ETHAN ALLEN®

Surviving in the Upholstery World of Over-Supply
IWF ATLANTA Symposium, August 24, 2010

**Lower your Fabric Layout/Cutting Yardage Requirements,
Increase your Plywood Yields on Every Frame You Cut,
All with Production Run Quantities of One**

Presented by Cliff Thorn,

VP of Upholstery Manufacturing at

ETHAN ALLEN®

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Ethan Allen - Background

❑ Ethan Allen Interiors Inc. (NYSE: ETH)

❑ A strong American brand for more than 75 years

❑ Manufactures approx. 65% of its products in its U.S. plants

❑ Nearly 300 Design Centers

❑ Ethan Allen's Upholstery Division:

❑ The division employs approximately 1,200 people

❑ Manufacturing highly customized made-to-order upholstery.

> **Ethan Allen's Goal:**
> Deliver customized upholstered furniture to its customers within 4-5 weeks, offering thousands of fabrics, trims, finishes, and cushion options.

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Upholstery Fabric Cutting –
The Business Problem

❑ **The Business Problem:** Manual Intensive Process for Upholstery Fabric cutting drives long lead times, high costs in labor and material

❑ **Key Challenges:**
1. Customized offering requires careful selection of Upholstery Fabric pieces to meet customer demand
2. Fabric nests were created manually - caused a bottleneck in the process
3. Short rolls inventory continues to grow; <u>thousands</u> of remnant rolls in stock

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Fabric Cutting - The Solution:
Invest in *TPO-FabricOptimizer* software to help Ethan Allen's staff meet the demands of custom manufacturing

❑ **System Goals:**
1. **Automation** of the fabric cutting processes, mainly: Piece-Selection, nesting and roll-picking
2. **Optimization**: Increase Material Utilization through optimal nesting and methodical use of short-rolls
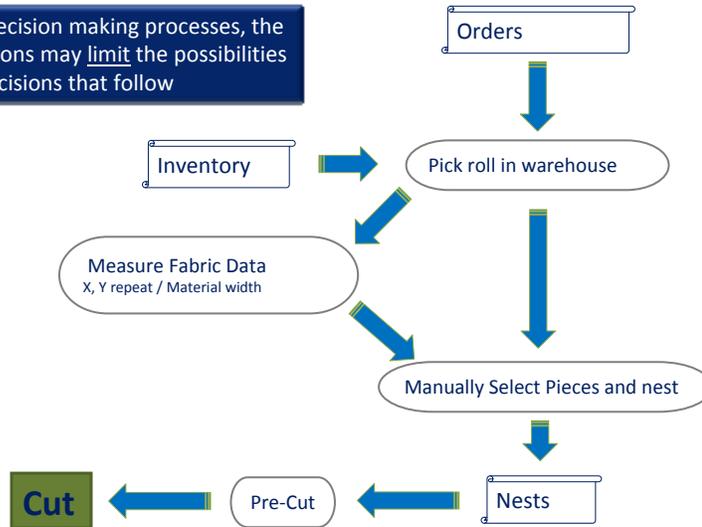
❑ **Key Challenges in system deployment:**
1. New Process Definition and Change Management
2. Upgrading data structures, to allow for data integration and process automation
3. All this during the toughest economic environment imaginable

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Fabric Cutting Process <u>Before</u> Implementing TPO

In <u>serial</u> decision making processes, the first decisions may <u>limit</u> the possibilities for the decisions that follow
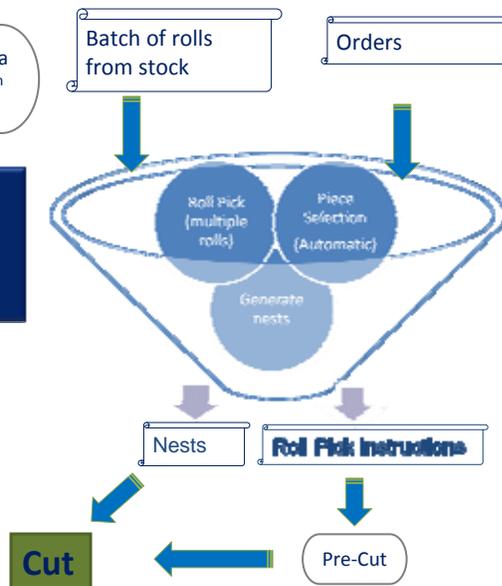
Orders

Inventory → Pick roll in warehouse

Measure Fabric Data
X, Y repeat / Material width

Manually Select Pieces and nest

Cut ← Pre-Cut ← Nests

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Fabric Cutting Process <u>After</u> Implementing TPO

Measure Fabric Data
X, Y repeat / Material width
(at material received)

Batch of rolls from stock

Orders

True optimal solutions will be found only when optimizing all decision factors

Roll Pick (multiple rolls)

Piece Selection (Automatic)

Generate nests

Nests

Roll Pick Instructions

Cut ← Pre-Cut

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Automatic & Optimized Piece-Selection
TPO's "Drawers" Concept

- ❑ Keep the options' logic for all styles in a dedicated database
  - ❑ Which pieces (with which match-points) are needed for which option & fabric
  - ❑ Fully support entire breadth of available custom choices
- ❑ Use simple DXF files to keep all styles' data <u>without the need of proprietary CAD tools</u>
- ❑ For any given order, use options database to retrieve the required parts from the DXF file to be automatically sent to nesting & cutting
- ❑ <u>Main Benefits:</u>
  - I. Easier maintenance of extensive array of styles and options
  - II. Eliminating human errors in piece selection process, usually seen late in the process

