Complete Leather Cutting Solution.
Powered by Mathematics.

Furniture

THAGORA
by **LEAR**

MorganTecnica

Complete Leather Cutting Solution

Automation has revolutionized the industry in numerous ways, and leather cutting is no exception. The use of automated cutting machines has transformed the way leather is cut. In today's highly competitive furniture industry, automation is no longer optional, but a requirement for companies to remain cost efficient and meet growing customer demands.

One of the most significant advantages of automation in leather cutting is the increased efficiency and speed of the process. The complexity of the process is induced by the characteristic of the raw material processed. Each hide is unique as shape and distribution of quality areas both from aesthetic and physical point of view. A performant solution needs to bring together advanced algorithms for hides digitization and nesting, production optimization software and high productivity equipment.

Together, Thagora and MorganTecnica offers a integrated software and hardware solution to streamline production processes for furniture manufacturers to deliver high-quality products to their customers in less time and more efficient, which ultimately leads to increased profits and productivity.
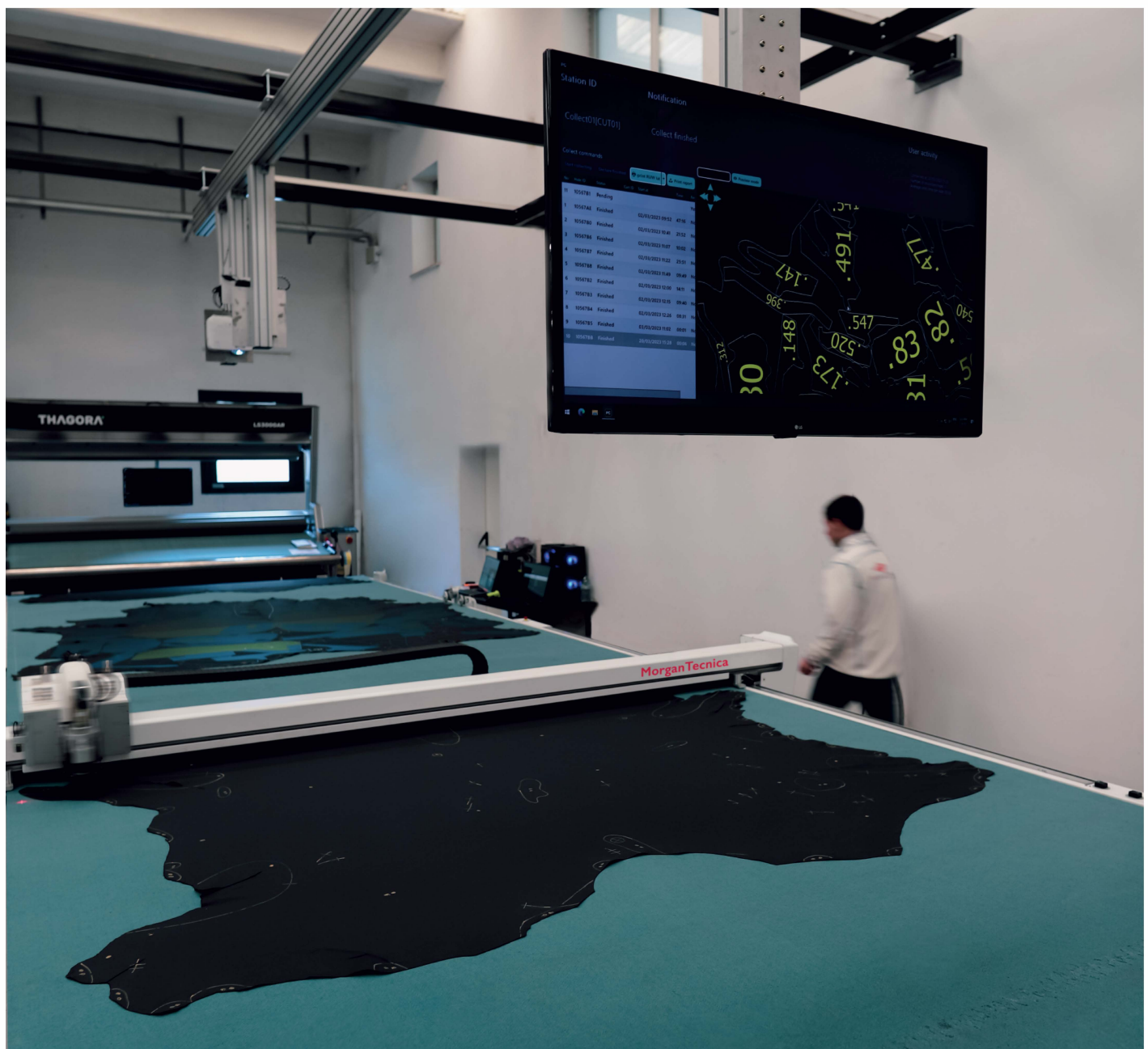
Solution Overview

