Exowear A/W 1997 line.

The transition from automotive to clothing reveals an important principle of the method: the material is not chosen for what it traditionally represents, but for what it is capable of doing within the garment.

The same logic applies to hardware. In the Ballistic Moulded Clasp Jacket, the front closure uses components specifically moulded for the product, becoming a visible part of its construction.

If in the Cell Parka the research focuses mainly on the behaviour of the surface, in the Moulded Clasp Jacket it directly concerns the rigid component. In both cases, the design does not begin from an already resolved form onto which materials or accessories are later added: material, hardware and pattern are considered simultaneously as parts of the same system.



Griffin's research into the relationship between clothing and storage becomes particularly evident in the Egg Cell pockets, one of the most recognisable systems developed during this phase of Mandarin Duck.

Their distinctive feature does not simply lie in increasing the capacity of a pocket. The volume is not fixed once and for all by the pattern, but can emerge progressively during use.

When the pocket is empty, the surface of the garment remains relatively compact. The construction, however, incorporates an additional amount of material that can be pushed outward when an object is inserted, generating a three-dimensional volume.

The pattern therefore contains two potential conditions at the same time: one flat and one expanded. The contents themselves determine which of the two configurations is activated.

The same principle can be applied to different garment types, including jackets and trousers. From a pattern-cutting perspective, the pocket is therefore designed not only through its position and dimensions, but also through the anticipation of its transformation.

In this case, it is not anatomical movement that changes the surface required by the garment, but the object being carried. The pattern must therefore take into account both the body and a second, variable volume that can emerge on its surface.

It is precisely here that the connection between Griffin's research and Mandarin Duck's experience in luggage becomes particularly clear. A problem typical of bag design – constructing a space capable of changing in relation to its contents – is transferred directly into clothing and transformed into a pattern-cutting problem.



The same relationship between clothing and storage is taken to a larger scale in the Jackpack, developed around 2000. Here, the research no longer concerns only an expandable pocket: the entire garment is designed through the overlap between clothing and a carrying system.

In the Jackpack, the functions of jacket and backpack are integrated into the same product. The storage volume is concentrated on the back, while shoulder straps, openings and fastening systems are incorporated directly into the construction.

Pattern cutting must therefore respond simultaneously to different requirements: fit, freedom of movement, distribution of volume and carrying capacity. Panels and anchor points must function when the product is used as a garment, but also when its configuration changes and the backpack component becomes predominant.

Compared with the Egg Cell, where the transformation affects a localised portion of the surface, in the Jackpack it concerns the overall organisation of the object. The same components must adapt to two different logics: that of a garment constructed around the body and that of a container constructed around objects.

The project therefore makes particularly clear the method developed by Jeff Griffin within Mandarina Duck. The garment is not treated simply as a form to be worn, but as a system capable of organising body, materials, components and storage.

Pattern cutting thus moves closer to the logic of product design: it does not simply determine the final silhouette, but constructs the relationships through which the object can be used, transformed and adapted to different conditions.

In my view, this version addresses the professor's observation precisely: Mandarina Duck remains fundamental as a context and as the origin of the bag-design logic, but Jeff Griffin and his design method become the central focus of the chapter.



Considered together, these projects show a progressive expansion of the design problem.

The Cell Parka intervenes in the properties of the surface through the transfer of a material from another industrial sector; the Moulded Clasp Jacket extends this research to components; the Egg Cell introduces a variable volume capable of changing through use; the Jackpack extends transformation to the entire object.

The pattern must therefore respond not only to the anatomy of the body, but also organise materials, access points, components, storage and possibilities for transformation at the same time.

Clothing design thus moves closer to the logic of product design: the garment is not defined simply as a form to be constructed around the body, but as a system whose parts are organised according to use.

Pattern cutting becomes the place where these different types of information are coordinated: it does not simply determine the form of the garment, but constructs the system through which body, space and objects can enter into relation.

TECH-NECK

TECH-NECK begins with the observation of an everyday condition: the contemporary body spends an increasing amount of time interacting with digital devices. During these actions, the body does not necessarily maintain the upright configuration on which the traditional tailoring mannequin is based, but assumes a specific posture determined by the relationship between gaze, device and gesture.

The aim of the project is not to establish which posture is correct or incorrect, nor to propose a garment capable of correcting the body. Instead, the starting point is to consider posture as design information. If the position of the body changes, the distances between certain anatomical points, the orientation of the joints, the surface required in specific areas and the relationship between the front and back of the body change at the same time. Garment construction can therefore be developed from these variations.

The project thus replaces the idea of an abstract, static body with that of a body observed during an action. The pattern is not developed exclusively for a neutral position, but tested against a recurring postural configuration: the one assumed while using a smartphone.

Before intervening on the garment, it is necessary to understand where the body changes and where it remains relatively stable.

For this reason, the neutral posture and the posture assumed while using a smartphone are observed through the same reference points. The analysis does not consider the body as a single mass leaning forward, but as a system composed of interconnected segments.

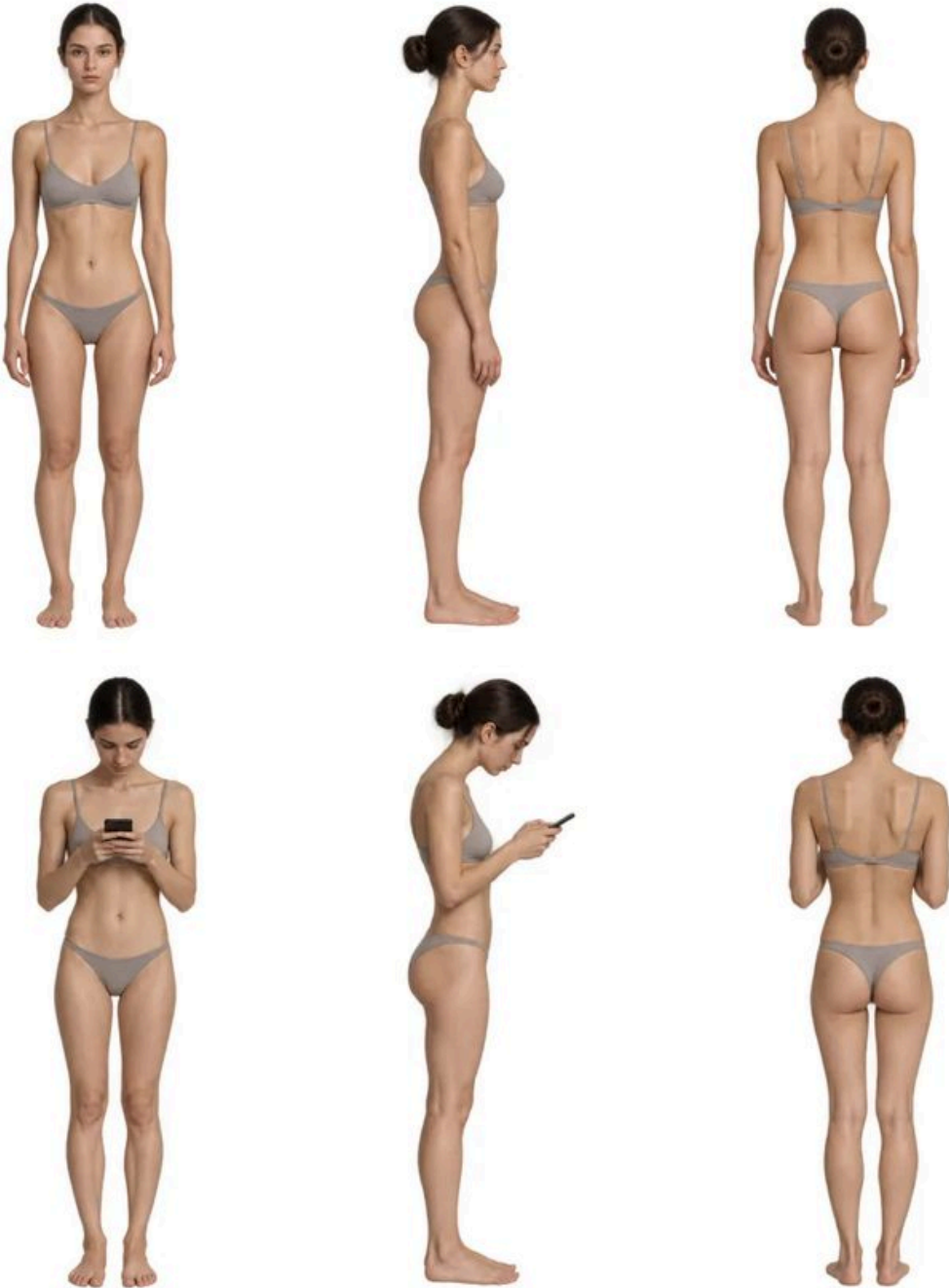
The most evident variations are concentrated in the upper body. The head rotates forward to direct the gaze towards the device; the relationship between the head and cervical spine changes; the shoulders move further forward; the curvature of the thoracic region increases; the arms leave their extended position and remain flexed in front of the torso.

