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# **WORLD'S FIRST** **IDEAL SEWING TECHNOLOGY** **ZARIF 2025**

**BASED ON A ROTATING LOOPER**

## **THE TECHNOLOGICAL DEAD END** **OF THE 19TH CENTURY**

Why do traditional technologies of lockstitch (type 301)  
and chainstitch (type 401) make complete autonomy  
of sewing industries impossible

A fundamental analysis of the irremediable limitations  
of 19th-century sewing technologies



## **ZARIF 2025 PLATFORM**

Ideal sewing technology ZARIF 2025 + AI + Humanoid robots + Autonomous robotic carts.

Ph.D. (Engineering) ZARIF SHARIFOVICH TADJIBAEV

# THE WORLD'S FIRST IDEAL SEWING TECHNOLOGY ZARIF 2025 BASED ON THE ROTARY LOOPER

## ***THE TECHNOLOGICAL DEAD END OF THE 19TH CENTURY***

*Why the traditional lockstitch technology (type 301) and chain stitch technology (type 401) make full autonomy of sewing production impossible. A fundamental analysis of the irremediable limitations of 19th-century sewing technologies*

### ZARIF 2025 PLATFORM

 ZARIF 2025 Ideal Sewing Technology |  Humanoid Robots  
 Artificial Intelligence |  Autonomous Robotic Trolleys

*The foundation of the future automated sewing factory without personnel*

### Zarif Sharifovich Tadjibaev

Candidate of Technical Sciences (Ph.D.), Inventor of the ZARIF 2025 Ideal Sewing Technology

US Patent No. 6,095,069

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Tashkent, 2026

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## ABOUT THIS BOOK

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The volume before you is the first book in the series *ZARIF 2025 — The Platform for Autonomous Sewing Production*. It is the world's first comprehensive guide to the revolutionary ZARIF 2025 sewing technology, which resolves once and for all the 170-year-old problem of automating sewing production. It describes in detail how the rotary looper technology, invented by Dr Zarif Tadjibaev, eliminates the fundamental shortcomings of traditional sewing machines (types 301 and 401), making fully autonomous, unmanned garment production possible.

### ▲ PROJECT STATUS (2026)

- The ZARIF 2025 prototype has confirmed the viability of the technology.
- The industrial version is under development (concept complete).
- Commercialisation is planned for 2026–2035.

### WHO IS THIS BOOK FOR?

- ✓ Engineers and technologists in the garment industry seeking solutions for the automation of production processes.
- ✓ Factory managers and production directors aiming to increase efficiency and reduce dependence on manual labour.
- ✓ Investors in industrial automation, robotics and artificial intelligence.
- ✓ AI and humanoid robot developers (Tesla, Figure AI, Boston Dynamics) interested in integration with sewing equipment.
- ✓ Digital transformation specialists seeking pathways to Industry 5.0.
- ✓ Students and lecturers at technical universities studying advanced technologies in the textile industry.

### WHAT WILL YOU LEARN FROM THIS BOOK?

- ✦ Why traditional sewing machines (types 301 and 401) are incompatible with robots — a detailed analysis of 11 fundamental defects of the lockstitch and 4 irresolvable problems of the chain stitch.

- ◆ How ZARIF 2025 technology eliminates all these shortcomings — the operating principles of the rotary looper, dual-rotation kinematics, Dry Head architecture and digital control.
- ◆ Three types of integration of humanoid robots with ZARIF 2025 machines — from simple loaders to full sewing automation.
- ◆ The economics of the future — how ZARIF 2025 reduces OPEX by 75%, increases OEE to 85%+ and delivers payback within 11.1 months.
- ◆ The commercialisation roadmap — from prototype to fully autonomous factories by 2035.
- ◆ Investment opportunities — how to become part of a market opportunity worth \$400–900 billion over 15 years.

## HOW TO READ THIS BOOK

This book clearly and consistently distinguishes between two levels of information:

### ✓ ALREADY PROVEN BY THE ZARIF 2025 PROTOTYPE

These facts are confirmed by 5,000+ hours of testing on a working prototype:

- Viability of the single-direction stitch-formation principle.
- Speed of up to 5,000 stitches per minute on materials up to 8 mm thick.
- Wide Head architecture: material range 0.1–8 mm without adjustment.
- Zero skipped stitches, zero thread breaks, zero needle breakages.
- Premium aesthetics: the reverse side of the new double thread chain stitch (type 401) is visually identical to the lockstitch (type 301).

### ◆ ENGINEERING CONCEPT

These solutions are described as a realistic next stage:

- Automatic thread-trimming device (1:1 drawings complete; prototype not yet manufactured).
- 360° circular sewing mechanism (1:1 drawings complete; prototype not yet manufactured).
- Industrial version with Dry Head architecture (requires further development).
- Integration with humanoid robots (being tested on prototypes).

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## PREFACE BY THE AUTHOR

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Dear readers,

I wish to begin this book with a personal admission. Thirty-one years ago, in 1994, I asked myself a question which, as it turned out, could transform the entire sewing industry. At the time I was a simple engineer in Tashkent, and the question was this:

*"Is it possible to create a double thread chain stitch without an eye-looper?"*

At the time I did not know that this question would mark the beginning of a journey that would lead to the creation of the world's first robot-native sewing technology — a technology capable of finally solving the problem that had eluded the entire industry for 170 years.

In 2000, I received US Patent No. 6,095,069 for a method of forming a double thread chain stitch using a rotary looper. That was only the beginning. Over the subsequent 25 years, I transformed it into the world's first ideal sewing technology: ZARIF 2025.

This book is not merely a technical description. It is an invitation to witness how the sewing industry is at last making the transition from the mechanical principles of the 19th century to the digital, autonomous ecosystem of Industry 5.0.