The combined Thagora software and hardware solution together and MorganTecnica cutting machines constitute a modular and scalable package designed to be configured for any volume of production. From very small workshops, where there are just a few hides to be cut every day, up to large factories, with thousands of hides to be cut daily. It is also suitable for any type of production, being adaptable to manufacturing of highly customized or series products.

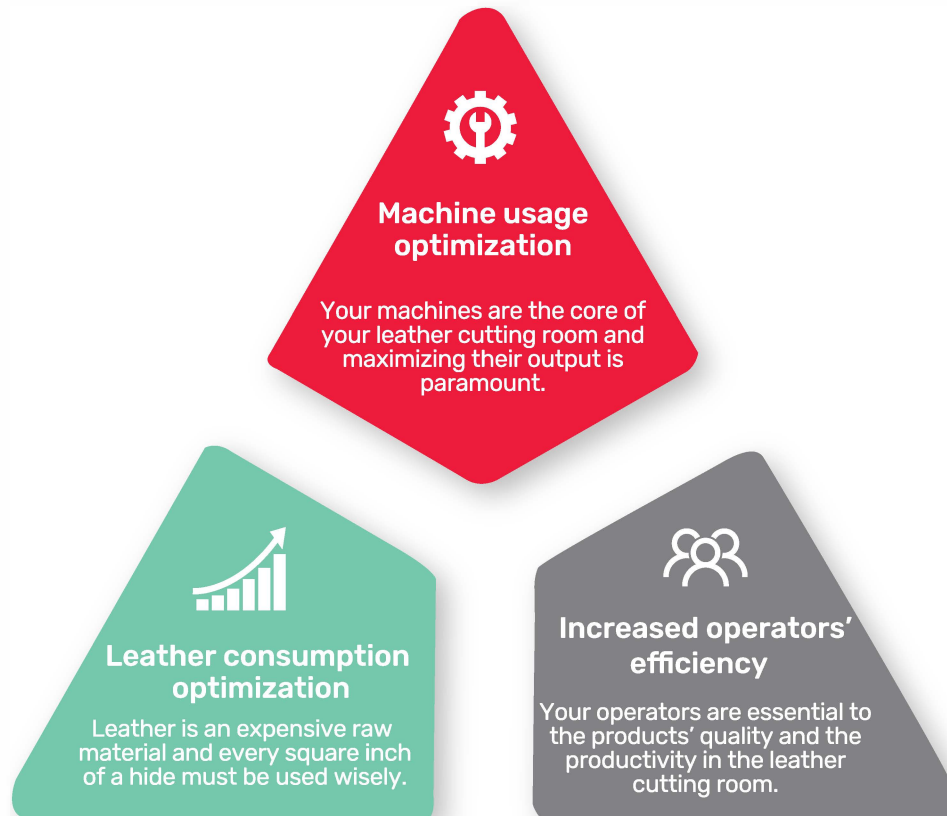| Models	○ Parts Import	○ Automatic parts checking		
Scanning	○ Conveyor table with digital pen marking	○ Conveyor table with analogic detection	○ Static table with top camera	
Production management	○ Production planner	○ Leather and warehouse management	○ Leather ranking	○ Leather pre-allocation
Automatic nesting	○ Multi-hide nesting	○ GPU technology		
Cutting	○ High speed and precision cutting	○ High quality of cut parts	○ Hybrid cutting compatibility (CNC & Manual in the same plant)	
Collecting	○ Parts collecting assisted by video-projector	○ Customizable collecting stategies		
Quality control	○ Parts quality control management	○ Recuts management		
Analytics & LiveReports	○ Advanced analytics engine	○ Live machine status and KPIs	○ Production reports	
ERP integration	○ Bidirectional communication with existing ERP	○ Complete data exchange		