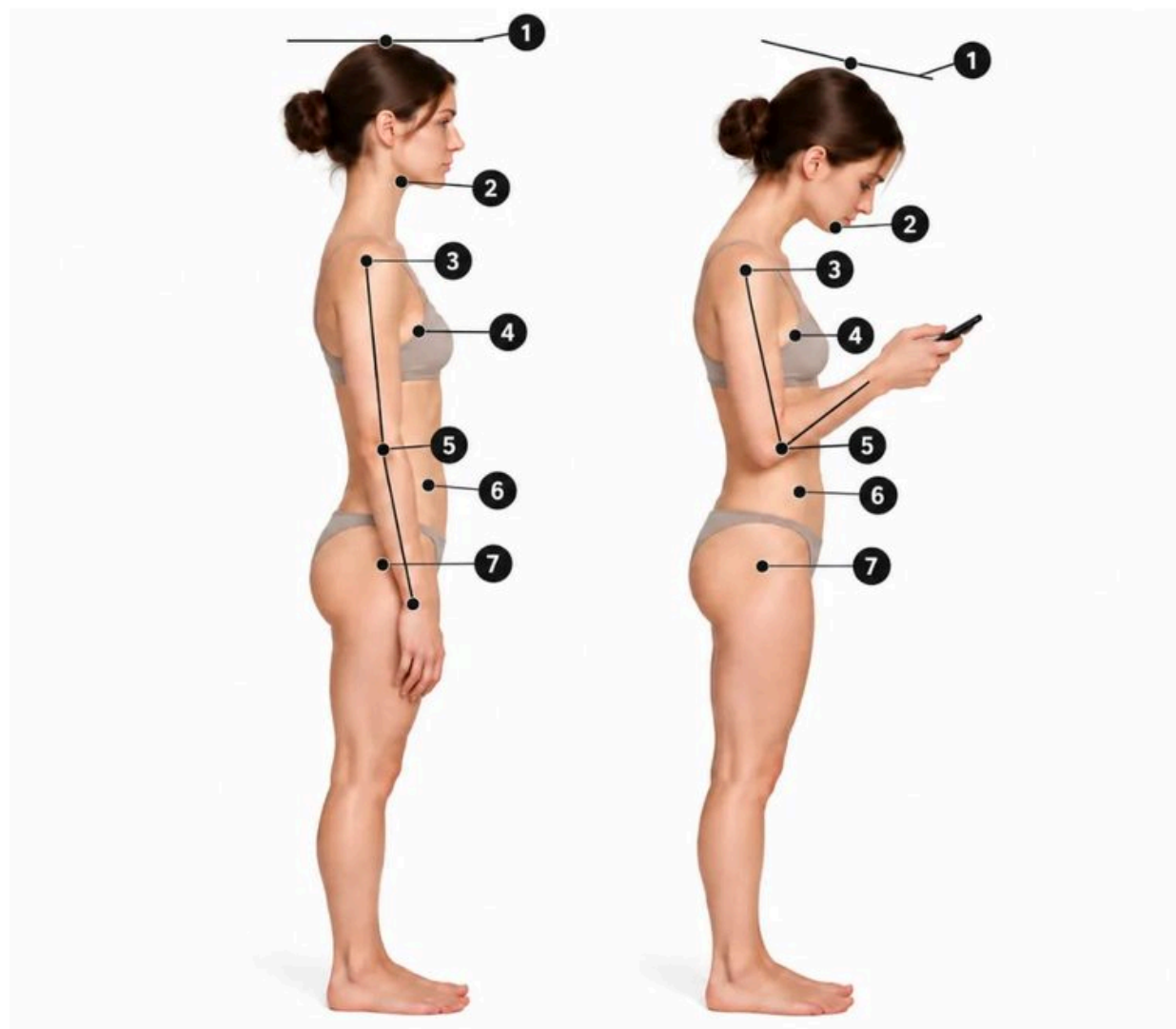
The lateral comparison makes these changes easier to read. In the model used for the project, for example, the craniovertebral angle changes from approximately 53° in the neutral posture to approximately 42° in the phone posture, while the angle between the upper arm and forearm shifts from an almost fully extended position, around 174°, to a flexion of approximately 60°. These values are not used as universal anatomical standards, but as comparative measurements of the same figure in two different configurations.

One particularly important observation concerns the torso. The overall axis between the upper torso and the pelvis remains relatively stable: the transformation therefore does not simply consist in bending the entire body forward. The change is more localised and mainly concerns the relationship between the head, cervical spine, thorax, shoulder and upper limb.

This distinction becomes fundamental in the following phase: if the postural modification is localised, the pattern must also be modified locally rather than through a uniform deformation of the entire garment.

POSTURAL ANALYSIS AND DESIGN TRANSLATION





N. - Area	Upright posture	Smartphone posture	Design solution
1 - Head	Head aligned with the torso. Upper tangent line of the head almost horizontal.	Head projected forward and tilted downward, with approximately 30-45° of head flexion depending on the task and the position of the phone.	Increased length at the upper centre back and greater extension of the back neck/hood.
2 - Chin / neck	Neck closer to neutral alignment.	Chin lowered with greater cervical flexion.	More open and less restrictive front neckline; greater extension and shaping at the back neck.
3 - Shoulders	The shoulder remains further back and the shoulder girdle appears more open.	Bringing the hands in front of the body causes the shoulder to shift and rotate forward, creating a more closed po	Cucitura spalla leggermente avanzata, maggior sviluppo sul dietro e giro manica orientato più anteriormente.
4 - Chest	The thoracic spine maintains a relatively moderate physiological curvature, and the torso appears more open.	Head and shoulder flexion is accompanied by thoracic curvature of approximately 59-62° during smartphone use.	Increase the length of the upper back using curved panels or expansion zones across the scapular region.
5 - Elbow flexion	The arm is almost fully extended; on our figure, the shoulder-elbow-wrist angle is approximately 174°.	The elbow bends sharply; on our figure, it measures approximately 60°. The value depends directly on the height and distance of the device.	Construct a pre-curved sleeve, adding volume at the back of the elbow and reducing it on the inside.
6 - Torso axis	The axis between the base of the neck and the pelvis remains almost vertical.	The greatest change occurs mainly in the cervical and thoracic regions.	Concentrate the modifications on the neck, upper back, shoulders and sleeves.
7 - Pelvic orientation	The pelvis shows a slight natural tilt, without any marked compensation.	Its orientation may shift slightly. The variation is, however, less pronounced than in the neck and thoracic region.	Use a shaped waistline and differentiate the centre front from the centre back.

Analysing the body alone is not sufficient to determine the shape of the pattern. Before constructing the pattern, it is necessary to understand how the material responds to the transformation required by the body.

This step is central to the design method of the collection. A pattern does not produce the same form when made in an elastic material, a heavy wool or a rigid surface. The geometry of the pattern and the physical properties of the material must be considered simultaneously.

Material research therefore precedes the final development of the pattern.

The collection uses materials with very different weights and structures: 325 gsm wool, 400 gsm polyester mesh, 500 gsm wool cloth, 300 gsm Tempotest acrylic canvas, 100 and 150 gsm Lycra, 180 gsm jersey and lighter cottons. This variety makes it necessary to evaluate the behaviour of each material before defining the final construction of the garment.

The assessment should not be limited to composition or weight. It is necessary to observe thickness, rigidity, drape, direction and degree of stretch, elastic recovery, resistance to folding and the ability to maintain a three-dimensional volume.

The key point is to distinguish between two possibilities.

Part of the deformation can either be absorbed by the material or must be built into the pattern.

A deformable material can adapt to a joint without requiring a large amount of additional volume. A material with little elasticity, by contrast, requires the pattern maker to physically incorporate the necessary space into the pattern through added length, panelling, rotations, darts, pleats or cuts.

Material therefore ceases to be a choice made after the form and becomes one of the parameters that determine the form itself.

Posture analysis and material research are two complementary stages of the same design process. The first makes it possible to identify the areas of the body that change configuration most significantly during smartphone use; the second helps determine how much of these variations can be absorbed by the material and how much must instead be incorporated directly into the construction of the garment.

The pattern therefore emerges from the interaction between body geometry, postural behaviour and material properties. It is not considered an autonomous two-dimensional form onto which fabric is applied afterwards, but as a structure that must be developed simultaneously with the choice of material.

Posture first determines where intervention is required. The inclination of the head, forward movement of the shoulders, increased curvature of the thoracic region and flexion of the upper limbs alter the distribution of surface needed around the body. Some areas require greater development, while others tend to compress. The relationship between front and back therefore cannot remain unchanged from a block constructed exclusively around an upright posture.

Material behaviour, by contrast, determines how to intervene. The project uses materials that differ greatly in composition, weight and construction, from 500 gsm wool cloth and 325 gsm wool to more deformable materials such as jersey and Lycra.

With a rigid material, the three-dimensionality required by the body must be introduced mainly through the pattern: by increasing or reducing lengths, introducing panels, cuts and curves, and shifting seam placement. An elastic or knitted material can instead absorb part of the variation directly through its own deformation.

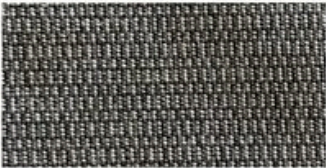
This relationship leads to a fundamental principle of the method:

the required deformation can either be constructed into the pattern or absorbed by the material.

The choice between these two possibilities, or their combination, determines the construction of each garment.

One example is the relationship between highly structured materials and articulated areas. A rigid surface can be used to maintain the external geometry, while jersey or stretch materials are inserted in areas subject to movement, such as the shoulder blades, back or knees. The garment is therefore not made uniformly elastic or uniformly rigid, but divided into areas with different behaviours according to the required function.

The pattern thus becomes a system composed of support zones, deformation zones and articulation zones.

Material	Composition	Swatch
Wool cloth	100% Wool 500 gsm Compact and heavy structure	
Wool	100% wool 325 gsm Canvas Medium-weight fabric	
Mesh	100% polyester 400 gsm Mesh-knit structure	
Acrylic canvas	100% acrylic fiber 300 gsm compact canvas	
Jersey	95% cotton · 5% polyester 180 gsm Rib-knit structure	
Lycra	100% polyester 150 gsm elastic knit structure	
Lycra	100% polyester 100 gsm light weight elastic knit structure	
Cotton canvas	100% cotton 80 gsm light weight canvas	

Properties	Use
High density, good dimensional stability and the ability to maintain three-dimensional volumes. Despite its weight, the wool structure allows curved surfaces to be shaped and supported.	Used in the outer and structured parts of the garment. Its density supports the construction of curves, panels and three-dimensional volumes, allowing the pattern to maintain a defined shape.
Lighter and more flexible than the 500 gsm wool cloth. It can be stiffened through interfacing, modifying its behaviour according to the structure required.	Used for lighter structures. When necessary, it is interfaced to increase stability and support, allowing structured elements to be achieved without the weight and thickness of the 500 gsm wool cloth.
Structured material capable of maintaining a defined shape while preserving an open structure that allows airflow. It therefore combines support and ventilation.	Used in outer layers when a structured construction is required, it supports the volume of the garment while simultaneously allowing ventilation.
Very rigid and stable material, with limited deformation and a strong ability to maintain the geometry defined by the pattern.	Used in the most structured outer sections. Its rigidity allows panels and volumes to remain sharply defined, making the form primarily determined by the pattern.
Flexible and deformable, it follows joint movement and allows changes in surface area without creating excessive tension.	Placed in areas of movement, such as the shoulder blades, back and knees, it creates articulated zones within a rigid outer structure. It facilitates the transition from an upright posture to the posture assumed while using the phone.
High elasticity and the ability to adapt directly to changes in the body's surface.	Used in close-fitting areas directly against the skin. Its high elasticity allows the material to absorb part of the postural variation, reducing the amount of volume or articulation that needs to be built into the pattern.
High elasticity and the ability to adapt directly to changes in the body's surface.	Used in the areas in direct contact with the body, especially where a very thin and close-fitting surface is required. It follows movement easily and allows the pattern to remain lighter and less complex.
Very lightweight, soft and breathable; minimal bulk within the garment.	Used as an internal lining. Its light weight limits the overall increase in garment weight, while the natural fibre provides comfort and breathability against the body.

Once the postural variations and material behaviour have been defined, this information is translated into concrete modifications of the pattern.

The process does not simply consist in increasing the overall ease of the garment. A greater amount of material distributed uniformly would certainly allow more movement, but it would remove the direct relationship between body shape and construction.

The aim is instead to localise the intervention.

