

APPAREL MANUFACTURING INNOVATION

FIT — IMPACT

**LUXURY FIBRE PRESERVATION:
A BREAKTHROUGH IN EFFICIENCY AND
SUSTAINABILITY**

Responsive Tailoring Through Dynamic Fit Adjustment

— A Zero-Waste Innovation

Infinite Scalability of The Perfect Fit

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RESPONSIVE TAILORING THROUGH DYNAMIC FIT ADJUSTMENT*

*Is a Patented Correlation Method (HiK**) that allows single-fibre garments to dynamically adapt to the wearer's body shape and movements in real time, ensuring a perfect fit without the need for additional details or fasteners. This Method introduces a revolutionary approach to garment engineering, combining reinforcement structures and varying knit angles for both structural stability and dynamic adaptability. By leveraging the interplay between the reinforcement structures and the directional stretch properties of knit fabrics, this process enables garments to respond naturally to body movement and maintain a stable, perfect fit while being produced at scale. Its precision, adaptability, and mechanical foundation make it the only viable solution for mass-producing self-adjusting tailored garments for the foreseeable future.*

Transformational Impact:

- **Unmatched Speed and Precision:** Delivers a perfect fit with consistent adaptability in real time across production scales.
- **Sustainability at Its Core:** Uses a single yarn type for easy recycling, with no seams or fasteners, reducing waste and promoting longevity.
- **Streamlined Production Chain:** Optimises design, development, and manufacturing, enabling scalable, accurate, high-quality production.
- **Universal Scalability:** Works seamlessly with any programmable knitting technology.
- **Dynamic and Static Fit Harmony:** Achieved through fibre behaviour and construction techniques, that balance both flexibility and structure.
- **Long-Term Viability:** Due to its mechanical component, it remains the only viable solution for self-adjusting garments at scale, with no competition on the horizon for the next significant leap in garment manufacturing technology.

WO2024094577 - AN AUTOMATED METHOD FOR KNITTING A TAILORED THREE-DIMENSIONAL GARMENT, AND A KNIT GARMENT

This innovation represents a groundbreaking development in the field of apparel technology. It enables garments to dynamically adjust to different body shapes, offering a level of fit and adaptability that was previously unattainable in mass-produced garments.

Technological Landscapes of:

- **Engineering & Computer Science** (for programmable production)
- **Apparel and Textile Engineering** (for garment construction and mechanical movement)
- **Garments, including Outerwear**

Abstract

(EN) The present invention provides for an automated process for producing knit garments having a tailored look when worn by wearers having different body shapes. Through a combination of woven fibre tailoring techniques, adapted to the domain of knit fabrics, and an innovative approach to programming a three-dimensional seamless garment knitting machine to knit the garment in a new way, a knit garment can be produced which adapts to fit different wearers having different body types while following the wearer's anatomy and providing support where required, thus allowing the same garment to provide a tailored look to different wearers having different body shapes.

(FR) La présente invention concerne un procédé automatisé de production de vêtements tricotés ayant un aspect personnalisé lorsqu'ils sont portés par des porteurs ayant différentes silhouettes. Par l'intermédiaire d'une combinaison de techniques de personnalisation de fibres tissées, adaptées au domaine des tissus tricotés, et d'une approche innovante pour programmer une machine de tricotage de vêtements sans couture tridimensionnels pour tricoter le vêtement d'une nouvelle manière, un vêtement tricoté peut être produit pour s'adapter à différents porteurs ayant différents types de silhouette tout en suivant l'anatomie du porteur et fournir un support le cas échéant, permettant ainsi au même vêtement de fournir un aspect personnalisé à différents porteurs ayant différentes silhouettes.