Benefits

The Thagora and MorganTecnica solution meets the great challenges of global leather upholstery industry

The leather upholstery industry is facing major challenges worldwide. The continuous sophistication of end customers' tastes leads to a higher degree of products customization. At the same time, the price of raw materials on a global scale and the cost of the highly qualified workforce are very important aspects. They add to the pressure of increasing production to cover new opportunities in emerging markets. With an understanding of these needs, Thagora and MorganTecnica offers the best-performing technical solution for the core of this business: the leather cutting room.

Machine usage optimization

Your machines are the core of your leather cutting room and maximizing their output is paramount.

Leather consumption optimization

Leather is an expensive raw material and every square inch of a hide must be used wisely.

Increased operators' efficiency

Your operators are essential to the products' quality and the productivity in the leather cutting room.

Leather Consumption Optimization

Leather saving is often regarded as a problem related only to nesting efficiency. Thagora offers a high nesting performance and it also capitalizes on all the opportunities to optimize production other areas of the leather cutting room that are often overlooked. The unique cutting performances of the MorganTecnica Ply1 deliver maximum precision and productivity with direct impact in overall production efficiency.

Automatic nesting

1 Multi-hide nesting

The Off-Line workflow allows simultaneous nesting of all hides, a key factor for higher efficiency results and less reusable waste.

2 GPU technology

Using the GPU's massive computational power allows the nesting algorithm to run considerable more nesting trials on each set of hides, which leads to a higher nesting efficiency.

Overall production optimization

1 Hides pre-allocation

The automatic classification of the available hides on the Off-Line Advanced workflow leads to a balanced allocation for each nesting job so that the whole batch is used efficiently.

2 Automatic production planning

Our automatic planning module optimizes the way products are combined in the nesting jobs, a key factor in the overall leather consumption.

Reducing the number of recuts

1 Cutting performance

MorganTecnica Ply1 is the innovative cutting machine with high technologies. The presence of the new generation linear motors, ensure high cutting precision, high performance and competitive costs. On the performance side, it is enough to mention two values: cutting speed up to 180 m per minute and an acceleration that can reach 3G.

2 Nesting features

Automatically placing the parts as far as possible from the leather edges without decreasing the efficiency has a significant impact in reducing the number of recuts.

3 Process analysis

Complete traceability of all the process steps and powerful analytics tools provide quick identification of any and all factors that generate an increased number of recuts in the process.

Better usage of the leather surface by increasing scanning precision

1 Machine accuracy

A high level of accuracy in leather scanning represents a critical factor in the efficient use of the hides' surface without compromising on quality.

2 Scanner operators' activity control

The advanced analytics module performs a statistical analysis of each operator's performance in terms of the leather scanning precision, thus contributing to higher usage of the leather surface.

Leather supplier control

1 Quality control

Hides ranking can be used as a commercial tool for leather purchasing in agreement with the supplier for the ranking rules. While the supplier control for hides quality from a nesting efficiency perspective can bring financial savings, other statistical reports become available for advanced analysis in Thagora and data for ERP.

Increased Operators' Efficiency

Your operators are vital in the production process. The effective use of their skills and the traceability of their work make all the difference. Given the high cost of labor and the difficult challenge of finding qualified professionals increasing the operators' efficiency is a significant economic advantage. Short induction time for new operators is another essential benefit of digitalization.