A first operation concerns the redistribution of lengths. When the body assumes a flexed position, some surfaces increase in extension while others compress. The cervical and dorsal regions may require greater development, while unnecessary amounts of fabric may appear at the front.

The front and back are therefore treated as independent surfaces. Length is added only where the body requires more of it and can be reduced or controlled in areas of compression.

A second operation concerns the repositioning of construction lines. Seams are not treated as fixed positions. A shoulder line, for example, can be moved forward to accommodate a shoulder that is projected more anteriorly. A back seam can instead follow the curvature of the scapular area and simultaneously become a point through which volume is introduced. In this way, the seam takes on a structural function: it no longer represents only the point at which two pieces are assembled, but becomes a tool through which three-dimensionality can be controlled.

The third operation concerns the articulation of the pattern. Areas characterised by significant angular changes, such as the elbow and knee, can be constructed from an already partially flexed configuration. Instead of developing a sleeve exclusively on an extended arm and later relying on the fabric to deform, volume is distributed differently between the inner and outer sides of the joint. The same principle can be applied to the scapular region. A completely rigid back surface would restrict shoulder movement; for this reason, articulation can be achieved through specific panels or by inserting more deformable materials. The final construction therefore results from the combination of three actions:

modifying the amount of surface, modifying the position of the lines and modifying the behaviour of articulated areas.

The result is not a pattern randomly distorted to reproduce a silhouette, but a system in which every variation should relate to the behaviour of the body or the material.

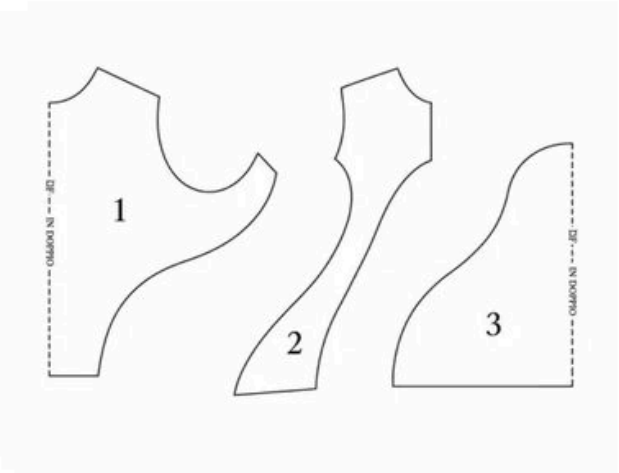


01 – Initial condition
In a neutral posture, the back maintains a stable configuration. The shoulder blades remain more retracted and closer to the spine, without requiring any particular expansion of the garment surface.

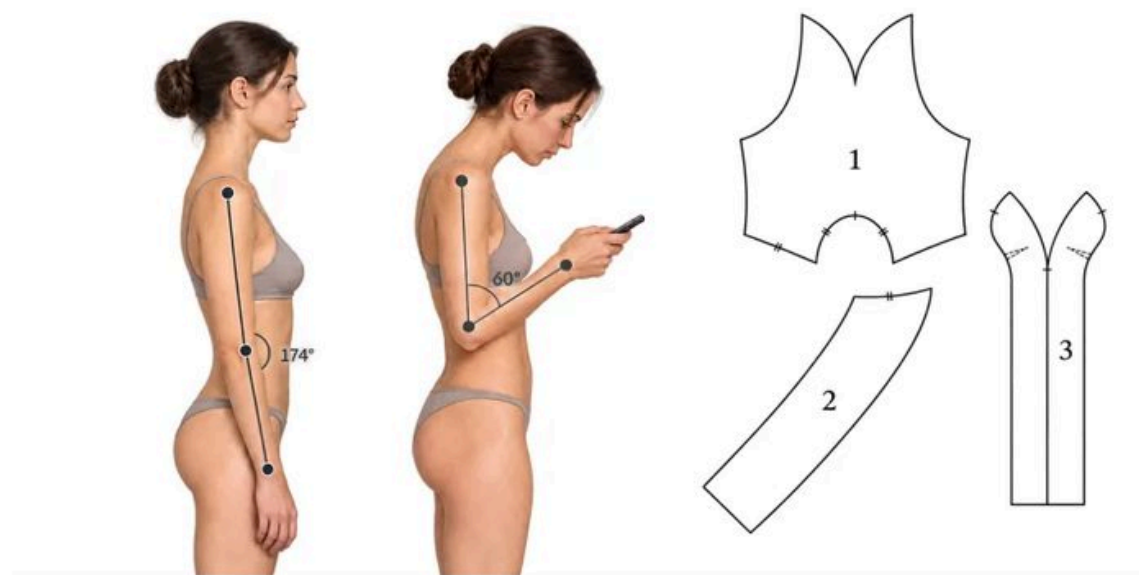
02 – Anatomical variation
Smartphone use causes forward shoulder protraction and lateral displacement of the shoulder blades. This alters the configuration of the back and increases the surface required across the scapular region.

03 – Design solution – back view
To accommodate this variation, the back of the garment integrates a continuous stretch panel covering the area between the neck, shoulder blades and back armhole. In this way, the garment follows the expansion of the back without restricting movement.

04 – Design solution – side view
Viewed from the side, the same solution reveals the continuity of the stretch panel from the back through the side and into the front hip area. This element replaces the traditional side seam and helps the garment adapt to postural changes in the torso.



The torso is composed of three main pieces: piece 1 forms the front and piece 3 the back, both made from a non-stretch base fabric. Piece 2 is a continuous insert in vertically ribbed stretch fabric, extending from the back armhole and scapular area, along the side, to the front of the pelvis. The insert replaces the traditional side seam and absorbs the changes in surface generated by the movement of the shoulder blades, back and side.



01 – Initial condition

With the arm in a relaxed position, the elbow angle is approximately 174° . The sleeve can therefore develop along an almost straight axis, with an even distribution of fabric along the upper arm and forearm.

02 – Anatomical variation

In the smartphone posture, the elbow reaches a flexion of approximately 60° . The outer elbow requires greater surface development, while the inner side is compressed. The sleeve construction must therefore be pre-shaped around the new configuration of the arm.

03 – Translation into the pattern

The sleeve is divided into three elements to redistribute volume and directly construct the flexion of the elbow:

1 – Upper sleeve

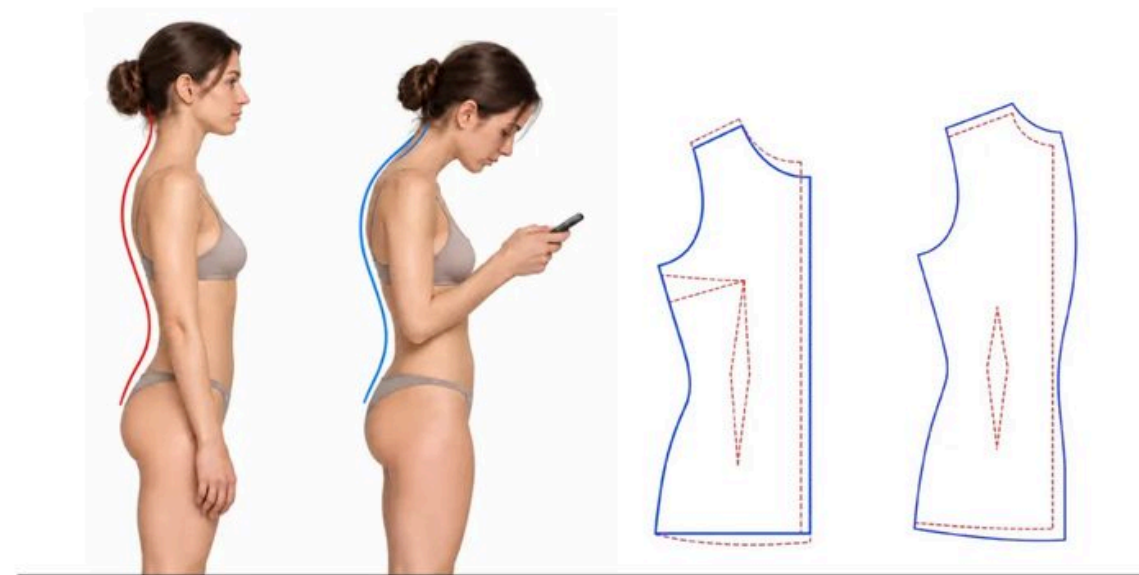
Upper sleeve with raglan cut. The balance point is shifted backwards from the standard position, inducing a forward rotation of the sleeve and adapting the volume to the posture of the arm brought forward.

2 – Undersleeve

Undersleeve element, developed in two mirrored pieces. It defines the lower part of the sleeve and works together with piece 01 to construct the volume and regulate the rotation of the arm.

3 – Elbow-wrist insert

Element extending from the elbow to the wrist. Its function is to increase volume around the elbow, facilitating arm flexion and allowing the bend to develop in a more controlled way.



01 – Initial condition

Neutral posture with the head and torso in an upright position. The back profile maintains the reference configuration used for the basic pattern.

02 – Anatomical variation

Cervical flexion and the forward movement of the torso alter the back profile and the relationship between neck, thorax and pelvis, requiring a redistribution of torso lengths.

03 – Front pattern modification

The neckline is lowered; the centre front is projected outward in the upper section, then gradually returns inward until it realigns with the hem. In addition, the front shoulder line is slightly lowered to accommodate the forward inclination of the torso and the new position of the neck.

04 – Back pattern modification

The centre back is raised at the neck, progressively extended through the dorsal/scapular region and brought back towards its original position at the hem, generating a continuous, gently curved line. The front shoulder modification is compensated at the back, where the shoulder line is rebalanced to maintain construction continuity and correct fit.



The definition of the collection begins directly from the variations identified during the analysis of posture. The body is not considered as a static surface on which the garment is subsequently constructed, but as a system in which the head, neck, shoulders, back, arms and torso continuously alter their relationship during smartphone use. These variations determine where surface needs to be increased or reduced, where construction lines should be repositioned and where specific articulations should be introduced into the pattern.

The transition from analysis to collection therefore does not occur through a simple aesthetic transformation of posture. Each garment is developed by relating body geometry, material behaviour and pattern construction. In areas requiring greater stability, rigid or structured materials are used to maintain the volumes and curvatures defined by the pattern; in areas subject to greater movement, jersey and stretch materials instead allow part of the variation to be absorbed directly through surface deformation. The garment is thus organised into support zones, deformation zones and articulation zones, each with a specific function.



The modifications are not distributed uniformly across the entire garment, but concentrated in the areas where the body changes configuration most significantly. The scapular region requires greater capacity for expansion; the sleeve is constructed with the elbow already considered in a flexed position; the neck, shoulder and centre back are redesigned in relation to the inclination of the upper body. Seams also become construction tools: they are repositioned, curved or replaced by functional panels in order to directly control volume and movement.