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* **FIT— IMPACT: RESPONSIVE TAILORING THROUGH DYNAMIC FIT ADJUSTMENT**
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** (HiK) - Designed for application with high-tech programmable knitwear technologies



GENERAL

The Patented Correlation Method (HiK) developed for high-tech programmable knitwear, redefines garment production by combining precision-engineered adaptive fit with highly efficient fibre usage. The Method introduces a fundamental shift in the way garments are made, by enabling the perfect fit to be achieved with a single type of fibre. For the first time, two seemingly incomparable production methods are being evaluated side by side:

- Self-adjusting, perfectly tailored garments engineered via the Patented Method
- High-end tailored woven garments produced through Cut-and-Sew methods

The application of the Method's principles extend the life of garments by minimising wear and tear, with panels that seamlessly adapt to the wearer's movements while naturally shaping the silhouette. By replacing the rigid eight-size system with a streamlined three-size model, the Method ensures a perfectly tailored fit across multiple standard sizes, reducing unsold garments and extending market reach while optimising material use.

Traditional cut-and-sew woven production achieves a tailored look at a significant cost - not only in unsold stock, but in wasted luxury material. Even with advanced cutting techniques, rigid* shaping methods still result in unavoidable waste. Approximately **20% of luxury fabrics are discarded** as offcuts - a direct loss of premium material. In addition, pre-defined static sizing systems leave little room for customers who do not fit standard sizes, creating further inefficiencies.

By eliminating unnecessary cutting and maximising fibre utilisation, the Method achieves waste-free luxury fibre production while reducing unsold garments caused by size mismatches. **Unsold stock waste is reduced by 78.6%** and material waste from cutting is completely eliminated (**0% luxury fibre waste production**), enabling the mass luxury market to balance efficiency with sustainability - without compromising quality and precision.

STEP 1. SELF-ADJUSTMENT: 3-SIZE PRODUCTION COVERS EIGHT STANDARD SIZES

Self-adjustment with simultaneous tailoring allows garments to dynamically conform to the wearer's body, achieving a perfect dynamic fit across a broader size range. When designed between two adjacent sizes, one engineered size seamlessly fits four traditional sizes, replacing individual static sizes with a more efficient model. **Moving to a three-size production model with Responsive Tailoring Through Dynamic Self-Adjustment replaces the need for eight traditional sizes.** Expanding Standard Sizing: the most in-demand sizes (36 IT – 50 IT) are efficiently may be covered within three adaptive sizes (S, M, L):

Size Engineered with the Method :	Traditional Sizes Covered:
S (measuring between 38/40 IT)	Fits sizes 36 IT – 42 IT
M (measuring between 42/44 IT)	Fits sizes 40 IT – 46 IT
L (measuring between 46/48 IT)	Fits sizes 44 IT – 50 IT

For example, size Small is based between 38 IT and 40 IT, yet it also: provides a perfectly fitted garment for size 36 IT (slightly looser fit) and fits size 42 IT comfortably (slightly tighter fit), maintaining a precisely tailored look.

Market Expansion & Waste Reduction:

Dynamic self-adjustment with reinforced structures accommodates a three-size range, replacing the need for individual static sizes. This leads to:

Market Expansion Coefficient: $8 \div 3 \approx 2.67$ and Unsold Rate Reduction: 75%

** NOTE: Traditional rigid tailoring techniques - refers to predefined shaping based on static size measurements rather than real-time dynamic adaptability. These rigid shaping methods are fundamentally different from the dynamic adaptability of the Patented Method, which eliminates the need for predesigned shaping and static grading. Traditionally the tailored fit is achieved by:*

- Pattern drafting based on fixed measurements (predefined shapes for each size).
- Structured cutting and sewing techniques that create a non-adaptive, fixed form.
- Darts, seams, and structured panels to sculpt fabric into a preset shape.

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STEP 2. UNSOLD GARMENTS DUE TO SIZE MISMATCH: up to 78.6%

Most women do not conform to the standard sizing range due to natural body variations. Given that garments are traditionally tailored to a limited range of fixed measurements (4 cm range across the bust, waist and hips), it is essential to estimate the probability of women falling outside this range. Using a normal distribution model of body measurements based on available anthropometric data, calculations confirm that **99.1% of women** are likely to have at least one measurement outside this rigid range. This indicates that **virtually all mass-market customers** experience some level of size mismatch, underscoring the critical need for a better fit solution.