Machines automation

① Scanning

Operating the Thagora Leather Scanning Machine is extremely simple, regardless of the operator's skill level. The only vital aspect left for the operator to focus on is quality zones identification. As such, high processing speed is achieved without compromising quality.

② Cutting

Morgan Tecnica Ply1 delivers high cutting performance as speed and precision. Each step of the process is enhanced by using augmented reality when placing the hides and collecting the cut parts together with a innovative and user-friendly graphics interface (gesture oriented GUI).

Complete traceability of the production process

① Process analysis

Complete data records of all the production steps along with the advanced analytics module greatly optimize the overall production process.

Machine Usage Optimization

Your machines are the core of your production line, so it is crucial to use them at their maximum output capacity. Thagora and Morgan Tecnica offer a fully integrated software and harware solution that maximizes the throughput of each machine, providing a significant increase in the production volume.

Increased machines output

① Off-Line workflow

In the Off-Line workflows, each process step is allocated to a specialized station, so machine productivity is maximized. In case of a scanner or cutter malfunction, the entire workflow remains operational.

② Machines' automation

Each step of the scanning and cutting processes is highly automated in order to exploit the machines to their maximum capacity as well as to reduce the operator's effort and reliance on manual labor.

Workflows

For years, the In-Line workflow has been the standard procedure in the leather cutting room. With all the operations – scanning, automatic or manual nesting, and cutting – being performed at once, on the cutter, the advantage of this process is its simplicity. This process is efficient for small scale workshops.

In 2010, Thagora launched the Off-Line workflow, designed to meet the requirements of the furniture and automotive industries. In 2013, after further developments made in close cooperation with our clients, we launched the Off-Line workflow with many tailor-made features for the precise needs of the leather-upholstered furniture industry. Additionally, the knowledge gained in this process was used to improve the In-Line workflow managed by Thagora.

In-Line

All steps of the leather cutting workflow - digitizing, nesting, cutting and collecting - are performed at once, on the cutter. The Morgan Ply1 architecture with 3 zones and single conveyor is an optimal for increased throughput.

Off-Line

The scanning, nesting and cutting are performed separately on different workstations. The hides required for one cutting job are selected and scanned. After the last hide is scanned, the Nesting Server starts the automatic multi-hide nesting. When the nesting job is approved, the hides are processed on the cutting machine.

In-Line Workflow
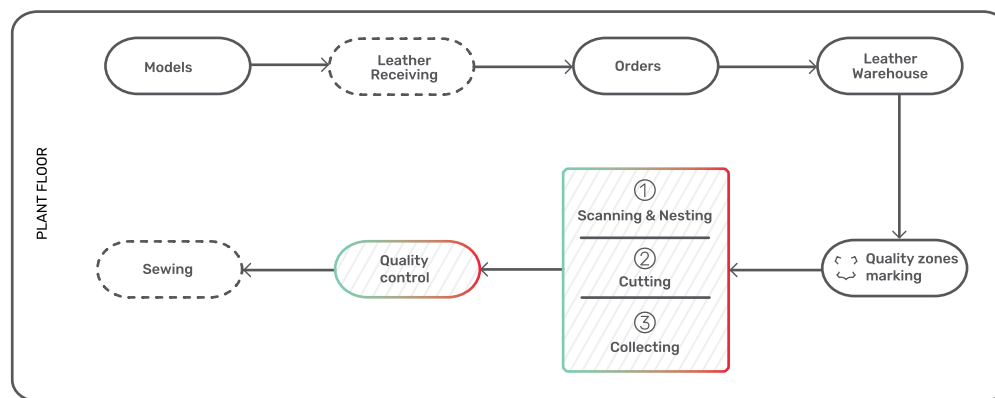
○ **Leather supplier's deliveries**
The hides delivered by suppliers are stored in the warehouse. Information about leather types, batches and quantities can be stored in the Thagora database, to offer a complete view of the stock and allow optimal planning.