The four selected looks represent the most complete applications of this method. In each one, pattern-making solutions, the alternation between rigid and elastic materials, and the construction of articulations are combined differently. These looks therefore form the transition point between the research on the body and the complete collection: they are not simply an aesthetic selection, but four examples through which the design system developed in the previous pages can be read in concrete terms.



The development of the four looks begins with a mapping of the body in the posture assumed while using a smartphone. The figure is observed from different views and two reference systems are identified, which are then used to construct the design lines.

Body envelope points – blue

The blue points correspond to the main external projections of the body, such as the shoulders, hips, glutes, knees and other anatomical prominences. These references define the minimum volume occupied by the figure: the garment can extend outward to generate volume, but must necessarily respect these limits in order to contain and wrap the body.

Articulation and postural variation points – red

The red points instead identify the areas in which the body presents greater mobility, rotation or changes in orientation, such as the neck, shoulder, elbow, pelvis and knee. These points make it possible to identify the areas in which the construction must take movement and postural transformation into account.

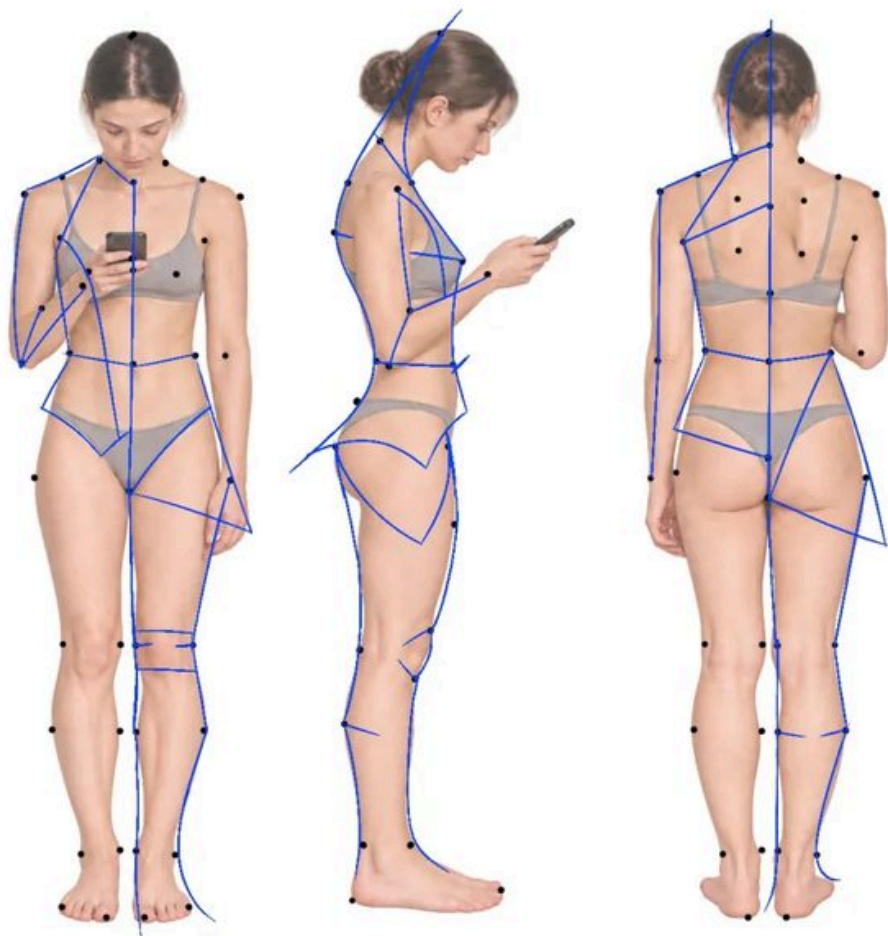
Starting from the points identified on the body, two types of lines are developed, each with a different function.

The lines generated from the blue points have a predominantly morphological and compositional role. They follow or extend beyond the outer limits of the figure and are used to define silhouette, panelling, direction, proportion and the development of volume. Although they begin from the body's actual dimensions, their configuration therefore derives from a design choice.

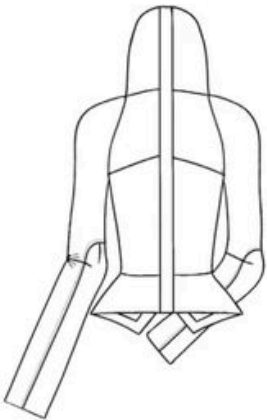
The lines that instead connect the red points respond more directly to the behaviour of the body. They link areas of articulation, flexion or postural change and are used to guide cuts, joins and articulation zones within the garment. In this case, the line does not simply define the appearance of the form, but contributes directly to its function and to the garment's ability to accommodate posture.

The lines are then selected and transferred into the design of the look. The final technical drawing therefore represents the last stage of the process, in which the initial mapping is transformed into a construction that can be physically realised.

LOOK 1



The first look focuses the research on sleeve construction and control of the back profile. The sleeve is shaped directly around the flexed position of the arm, while at the back a thermoformed Plexiglas strip follows the curvature of the spine in the posture associated with phone use. Fabric and hardware therefore work together in defining the form.



100% wool
500 gsm compact and heavy structure



100% wool
325 gsm medium-weight fabric



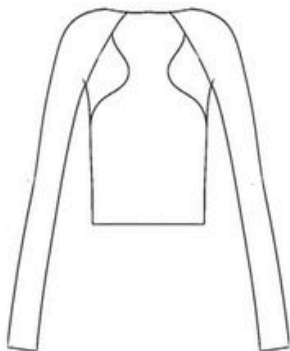
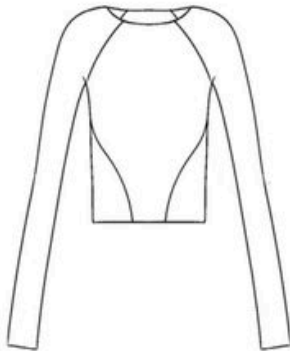
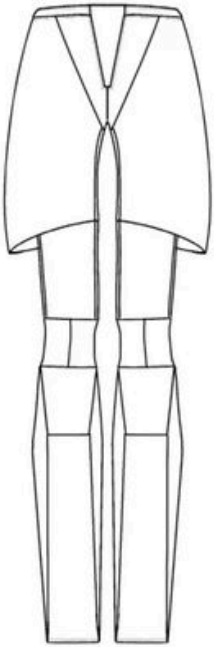
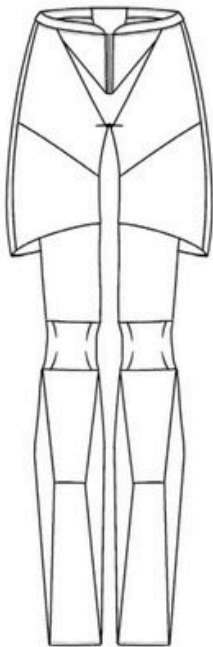
100% cotton
80 gsm lightweight canvas



LYCRA
100% polyester
150 gsm stretch-knit structure



LYCRA
100% polyester
100 gsm lightweight stretch-knit structure





The first look is constructed through a combination of materials with different degrees of rigidity, weight and elasticity. The more structured outer sections use 325 gsm wool and 500 gsm wool cloth: the first retains a certain flexibility while supporting the shape of the garment, while the heavier cloth is used in areas requiring greater stability and control of volume. The difference in weight between the two fabrics therefore makes it possible to alternate softer and more rigid surfaces without interrupting the continuity of the construction. The internal lining is made from 80 gsm cotton, chosen to complete the structure without excessively increasing weight or thickness.

Beneath the outer structure is a close-fitting long-sleeve top, made mainly from 150 gsm Lycra and articulated through cuts that identify areas with different movement requirements. Around the shoulder blades, shoulders and arms, where greater stretch is needed, a lighter 100 gsm Lycra is used, while the rest of the garment retains the heavier weight to provide greater support and stability.

The sleeve does not end at the wrist, but extends to wrap around the hand while leaving the fingertips exposed. This construction maintains continuity between arm and hand without interfering with touchscreen use, allowing the garment to directly accompany the gesture associated with using the phone.

A thermoformed Plexiglas strip is applied to the back of the jacket, 6 mm thick, 4 cm wide and extending along the entire length of the back. The shape is heat-moulded to follow the profile of the spine in the posture assumed while using a smartphone, transforming the Plexiglas into a structural element that supports and maintains the configuration of the back.

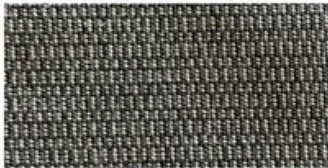
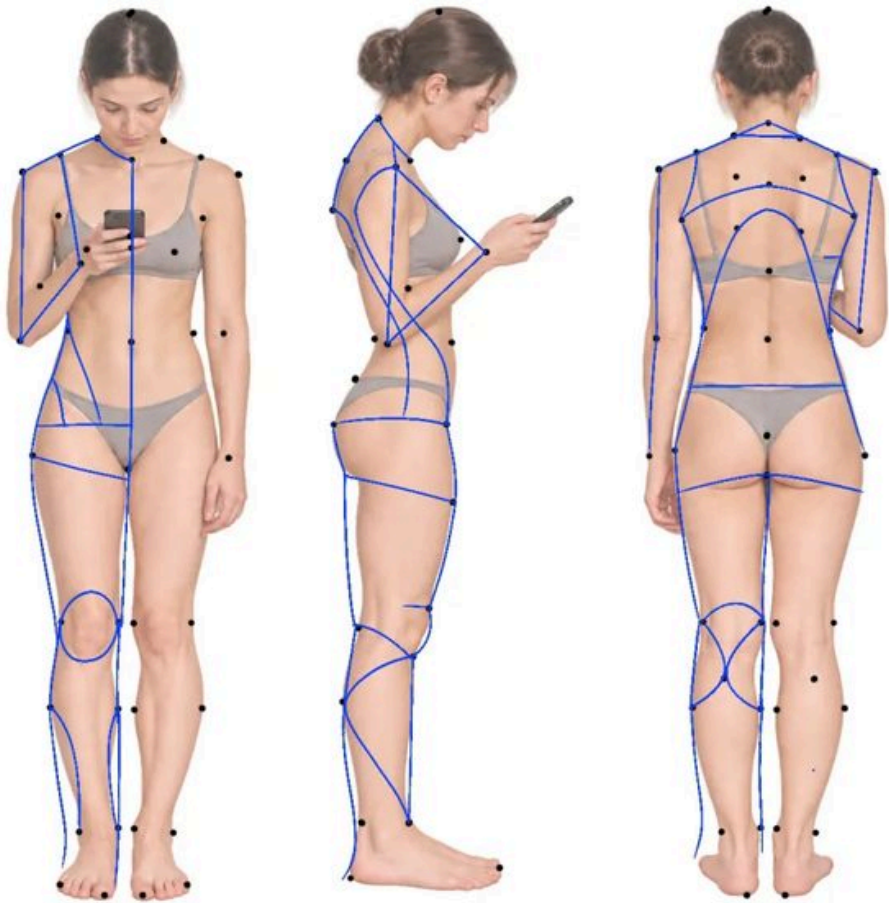
The strip is fixed directly to the jacket through a series of bolts distributed along the vertical axis, corresponding to points such as the neck, thorax, waist and pelvis. To withstand the stress generated by movement and the fixing points, the attachment area of the garment is reinforced with a strip of fabric of the same width as the Plexiglas, cut on the straight grain to increase the stability of the textile base.

