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The Critical Role of The Cutting Department in Knit Garment Manufacturing

[1]N. Sangeetha, [2]K. Prathiviraj, [3]Z. Syed Abdulla, [4]Thayub.S
[1]Assistant Professor, NIFT-TEA College of Knitwear Fashion, Tirupur, Tamilnadu, India,
[2,3,4]Student, NIFT-TEA College of Knitwear Fashion, Tirupur, Tamilnadu, India.
sangeetha7988@gmail.com
Corresponding Author: N.Sangeetha

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Abstract:
The cutting department plays a vital role in knit garment manufacturing, linking fabric preparation to sewing with precision and efficiency. Due to the stretchable nature of knit fabrics, accurate handling during cutting is essential to ensure proper fit and reduce defects. This article explores key processes such as fabric relaxation, marker planning, spreading, and cutting execution. It highlights the department's impact on productivity, material utilization, and quality control. Technological advances like CAD systems and automated cutters enhance cutting room performance. The study also addresses challenges unique to knits, such as distortion and ply misalignment. Effective cutting ensures smoother production flow and fewer sewing issues. Overall, the department is critical to maintaining garment quality and cost-efficiency.

Keywords: Knit garment manufacturing, cutting department, fabric relaxation, marker planning, spreading, quality control, CAD technology, production efficiency.

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1. Introduction
In knit garment manufacturing, the cutting department serves as the linchpin connecting material preparation to sewing and finishing. It governs fabric utilization, dimensional accuracy, panel quality, and production flow. Especially for knit fabrics, which are highly elastic and susceptible to distortion, proper handling during cutting is essential to maintain fit and consistency in bulk production (Khalilullah & Al-Kamran, 2020).

This article examines the structure, activities, and strategic significance of the cutting department in knit garment factories. It analyzes the operational stages—fabric relaxation, marker planning, spreading, cutting, and quality control—and explores how precision cutting underpins efficiency, reduces waste, and affects downstream sewing productivity. The discussion draws on case studies, technical analyses, and industry literature.

2. Structure and Workflow of the Cutting Department
2.1 Organization and Roles
The cutting department typically includes a supervisor or cutting-in-charge, spreaders, cutters, quality inspectors, and helpers who handle sorting, ply numbering, and bundle preparation (Sarkar, 2015). Fabric requisition aligns with established cutting schedules, and teams coordinate to meet sewing line feed requirements.

2.2 Fabric Relaxation and Receipt
Knit fabrics must be relaxed prior to spreading to release built-in tension and shrinkage (Hoshima-Int, 2021; Inflibnet, 2015). Rolls are opened and layers laid flat overnight or several hours. This practice ensures accurate sizing and prevents distortion during pattern cutting.

2.3 Marker Planning and Preparation
Marker planning involves determining piece layout based on size-ratio and shade grouping. Cutting departments today often use CAD systems; in lower-tech contexts, paper markers are used

(GarmentExportHouse, 2024; Hoshima-Int, 2021). Marker length, number of plies, and optimal nesting are planned to minimize waste and maximize fabric usage.

2.4 Spreading and Lay Setup

Fabric spreading lays multiple layers (plies) onto tables with consistent tension and accurate alignment. In knit garment production, misaligned grain or uneven tension can cause skew, bowing, or mismatched panels (TextileBlog, 2020). Lay height is determined depending on fabric thickness and marker length (TextileIndustry.net, 2020).

2.5 Cutting Execution

Cutting is performed using straight-knife, band-knife, or computer-controlled cutting machines. Crucial parameters include blade sharpness, consistency of cutting angle, and supporting lay beneath the fabric to avoid scorching or frayed edges (Textilesphere, 2020).

3. Quality Control and Defect Management

3.1 Inspection of Marker and Spreading

Before cutting, quality inspectors validate marker placement, lay height, fabric shade grouping, and spread tension. This ensures proper alignment and uniformity across plies (TextileIndustry.net, 2020).

3.2 Cut Panel Inspection

Post-cut, inspectors sample top, middle, and bottom plies to verify dimensional accuracy, notch placement, drill hole integrity, and panel completeness (Khalilullah & Al-Kamran, 2020). Typical defects include missed cuts, ply misalignment, skew, notch misplacement, and frayed or fused edges (TextileLearner, 2021; TextileIndustry.net, 2020).

3.3 Common Cutting Defects

Common defects in knit cutting include:

- Miss-cuts and misalignment
- Running shade or shade variation across plies
- Ply fusion due to blade heat or friction
- Notching or drill misplacement
- Leaning or skew errors from fabric tension inconsistencies (TextileIndustry.net, 2020).

Inspection ensures early detection: defective panels are recut before welding into production bundles.

3.4 Re-cutting and Bundling

Defective panels identified during inspection or sewing stage are re-cut according to specification. Bundles are organized by style, size, and shade; each bundle is ticketed with identifiers for downstream sewing accuracy (GarmentExportHouse, 2024; Hoshima-Int, 2021).

4. Efficiency, Waste Reduction & Technological Enhancement

4.1 Minimizing Material Waste

Cutting-room planning can account for up to 30 % of total fabric consumption in cut-and-sew knit garments (TextileBlog, 2013). Using optimized marker planning and nesting—often through heuristic algorithms—can reduce lay counts and material costs significantly (Shang et al., 2019).

4.2 Time and Line Balance

Lean methodology principles applied to cutting operations—such as VSM, standard minute value (SMV) analysis, and time studies—facilitate balancing the cutting output with sewing line demand, reducing bottlenecks (Kong et al., 2024).

4.3 Automation and CAD Integration

Modern cutting rooms increasingly adopt computer-controlled layer cutters, digital marker systems, and automated spreaders. Gerber's innovations in VACUUM-compressed CNC cutters pioneered this integration and remain foundational in high-efficiency operations (Gerber, late 1960s) (Joseph Gerber, 2025).

4.4 Future of Vision-Based Quality Control

Emerging systems using visual inspection and thread count detection during spreading and cutting help detect shade inconsistencies, margin variances, or knit defects—further reducing downstream problems (Hu et al., 2018; Habib et al., 2014).

5. Knit-Specific Challenges and Importance

5.1 Elasticity and Distortion

Knits—particularly those with spandex or stretch yarns—can distort during handling. Proper relaxation, controlled spreading, and tension management are essential to maintain pattern accuracy and dimensional stability (Inflibnet, 2015).

5.2 Grain Orientation and Panel Consistency

Orienting pattern pieces along wale or course lines dictates the behavior of knit panels. Misorientation can affect stretch and drape, impacting garment fit and appearance (TextileBlog, 2020).

5.3 Impact on Downstream Productivity

Accurate panels support efficient sewing lines. Poor cutting quality—such as misaligned notches, fused plies, or skew—causes sewing rework, operator delay, fit defects, and increased wastage.

6. Conclusion

The cutting department in knit garment manufacturing plays a critical operational and strategic role. Through precise fabric handling, careful marker planning, and rigorous quality control, it ensures that panels meet specifications and downstream sewing lines operate smoothly. Minimizing waste, reducing defects, optimizing production flow, and managing the unique challenges of knit materials all rest heavily on cutting-room performance.

Investments in automation, CAD systems, lean methodologies, and future vision-based inspection technologies can further elevate efficiency and consistency. For knitwear manufacturers striving for high quality and cost competitiveness, the cutting department remains the foundational step in delivering superior garment products.

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