○ **Quality zones marking**
According to the jobs scheduling, the quantity of hides required for one job is transported to the marking area. After all the hides from one scan job are marked, they are sent to the MorganTecnica cutting area.
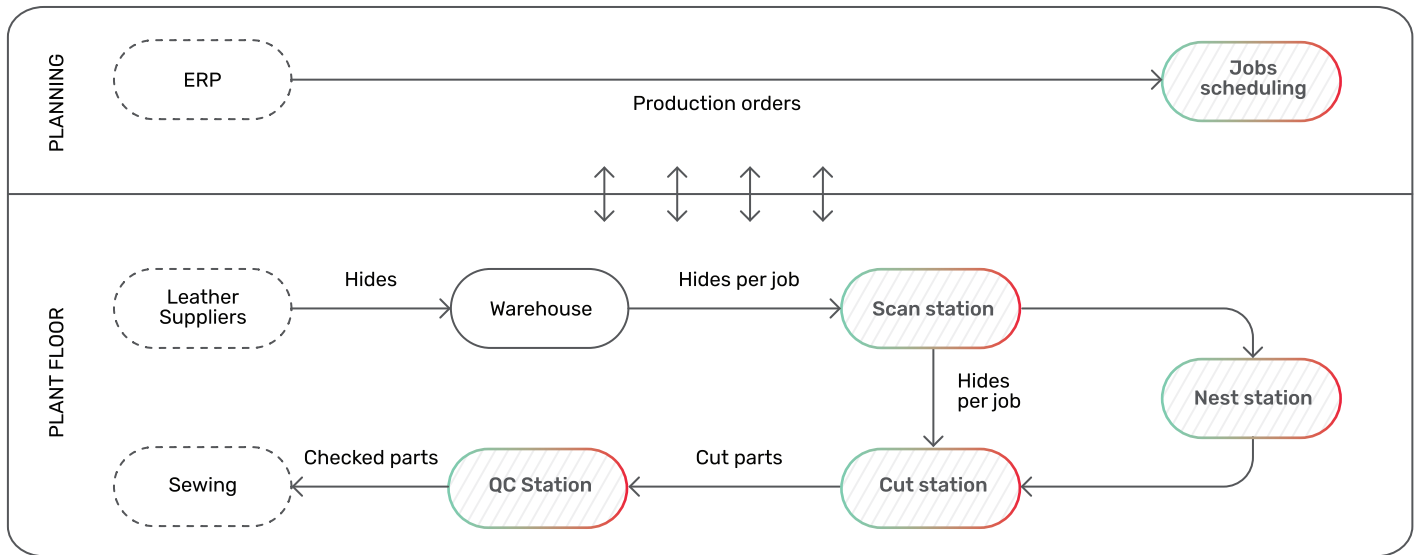
○ **Job processing**
The marked hides are processed in sequence on the Ply1 cutting machine. The 3 zone architecture is optimal for maximizing the productivity as each step of the process. The cutting precision is enhanced due to a single lay process for each hide on the cutters single conveyor.

○ **Quality control and parts bundling**
The operator checks the parts for quality and quantity using the information displayed on the monitor. The parts can be bundled using different criteria (by customer order, by product, etc.) and sent to sewing.

Leather digitization ——— Nesting ——— Cutting ——— Quality control ——— Reporting and data management

Off-Line Basic Workflow - Scan to Job

Planning

○ Customer orders transfer from ERP to Thagora

The customer orders are centralized in the ERP system. Using the Thagora Data Exchange module, the customer orders are automatically transferred to the Thagora database. In the absence of the required information in the ERP, the customer orders can be manually added in the Thagora applications.

○ Planning the production

The customer orders are converted into production orders using a powerful planning algorithm which aims for overall process optimizations, while taking into account all the production constraints. Especially useful in mass customization production, the automatic planning can lead to increased leather usage efficiency and offers a clear view of the production dashboard.