On the inside, each bolt is secured with a nut. The hardware is then enclosed between the padding and lining, preventing direct contact with the body and maintaining a clean internal surface.



LOOK 2

The second look further explores the relationship between sleeve construction and freedom of articulation. A zip system makes it possible to modify the configuration of the sleeve in relation to the position of the arm, while jersey inserts are placed in the areas requiring greater deformability. The construction thus alternates more rigid surfaces with elastic zones in order to accommodate movement without losing the overall structure of the garment.



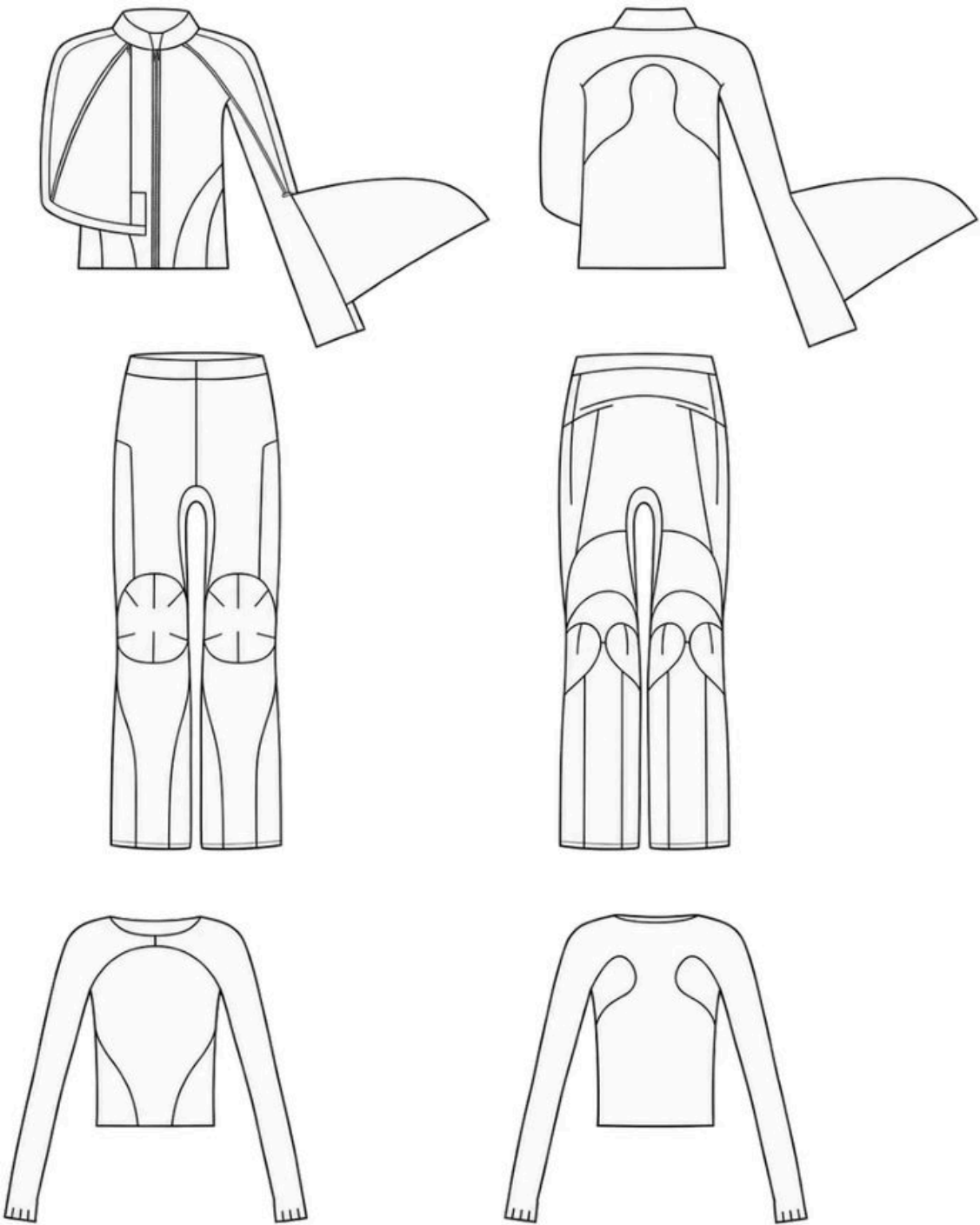
Tela Tempotest
100% acrylic fiber
300 gsm
compact cava structure



Jersey a coste
95% cotton · 5% polyester
rib knit-structure



lining
100% cotton
80 gsm
lightweight canvas





The second look brings into relation a highly structured material, Tempotest canvas, with a ribbed stretch jersey used exclusively in the areas where the body requires a greater capacity for deformation. Tempotest maintains the geometry established by the pattern, while the jersey is introduced at the joints, in areas of tension and at points of positional change, allowing the garment to adapt to movement without losing its overall structure.

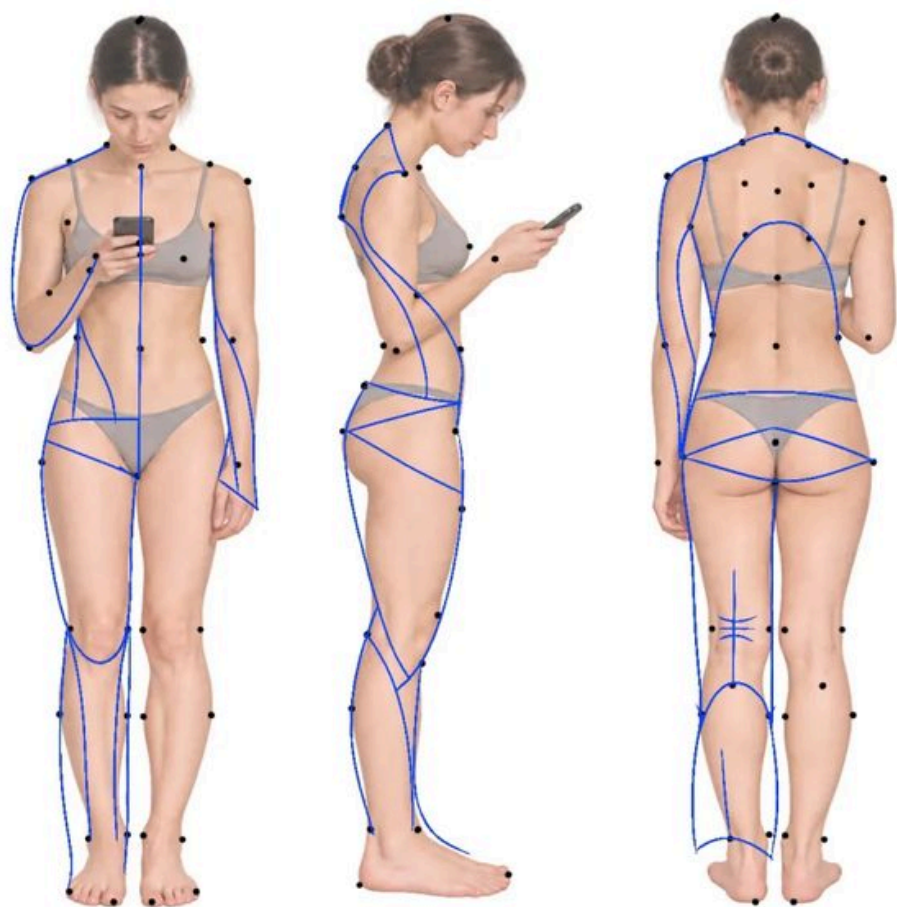
In the trousers, the rigid fabric is shaped through cuts and darts that follow and construct the form of the leg. The ribbed jersey is instead inserted in three specific areas: the gusset, the knee and the calf. The gusset increases freedom of movement and contributes to the construction of the crotch, while at the back the traditional centre seam is replaced by a system of darts that shapes the volume without resorting to a continuous vertical line. In the back knee area, the ribs of the jersey are oriented horizontally so as to accommodate flexion and manage the change in surface when the leg bends. On the calf, by contrast, the ribs are arranged vertically to allow the surface to adapt more effectively to changes in the circumference of the lower leg and hem.

The jacket is constructed mainly in Tempotest, but incorporates a continuous panel in ribbed jersey that begins at the neck, crosses the scapular region and continues along the side to the front of the pelvis. This insert replaces the traditional side seam and creates a continuous zone of deformation capable of accommodating both the expansion of the back and the lateral movement of the torso. In the upper section, a rigid-fabric surface visually connects the two shoulders and partially covers the stretch insert, maintaining the formal continuity of the jacket without restricting its function.