— *Zarif Tadjibaev, Tashkent, 2026*

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## INTRODUCTION

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The world sewing industry, with a turnover of \$2.36 trillion, remains the last major manufacturing sector where 90% of operations are still performed manually. Whilst automotive manufacturing, electronics and logistics have already transitioned to full or partial autonomy, the sewing shop floor has remained trapped in the technological paradigm of 1846. The reason is not a lack of robots, nor any weakness of artificial intelligence. The reason lies in the sewing machine itself, whose architecture has not changed since Elias Howe invented the lockstitch.

Over the past 15 years, the industry spent more than \$220 million on attempts to robotise sewing. Adidas closed its "Speedfactory" plants, SoftWear Automation was unable to scale beyond simple T-shirts, and Sewbo remained a laboratory curiosity. Every project foundered against the same barrier: the traditional sewing machine demands constant human intervention — to change the bobbin, adjust the tension, replace a broken needle, re-thread a snapped thread.

ZARIF 2025 is not an improvement on the old paradigm. It is its complete replacement. At the heart of the technology is a rotary looper that makes two full rotations per needle cycle, eliminating the root causes of all key problems: the bobbin, the eye-looper, the "thread triangle" and critically small clearances. The result is a new type of double thread chain stitch that looks like a lockstitch, stretches like a chain stitch and outlasts both.

This book will guide you through 31 years of invention history — from the question posed in 1994 to the prototype that, in 2025, proved that ideal sewing technology is possible. And it is already here.

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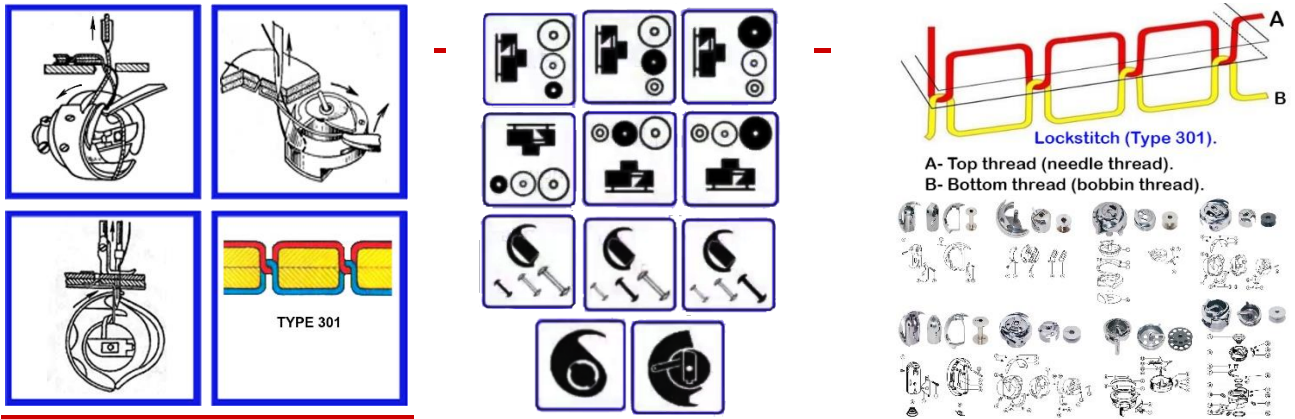
## CHAPTER 1. THE CRISIS OF TRADITIONAL TECHNOLOGIES

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### 1.1. The Two Pillars That Support the World — and Hold It Back

To appreciate the scale of the ZARIF 2025 revolution, one must first understand the depth of the crisis in which the two dominant technologies of the sewing world find themselves: the lockstitch type 301 (80–85% of the market) and the double thread chain stitch type 401 (15–20% of the market). Both were invented in the mid-19th century and have since been improved only "cosmetically" — servo drives, digital displays, automatic lubrication. But their fundamental mechanical flaws have not been eliminated.

### 1.2. Lockstitch (Type 301): 11 Irremediable Defects



The lockstitch type 301 (ISO 4915:1991) occupies a dominant position in the world sewing industry — more than 80–85% of all single-needle seams are produced by this method. However, this statistic reflects not technical superiority but the absence of any widely implemented alternative over 177 years of sewing equipment evolution. After 170 years of continuous engineering development, lockstitch technology has reached the physical limits of its operating principle. All modern improvements are engineering compromises that attempt to mitigate the system's inherent shortcomings without solving its fundamental problems.

### ▲ KEY CONCLUSION

The eleven fundamental defects described below are NOT the result of engineering errors but are the inevitable consequences of the basic physics of lockstitch formation, embedded in the very DNA of this technology since its invention in the 1840s. They are irremediable within the framework of the existing concept.

### DEFECT NO. 1: FREQUENT BOBBIN REPLACEMENT — THE SYSTEMIC BARRIER TO AUTOMATION

The limited quantity of bottom thread on the bobbin requires regular stoppages of the production process. This is one of the principal obstacles to full automation of sewing production, reducing overall efficiency by 10–25%.

#### Technical Parameters

- A standard industrial bobbin (type L or M) holds 60–110 metres of thread
- At operating speeds of 4,000–5,000 stitches per minute, thread is exhausted within 12–20 minutes
- An average operator performs 30–50 bobbin changes during an 8-hour shift
- Each change: 30–45 seconds of downtime (stop, remove, replace, re-thread, check)
- Total losses: 20–35 minutes per machine per shift

#### Global Productivity Losses (100 Sewing Machines)

Indicator	Scale of Losses	Equivalent
Daily losses	40–50 hours of productivity	Work of 5–6 operators per shift
Annual losses	~12,000 hours	8–10% of total available working time
When changing thread colour	Downtime increases 2–3 times	Critical in multi-colour production