○ Jobs scheduling

The approved production planning is followed by the generation of jobs: scan jobs, nest jobs, cut jobs and quality control jobs. The jobs are scheduled and automatically uploaded to each production station. A balanced workload on each station and intelligently attributed jobs priorities ensure that the production planning will be correctly implemented.

Plant Floor

○ Leather supplier's deliveries

The hides delivered by suppliers are stored in the warehouse. Information about leather types, batches and quantities can be stored in the Thagora database, to offer a complete view of the stock and allow optimal planning.

○ Scanning the hides per job

According to the scan jobs scheduling, the quantity of hides required for one job is transported to the scanning stations. After all the hides from one scan job are scanned, they are sent to the cutting area.

○ Multi-hide nesting

After all the hides from one scan job are scanned, the corresponding nest jobs start automatically. When a nesting job is finished, it can be approved either automatically or manually, by an operator.
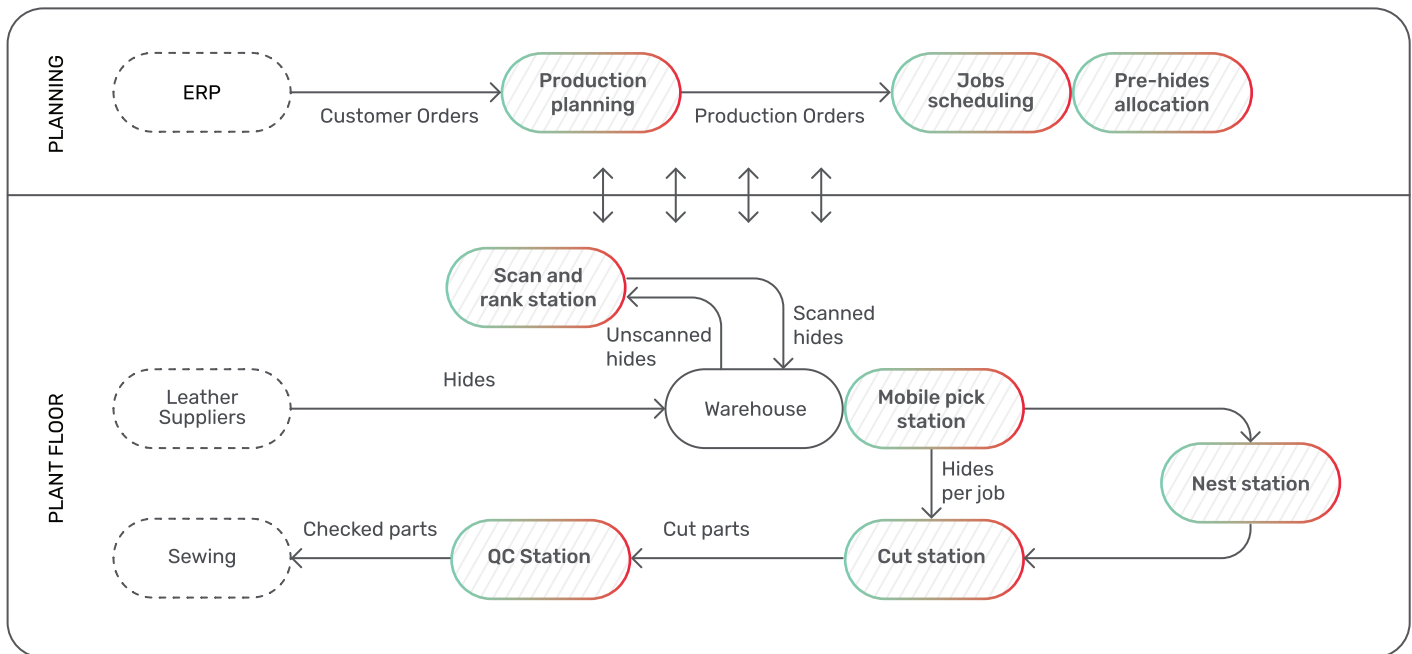
○ Cutting the hides

The approved jobs are ready to be cut. The hides are processed one by one. MorganTecnica Ply1 delivers high cutting performance as speed and precision. Each step of the process is enhanced by using augmented reality when placing the hides and collecting the cut parts together with a innovative and userfriendly graphics interface. Ply1 can reach up to 3G acceleration and speed up to 180 m/min that makes it the fastest in its category. High performance, maximum precision, minimal maintenance, modern design and innovative software are the distinctive features of this powerful cutting machine.