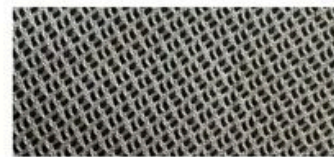
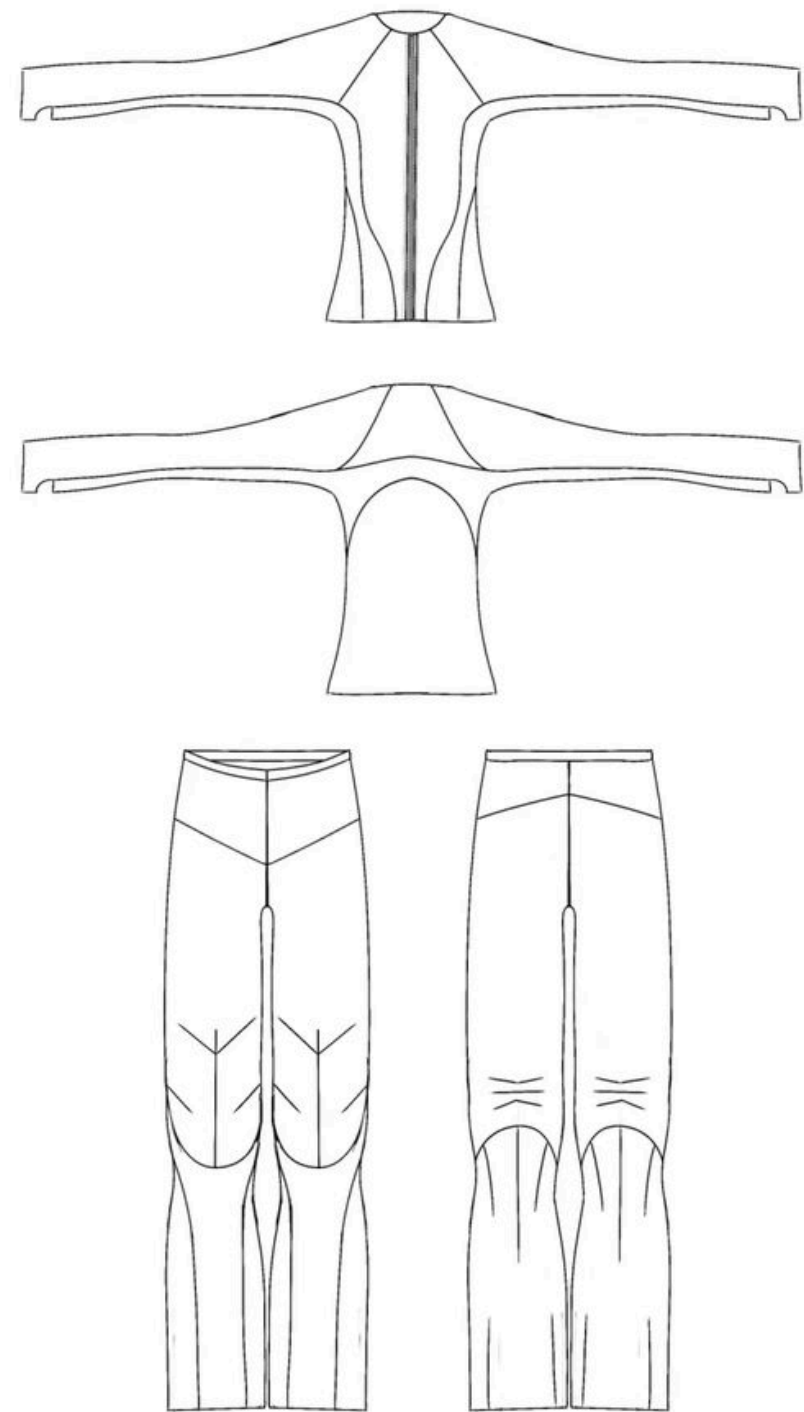
The sleeve introduces the most specific system of the look. The basic construction maintains an extended configuration, but combines a raglan cut with an additional panel on the forearm. This element can be connected to the upper part of the sleeve through a zip that begins at the elbow area and continues up to the neck. When the zip is closed, the distance between the two parts is reduced and the arm is brought into a configuration of approximately 60°, corresponding to the position used in the project for phone use. When the system is not active, the zip is opened and the panel can be wrapped around the forearm and fastened with a snap button, returning the sleeve to a freer configuration.



LOOK 3



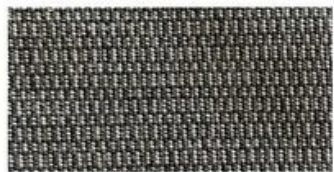
The third look develops the experimentation around the behaviour of rigid materials and mesh. The mesh is used as a structured yet open surface, capable of maintaining a volumetric presence while still allowing air to pass through. At the same time, the more rigid fabrics are shaped through the pattern to construct curves and volumes that remain defined even when the garment is not under tension.



Mesh
100% polyester
400 gsm
mesh knit structure



100% wool
500 gsm compact and
heavy structure



100% acrylic fiber
300 gsm
compact canvas



Lycra
100% polyester
150 gsm
compact and heavy structure



lining
100% cotton
80 gsm
lightweight canvas



The third look develops the relationship between structure and breathability through the use of a heavy polyester mesh, normally employed in upholstery. Its open construction allows air to pass through, while the weight and density of the material still make it possible to maintain a stable and structured surface. This base is combined with a continuous element in 500 gsm wool cloth, which begins at the scapular region, crosses the side and reaches the front of the pelvis, creating a more compact and controlled zone within the mesh surface.

In this look, the same wool structure continues without interruption along the sleeve. The panel does not follow a straight direction, but develops along a curved trajectory that progressively wraps around the arm: it begins at the back of the shoulder and scapular area and rotates until it reaches the front of the wrist. Its geometry is designed around the flexed position of the arm, in which the panel visually realigns; when the arm is extended, the band instead rotates around the surface of the arm, making the torsion incorporated into the pattern visible.

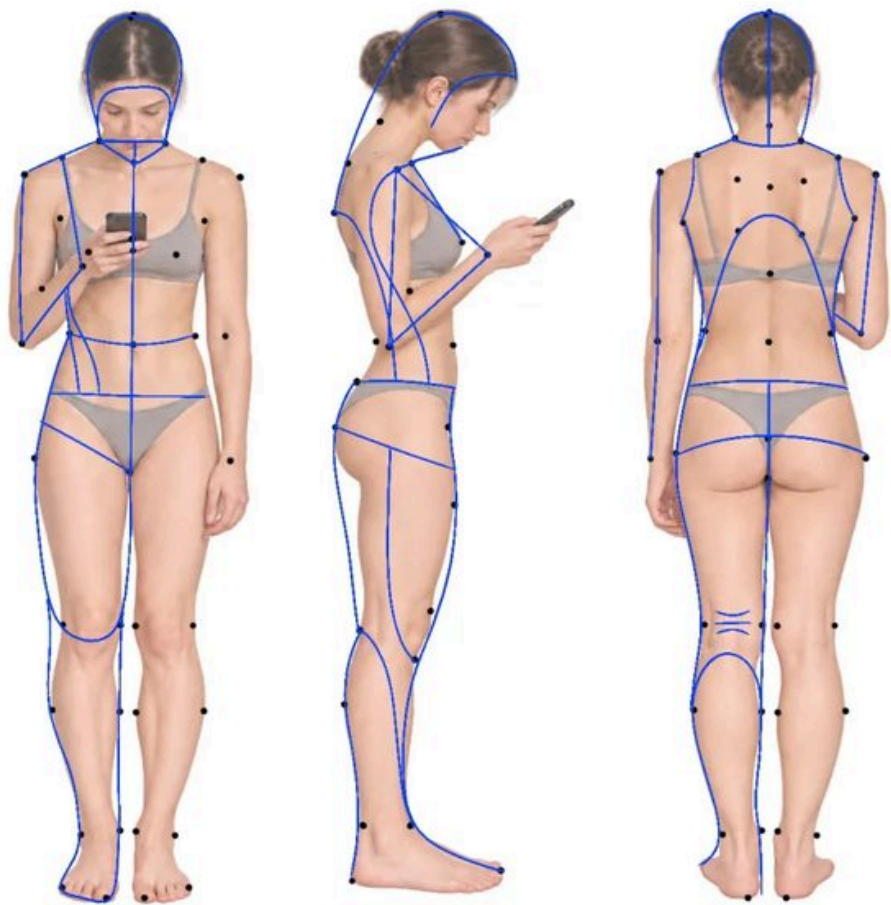
The edges of the garment are also shaped in relation to movement. At the wrist, the outer side of the sleeve is developed with greater length than the inner side, compensating for the increase in surface required externally during elbow flexion. The hem of the top follows the same logic: the front is shorter while the back is extended, adapting the length of the garment to the change in the torso profile during flexion.

The trousers are made entirely from Tempotest canvas, chosen for its high rigidity. The shape of the leg is constructed directly through cuts, darts and variations in volume, using the pattern to shape a material that has limited deformability. The hem is also shaped to better follow changes in the position of the leg during flexion, preventing the construction from being constrained by a completely horizontal edge.

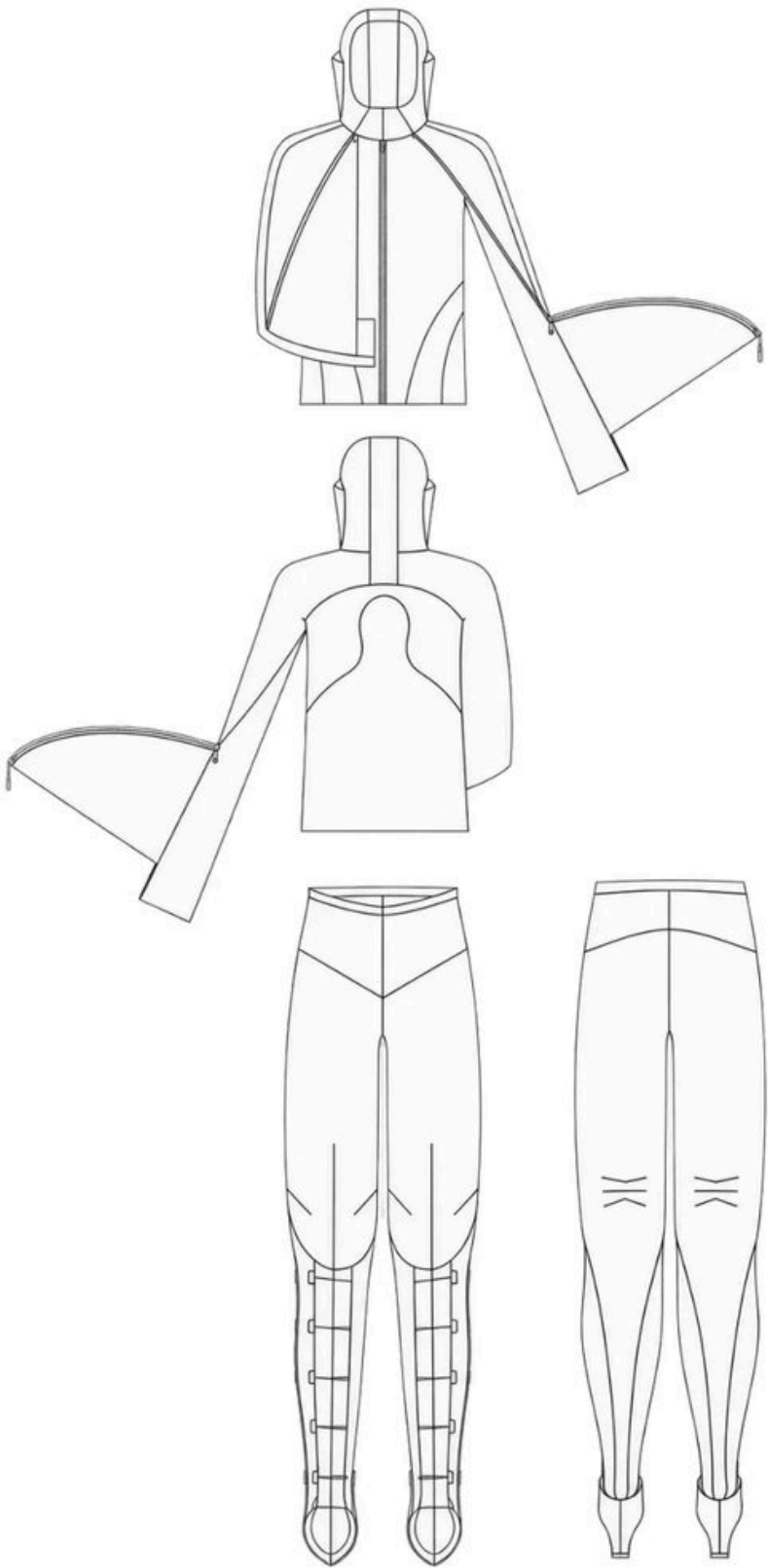
As in the other trousers from the final looks, the traditional side seam is also removed. The upper section is constructed through a single continuous panel connecting the centre back and front, functioning as a large yoke and maintaining continuity along the side. A concealed pocket is integrated within this construction and positioned laterally, in the point most easily reached by the hand without interrupting the outer surface of the trousers.