A. Prerequisite Parameters:

Engineered with the Patented Method (X)

- 1 size accommodates up to **4 traditional sizes**
- **Unsold rate:** 2.5% - 5%. Average: **3.75%**

Tailored Cut-and-Sew (Y)

- 1 size accommodates **only 1 fixed size**
- **Unsold rate:** 15% - 20%. Average: **17.5%**

B. Calculation:

- **Unsold Garments with the Patented Method:** Approximately 3.75% of garments remain unsold due to sizing constraints.
- **Unsold Garments with Cut-and-Sew:** Around 17.5% of garments remain unsold due to sizing constraints.
- **Unsold Garment Reduction Potential:** The Patented Method reduces the number of unsold garments by nearly 80% compared to traditional cut-and-sew. This results in a waste reduction of approximately 78.6% in unsold stock, calculated as: $1 - (X \div Y) = 1 - (3.75\% \div 17.5\%) = 78.6\%$

Potential for Reduction of Unsold Stock due to Size Mismatch: 78.6%

STEP 3. LUXURY FIBRE PRODUCTION WASTE REDUCTION: 100%

The Patented Method is a revolutionary approach to garment production that eliminates all luxury fibre waste during the manufacturing process. It ensures a perfect fit for cut-and-sew woven garments, utilising 100% of the luxury fibre intended for wear, eliminating any production-stage loss. In contrast, the cut-and-sew method discards 20% of total luxury fibre upfront, even before accounting for unsold garments. Comparison of both methods:

METHOD	LUXURY FIBRE REQUIRED FOR PRODUCTION PER GARMENT	LUXURY FIBRE WEIGHT PER FINAL GARMENT	LUXURY FIBRE WASTE IN PRODUCTION	TOTAL PRODUCTION WASTE PER GARMENT
Patented Correlation Method, HtK	350g <i>Fibre (Yarn)</i>	350g <i>Fibre (Yarn)</i>	0g <i>Physically Zero Waste</i>	10g <i>Only Non-Luxury Fibre (Cast-on/cast-off yarn)</i>
Tailored Cut-and-Sew Woven	420g <i>Fibre (Fabric)</i>	350g <i>Fibre (Fabric)</i>	70g <i>20% of Total Fabric discarded as off-cuts</i>	70g <i>Luxury Fibre Waste (Due to off-cuts)</i>
Reduction in Luxury Fibre Waste during Production		100% Reduction		
Reduction in Overall Fibre Waste during Production		85.7% Reduction		

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STEP 4. REDUCTION OF WASTE PER SOLD GARMENT: *up to 84.9%*

The Patented Correlation Method drastically reduces waste compared to traditional woven tailoring. Even more so in terms of saving and preserving the luxury fibre. Through dynamic self-adjustment, the method reduces total production waste to just 23.1g per garment produced (**6.61%**), with an adjusted total waste per garment sold of 24.03g.

This compares to 131.25g of waste per garment produced (**37.5%**) with an adjusted waste per garment sold of 159.09g for conventional tailored cut and sew woven garments.

It is important to note that the waste generated by the Method during production is non-luxury fibre (yarn) and the system allows garments to be made in multiple sizes, reducing the need to overproduce less popular sizes and ensuring a more sustainable approach to meeting market demand.

METRIC	ENGINEERED WITH THE PATENTED METHOD, <i>HtK</i>	TAILORED WITH CUT-AND-SEW, <i>Woven</i>
1. Fibre per Garment Required	350g	420g
2. Luxury Fibre per Garment Required	350g	350g
3. Luxury Fibre Waste during Production (%)	0%	20%
4. Overall Production Waste	10g <i>(All non luxury fibre)</i>	70g <i>(20% of luxury fibre)</i>
5. Luxury Fibre Waste during Production	0 g	70g
6. Unsold Stock Rate	3.75%	17.5%
7. Unsold Stock Fibre Waste	$350g \times 3.75\% = 13.125g$	$350g \times 17.5\% = 61.25g$
8. Total Waste per Garment Produced	$10g + 13.125g = 23.125g = 6.61\%$	$70g + 61.25g = 131.25g = 37.5\%$
9. Adjusted Waste per Sold Garment	$23.125g \div (1 - 0.0375) =$ $23.125g \div 0.9625 =$ 24.05g	$131.25g \div (1 - 0.175) =$ $131.25g \div 0.825 =$ 159.12g
10. Luxury Fibre Waste per Garment Sold (%)	$100\% - 42\% = 58\%$	$159.12g \rightarrow 100\% \text{ Luxury Fibre}$
11. Final Luxury Fibre Waste per Garment Sold	58% of 24.05g $\rightarrow$ 13.95g	100% of 159 g $\rightarrow$ 159 g
Luxury Fibre Waste Reduction	91.2%	
Overall Production Waste Reduction	84.9%	