○ Quality control and parts bundling

The operator checks the parts for quality and quantity using the information displayed on the monitor. The parts can be bundled using different criteria (by customer order, by product, etc.) and sent to sewing.

Off-Line Advanced Workflow - Scan to Warehouse

Planning

Customer orders transfer from ERP to Thagora

The customer orders are centralized in the ERP system. Using the Thagora Data Exchange module, the customer orders are automatically transferred to the Thagora database. In the absence of the required information in the ERP, the customer orders can be manually added in the Thagora applications.

Planning the production

The customer orders are converted into production orders using a powerful planning algorithm which aims for overall process optimizations, while taking into account all the production constraints. Especially useful in mass customization production, the automatic planning can lead to increased leather usage efficiency and offers a clear view of the production dashboard.

Jobs scheduling

The approved production planning is followed by the generation of jobs: scan jobs, nest jobs, cut jobs and quality control jobs. The jobs are scheduled and automatically uploaded to each production station. A balanced workload on each station and intelligently attributed jobs priorities ensure that the production planning will be correctly implemented.

Hides pre-allocation

A distinctive option of this workflow is represented by the hides' pre-allocation procedure. During the scanning process, each hide is evaluated and ranked by nesting efficiency. In order to ensure a higher overall yield, the system calculates the required area per rank for one nest job.

Plant Floor

Leather supplier's deliveries

The hides delivered by suppliers are stored in the warehouse. Information about leather types, batches and quantities can be stored in the Thagora database, to offer a complete view of the stock and allow optimal planning.

Scanning and ranking the hides per batch

The unscanned batches are brought to the scanning station. The hides are scanned and automatically ranked individually. The ranked hides are stored on different horses according to their rank and sent back to the warehouse.

Picking the hides for one job

The pick jobs are received on a mobile device. Each job indicates the required hide area by rank. The operator picks the hides by scanning their barcode until the required quantities are reached. The picked hides are stored on a separate horse for each job and sent to the cutting area.

Multi-hide nesting

After all the hides from one production order are picked, the corresponding nest jobs start automatically. When a nesting job is finished, it can be approved either automatically or manually, by an operator.

Cutting the hides

The approved jobs are ready to be cut. The hides are processed one by one. MorganTecnica Ply1 delivers high cutting performance as speed and precision. Each step of the process is enhanced by using augmented reality when placing the hides and collecting the cut parts together with a innovative and userfriendly graphics interface. Ply1 can reach up to 3G acceleration and speed up to 180 m/min that makes it the fastest in its category. High performance, maximum precision, minimal maintenance, modern design and innovative software are the distinctive features of this powerful cutting machine.

Quality control and parts bundling

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Thagora Leather Scanning

Thagora offers two scanning solutions to cover a wide range of production characteristics. Thagora Leather Scanning Machine is an advanced conveyorized equipment featuring leading-class technology. The Static table with photo camera is a basic solution for hides' digitization, suitable for small production volumes.

Thagora Leather Scanning Machine

This is a conveyorized leather scanning machine dedicated for mass production enterprises. The digital pen used for marking doesn't leave traces of chalk or ink on the hides. The machine uses augmented reality and other advanced features for a fast and accurate inspection process and high detection stability. The leather scanning machine is available for two working scenarios: **analogic** for automatic digitization of pre-marked hides and **digital** for marking the defects using a digital pen directly on the conveyor.