LOOK 4



The fourth look brings together several elements directly related to device use. The sleeve construction once again integrates a fastening system that intervenes in the position of the arm, while the hood incorporates dedicated headphone pockets, integrating them into the structure of the garment. In the trousers, buckles and fastening systems are used to modify and control the shaping of the leg, introducing an adjustable component into the silhouette.



100% acrylic fiber
300 gsm
compact canvas



100% lana
325 gsm
canvas
medium-weight fabric



100% lana
500 gsm struttura
compatta e pesante



lining
100% cotone
80 gsm
lightweight cavas



Lycra
100% polyester
100 gsm
lightweight knit structure

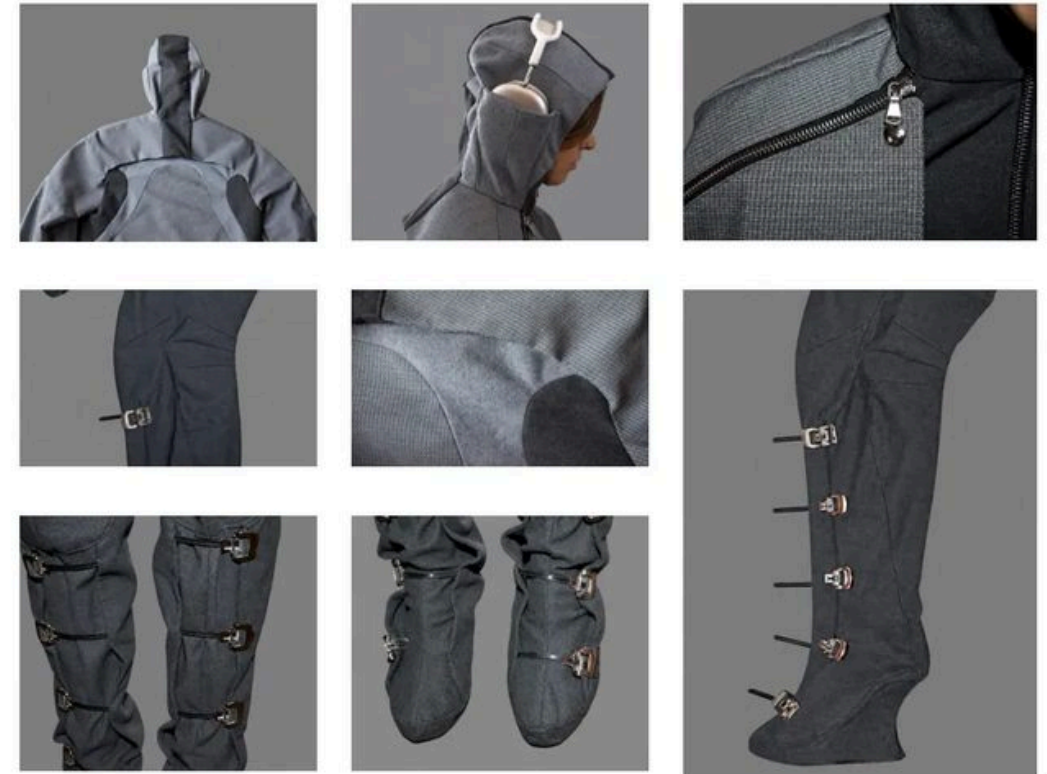


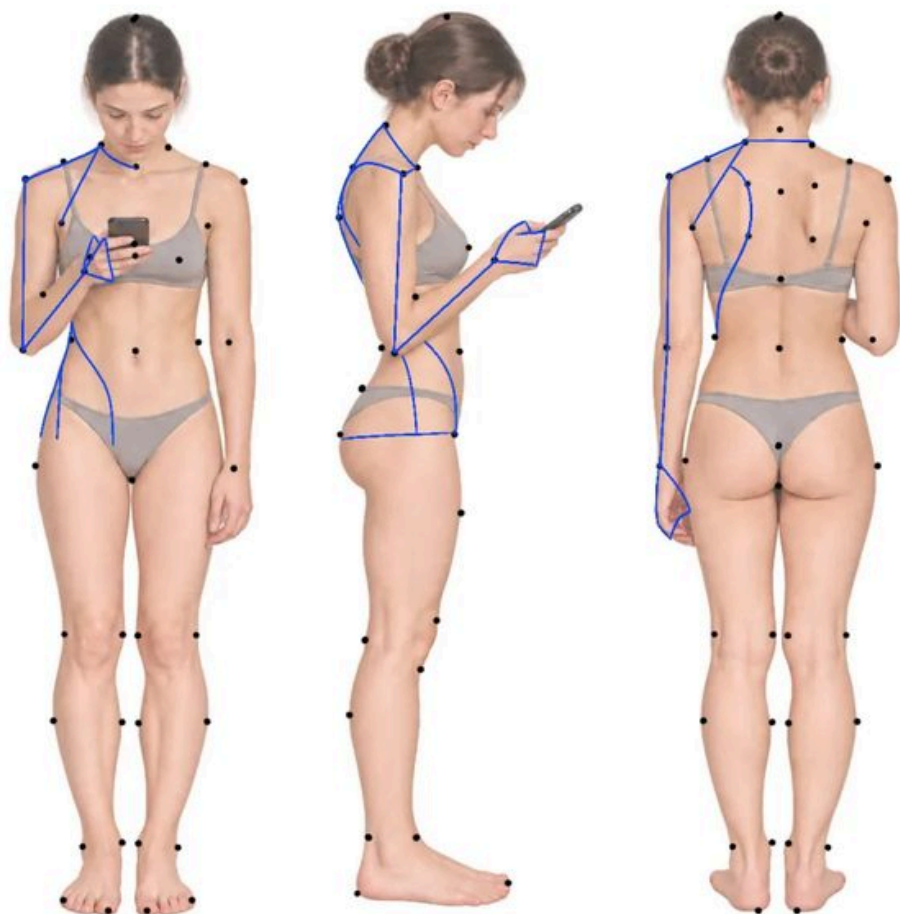
The fourth look combines Tempotest canvas and 325 gsm wool to construct a structured jacket that can still adapt to posture. The main body alternates between the two materials, while a continuous wool structure connects the scapular area to the side and continues towards the front of the pelvis, replacing the traditional side construction. The sleeve also maintains a configuration developed around the flexed position of the arm and integrates the fastening system used to control its position during phone use.

The hood is developed as an extension of the head posture: it fully wraps around the head through an ergonomic shape oriented downward, following the inclination assumed while looking at the screen. Dedicated headphone pockets are integrated on both sides. At ear level, the internal construction creates a concave area that allows the headphone ear cup to rest directly against the ear without an intervening layer of fabric, keeping it correctly positioned during use.

The trousers are made primarily from 325 gsm wool, with selected areas reinforced through interfacing and a full cotton lining. The construction extends all the way to the foot, directly integrating a heeled shoe into the lower section and therefore transforming trousers and footwear into a single continuous system. From the knee towards the hem, the shape is regulated through a series of hardware fastenings, allowing the fit and volume of the lower leg to be adjusted.

In the upper section, shaping is controlled through cuts and darts that distribute volume between the pelvis, thigh and knee. As in the other trousers developed for the final looks, the traditional side seam is eliminated through a continuous panel connecting front and back. A concealed side pocket is integrated within this construction and positioned at the hip, maintaining functional access without interrupting the external continuity of the garment.

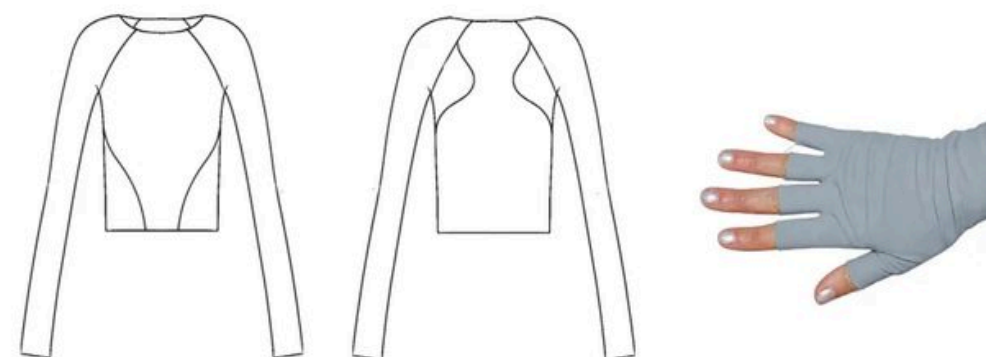




For each look, a close-fitting Lycra top was developed as a direct extension of the anatomical research applied to the outerwear garments.

The garment uses two different Lycra weights, 150 gsm and 100 gsm, distributed according to the function of each area. The front is made from the heavier material, which is less yielding and therefore more stable, while the back and sleeves use the lighter Lycra, which is more elastic and better suited to accommodating postural changes and the movement of the shoulders, arms and torso.