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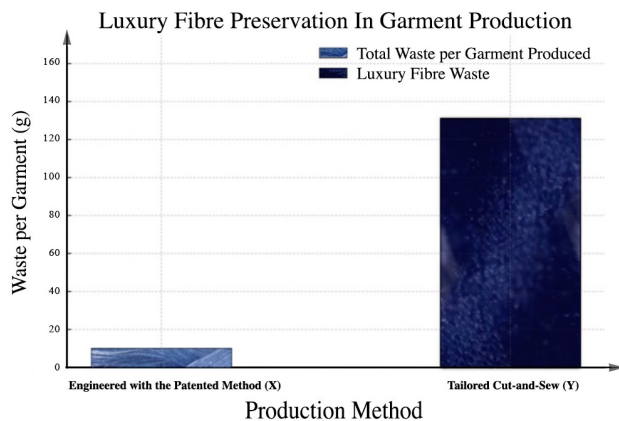
SUMMARY OF WASTE REDUCTION & LUXURY FIBRE PRESERVATION

Fundamental Restructuring Of Material Efficiency And Waste Elimination

These two graphs visually confirm the magnitude of impact of the Patented Correlation Method over traditional cut-and-sew woven production for achieving a fully tailored appeal in terms of overall fibre waste reduction and luxury fibre preservation in particular.

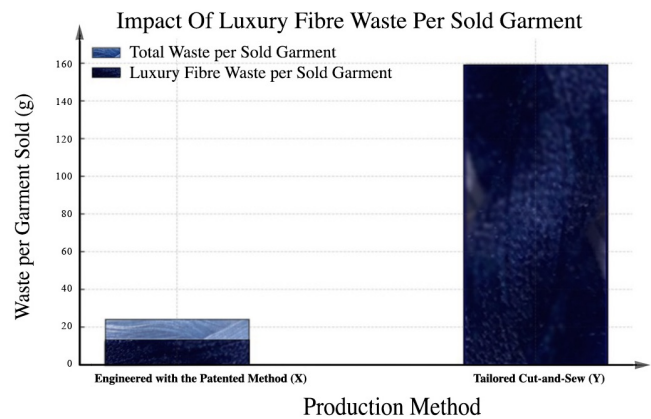
The move to the 3-size model with the Patented Method represents a revolutionary leap in material efficiency and waste reduction. Even when comparing identical garment production volumes, the Patented Method with high-tech knitwear demonstrates the potential for significant global savings, conserving luxury materials at an unprecedented level.

Graph 1



Luxury Fibre Waste Reduction: 100%
Total Production Waste Reduction: 85.7%

Graph 2



Luxury Fibre Waste Reduction: 91.2%
Total Production Waste Reduction: 84.9%

The above calculations do not yet account for:

- **The extended life of garments**, which leads to even greater long-term fibre savings—delivering the highest-quality luxury garments with maximum efficiency, profitability and sustainability;
- **The potential for further fibre savings at scale**, as broader customer coverage reduces the need for overproduction;
- **The ease of recycling** due to the fact that the garments are to be made from a **single type of a fibre** without additional details or any fasteners. While this supports a **streamlined circularity model**, a full discussion of its implications is beyond the scope of this summary.

Together, these factors may account for up to 96% luxury fibre preservation.

This demonstrates that the Patented Method is not only a sustainable alternative, but a transformational solution for the future of apparel manufacturing.

Further information is available from **KEY FIGURES: Financial & Sustainability Impact**, link:

https://www.linkedin.com/posts/nataliya-dolenko-84702a218_fit-impact-nataliya-dolenko-geneve-822025-activity-7294076925721862144-iZMI?utm_source=share&utm_medium=member_desktop&rcm=ACoADbSKicBiCMI-P5OeIaZ0H6NNFHZ2ef8oc

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