Features - digital scanning

- Used for leather inspection process based on augmented reality with digital pen marking
- Unlimited quality/lamination zones detection
- The LED inspection lights with glare free lenticular lens are adjustable in terms of intensity and color, ensuring the best condition for the hides inspection
- Integrated software module for quick automatic ranking of hides
- Integrated stretching system that allows the identification of the fine cuts on the hides
- Optional can be equipped with a secondary conveyor for hides unloading
- Can be used in analogic detection mode

GPU Automatic Nesting

Yield is undoubtedly the main concern of any manufacturer of natural leather products. Consequently, a key element in the evaluation of a leather cutting solution is the automatic nesting efficiency. Being aware of the GPU technology and multi-hide nesting opportunities, the Thagora team has undertaken an extensive R&D project for the leather cutting industry to follow these improvement goals. The 10-20X increase in computational speed due to the GPU technology was successfully converted in leather savings up to 8%.

The Off-Line workflow opens up new possibilities

Multi-hide nesting
The Off-Line workflow allows simultaneous nesting of more than one hide - a key factor for high efficiency and less reusable waste.

24/7 nesting
The separation between nesting and cutting allows a longer time allocation to the nesting process without negatively impacting the cutting process and overall production time. This represents a key factor for multi-hide nesting, with direct results in your operation's efficiency.

Special functions
Functions like Centre Pack or Centre Nest help to place the parts as far as possible from the hides edge to avoid possible problems during the cutting process.

MorganTecnica PLY1 Cutting Machine

Ply1 is the latest MorganTecnica single ply cutting machine with unique performances.
Thanks to the new generation of linear motors, Ply1 can reach up to 3G acceleration and speed up to 180 m/min that makes it the fastest in its category. High performance, maximum precision, minimal maintenance, modern design and innovative software are the distinctive features of this powerful cutting machine.

The machine meets all the needs of the leather cutting world, it is the first single sheet cutting system where absolute precision and low maintenance make it a real innovative cutting system. The installed software is easy and intuitive with touch screen technology. Ply1, a machine designed to produce small and variable batches. The high acceleration and cutting speed combined with the advanced cut path optimization software features enable high productivity and quality for the leather cutting process. The multi-tools heads can manage up to 3 tools at the same time.

Cutting quality
□ Best start point automatic calculation for each pattern
□ Smart cut sequence
□ Perimeter harmonization
□ Automatic knife initialization available

ROI and Running costs
□ Industry 4.0 technology
□ Low energy consumption
□ Linear motors (no maintenance needed)
□ No paper or plastic needed (consumable savings)
□ Automatic mapping of cutting surface (low maintenance cost)
□ System suitable to be operated by a single operator

Usability
□ Innovative and user-friendly graphics interface (gesture oriented GUI)
□ Ergonomic PC station
□ Interactive PC touch
□ Belt self-cleaning system available

Control
□ Anomalies auto-diagnosis system
□ Safety laser scan system
□ Detailed data center

Reliability
□ 1 year warrant
□ Linear motor
□ 4 mm thick steel chassis structure

Performance

□ Max. cutting speed	180 m/min
□ Max. acceleration	27 m/s2 (with only one tool insyaled)
□ Max cutting thickness (single layer)	30 mm
□ Cutting area dimensions	280 x 320 cm

11

Thagora and Morgan proposes a step forward for the leather cutting process, with a completely digital, Industry 4.0 ready solution for the furniture industry. It combines an advanced software system, with an automatic, multi-hide nesting solution on GPU, Thagora Leather Scanning Machine, Morgan Ply1 cutting machine and process optimization to achieve higher leather savings and productivity.

WHAT WE COULD DO NEXT :

Set up a meeting for understanding your current process and evaluate the improvement potential

AND

Build together a System Architecture for your cutting process and perform a complete solution test from scanning to nesting and cutting, so you can get an idea of overall Return On Investment.

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Thagora & MorganTechnica offers a mature and robust platform, a flexible, scalable, and easy-to-integrate technology. Being an open platform, this can be seamlessly integrated upstream and downstream into the production flow and linked to the company's digital ecosystem.

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Presentation Movie