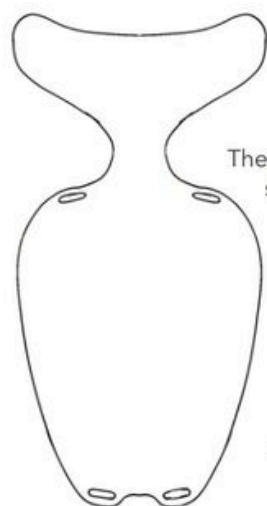
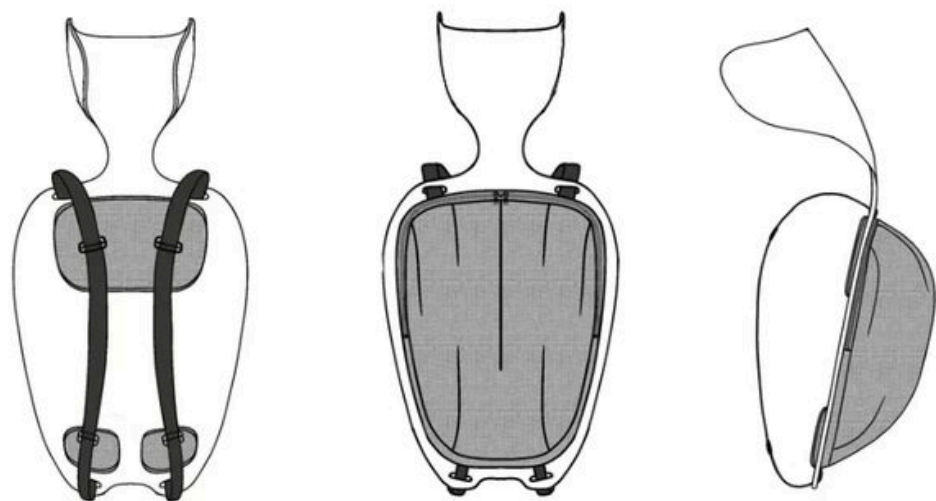
The construction begins with a raglan sleeve, while the cut lines follow the same anatomical trajectories used in the jackets. The side panel begins at the back from the raglan line, follows the shape of the shoulder blades, runs along the side and reaches the front while following the projections of the pelvis. The side is therefore not defined by a traditional straight side seam, but by a continuous line that moves between front and back according to the shape of the body.



The sleeve seam also moves away from conventional construction. Its path is not straight, but gradually rotates around the arm in an anticlockwise direction, beginning on the outer side of the shoulder and reaching towards the inside of the wrist. This trajectory follows the changing orientation of the limb and responds in particular to elbow flexion, allowing the construction line to react directly to the movement of the arm.

The end of the sleeve is also extended beyond the conventional finishing point, altering the usual wrist hem and transforming it into a continuation of the garment that covers part of the hand. The fingertips remain exposed, however, preserving the tactile sensitivity required for smartphone use.

In this way, the top applies the same principle that guides the entire collection: the construction does not begin from predetermined lines, but is modified in relation to posture, movement and the specific gestures of the body.

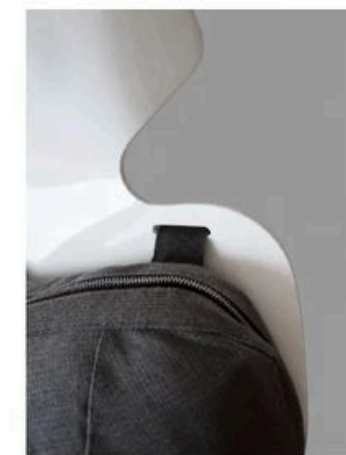


The backpack is composed of two main elements: a shell-shaped textile volume and a structural shell in thermoformed Plexiglas.

The textile part forms the actual container, while the most significant element from a design perspective is the rigid structure, shaped around the posture assumed during phone use. The shell begins at the lumbar area, follows the curvature of the back and extends upward until it reaches and wraps around the head, becoming a continuation of the body's postural configuration.

Openings are created at the four ends of the structure, through which the backpack straps pass, directly connecting the textile volume to the shell. At the front, the shoulder straps are completed with openable metal hooks, allowing the system to be worn and removed while keeping the position of the structure unchanged.

In this way, the container, rigid support and carrying system are designed as a single object, constructed not from a standard backpack form, but directly from the relationship between body, posture and phone use.



The four looks analysed represent the design focus of TECH-NECK and form an extract from the complete collection. They are the looks through which the project was developed and explored in concrete terms, from construction and materials to accessories and the relationship with the body.



The same research is then extended across the entire proposal. TECH-NECK is completed through an overall lineup of 26 looks.



This research began with an apparently simple problem: understanding how the body can become the starting point for the construction of a garment. Throughout the thesis, however, the body gradually emerged as something far more complex than a surface to be measured. It is a three-dimensional system that continuously changes in relation to movement, posture, activity and the objects with which it interacts.

Pattern cutting operates precisely within this complexity. It does not simply translate a series of measurements into a pattern, but organises different types of information through lines, volumes, seams, panels and materials. The transition from the real body to the standardised body makes industrial production possible, but inevitably introduces a simplification: a size describes only certain characteristics of the body and cannot fully predict its behaviour during use.

The analysis of military wear, workwear and sportswear has shown how this distance can be addressed by starting from function. In these areas, garment construction is modified by information that does not belong exclusively to anatomy: an object to be carried, an area exposed to abrasion, a specific posture, the need for protection or a particular movement. The final form therefore becomes a consequence of the conditions anticipated during use.

The case studies analysed afterwards take this principle beyond strictly technical function. In Aitor Throup's work, the body is used directly as a design basis, constructing surfaces around specific anatomical configurations rather than necessarily beginning from conventional blocks. Tony Spackman, by contrast, transforms the body into a map of areas with different requirements, translating movement and anatomy into panels, articulations, openings and material variations. Vexed Generation demonstrates how an environmental or social condition can also become a brief capable of concretely modifying material, volume, openings and garment construction, while Mandarin Duck extends the same logic to the point of conceiving the garment as a system in which body, objects, materials and transformation must work together.

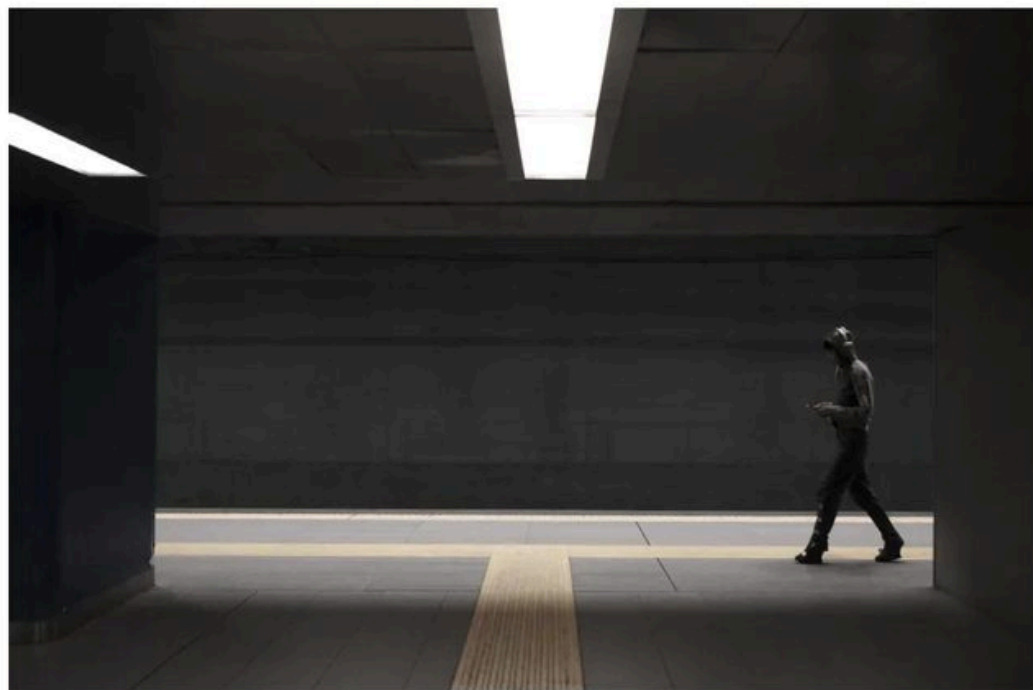
TECH-NECK emerges as an application of this method to a contemporary condition. The starting point was not a garment archetype to be modified, but the observation of the body during smartphone use: an everyday posture that moves away from the upright configuration on which mannequins and basic pattern blocks are normally constructed.

Posture was therefore transformed into design information. Mapping the body envelope points and areas of articulation made it possible to distinguish between lines used to define silhouette and volume and lines directly connected to the behaviour of the body, used to guide cuts, joins and movement zones. At the same time, material research showed that the response cannot depend solely on pattern geometry: deformation can either be absorbed by the fabric or must be physically constructed into the pattern. For this reason, posture, material and construction were developed as parts of the same process.

The result does not aim to propose a correct posture or construct a device intended to correct the body. TECH-NECK instead uses an existing condition as design information. Smartphone posture becomes what, in other contexts analysed throughout the thesis, had been the worker's gesture, the cyclist's position, the athlete's movement or the soldier's equipment.

The research therefore leads to considering the pattern not as a fixed structure to which the body must adapt, but as a tool capable of changing when the way the body is used changes.

It is not the body that must fit into the pattern. The pattern can be constructed from the body.

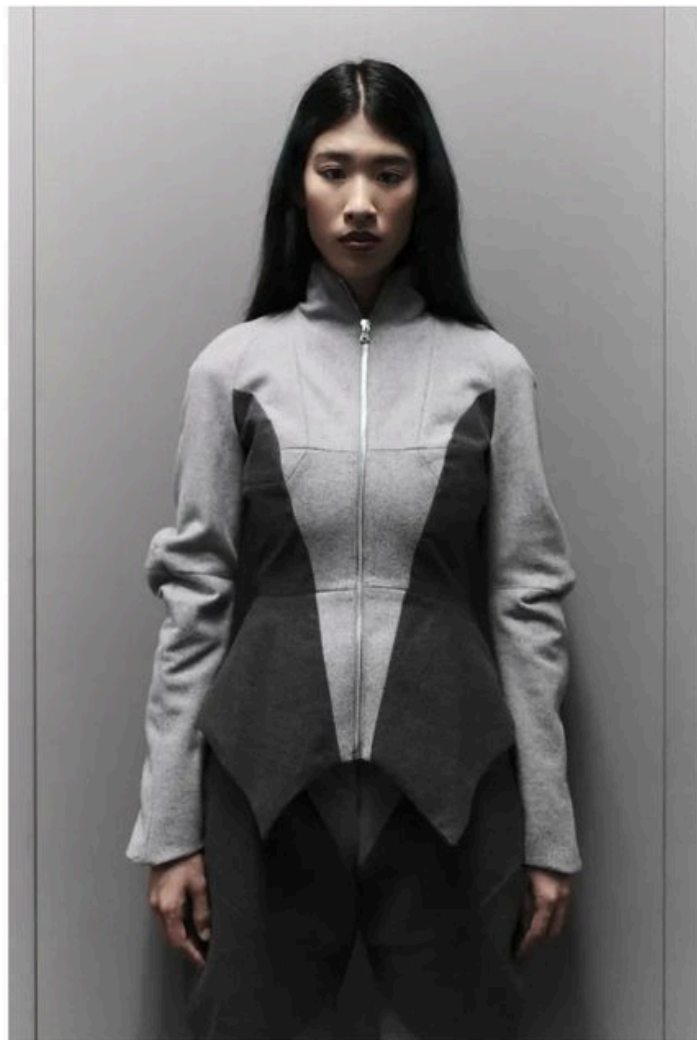












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