Customer Specific Order → Exact set of pieces to cut for that specific order

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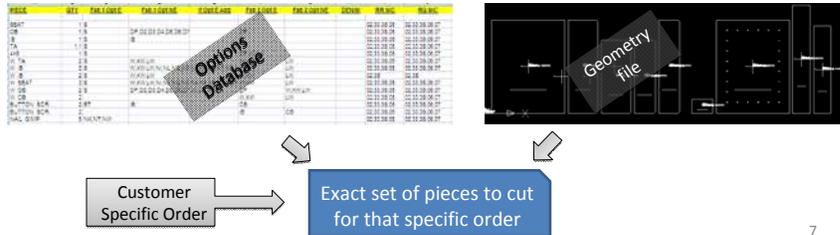
TPO's Roll Management For Optimized Material Usage (Example):
Configurable, optimized remnant (short-end) selection options

- ❑ A given order requires about 15 yards of material to be nested
- ❑ Traditionally, each style has one marker on a single roll, leaving behind a growing stock of short rolls
- ❑ A dynamic marker making technology, with access to the inventory database, will better **utilize all rolls in stock**, nesting over multiple rolls where possible and keeping short-roll inventory to a minimum

|	Starting inventory	Dye-lot (Shade)	Used rolls	=Final inventory
Single-roll nesting	<u>Roll A:</u> 5.9 yards	Dye-lot 1	---	<u>A:</u> 5.9 yards
	<u>Roll B:</u> 9.9 yards	Dye-lot 1	---	<u>B:</u> 9.9 yards
	<u>Roll C:</u> 32.4 yards	Dye-lot 2	**---**	<u>C:</u> 32.4 yards
	<u>Roll D:</u> 44.1 yards	Dye-lot 1	<u>D:</u> 14.6 yards	<u>D:</u> 29.5 yards
TPO's Dynamic, Multi-roll nesting	<u>Roll A:</u> 5.9 yards	Dye-lot 1	<u>A:</u> 5.9 yards	---
	<u>Roll B:</u> 9.9 yards	Dye-lot 1	<u>B:</u> 9.3 yards	---
	<u>Roll C:</u> 32.4 yards	Dye-lot 2	---	<u>C:</u> 32.4 yards
	<u>Roll D:</u> 44.1 yards	Dye-lot 1	---	<u>D:</u> 44.1 yards

Automatic Roll-Selection Optimization

Roll Management for Optimized Material Usage:
(Example – Continued)

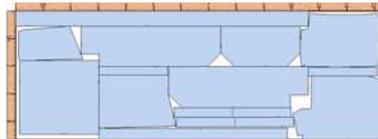❑ **Single-Roll Marker utilizes 14.6 yards of a single roll:**
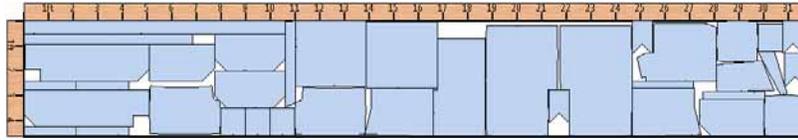
❑ **Leveraging actual inventory, TPO separates the marker to 2 short-rolls, fully utilizing them:**

9.3 yards

+
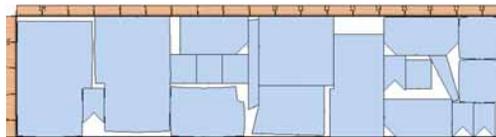
5.9 yards

Fabric Cutting - Main Benefits Driven by TPO

❑ **Raw Material savings**
   ❑ Automatic and Optimized nesting
   ❑ Support multiple orders per one roll & multiple rolls per one order
   ❑ Roll width optimization

   ❑ **Average improvement of 6.4%** in fabric consumption
   ❑ The **median improvement on material yield was 5.2%,** i.e. TPO saved 5.2% or more for 50% of the order-lines

❑ **Eliminate short rolls and reduce Inventory costs**
   ❑ Configurable, optimized remnant (short-end) selection options

   ❑ For 15% of the orders, TPO utilized short rolls
   ❑ In each such case, at least one of the rolls (the shorter one) is fully utilized.

Main Benefits Driven by TPO – Cont.

❑ **Reduced Labor** associated with manual nesting process **by 50%**
   I.   End-to-End Process Automation; less manual touch points
   II. Automatic piece selection, nesting and roll-picking

❑ **Improved Quality** - Less manual operations and less mistakes
   I.   Automatic piece selection (the 'Drawer' system), eliminating errors found in the sewing stage or even later in the process
   II. Automatic dye-lot matching within orders

❑ **Reduced ecological footprint** without compromising productivity or efficiency
   I.   Reduced inventory levels and material consumption
   II. Reduced material waste and waste handling costs

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Plywood Cutting – The Business Problem

❑ **The Business Problem:** Manual Intensive process drives long lead times, high costs in labor, and low material utilization

❑ **Key Challenges:**
   1. Automate the frame production process
   2. Customized orders require JIT nesting and programming and reduce the need for high level of inventory
   3. Shift in management strategies and planning

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Plywood Cutting - The Solution:

Invest in *TPO-WoodOptimizer (NESTERWood)* software to help Ethan Allen's staff meet the demands of custom manufacturing

❑ **System Goals:**
1. **Automation:** frame production order initiates automatically once the sewn cover is ready for upholstering
2. **Optimization**:
   1. Increase Material Utilization through optimal plywood nesting, and increase
   2. Increase machine throughput through optimized cut-paths

❑ **Key Challenges in system deployment:**
1. New Process Definition and Change Management
2. Move to JIT production process
3. New nesting method

Plywood Cutting - Main Benefits Driven by NESTERwood

❑ **Raw Material savings**
   ❑ Automatic and Optimized Dynamic nesting
   ❑ Utilize remnants by supporting multiple orders per one sheet
   ❑ Frames are produced JIT

   ❑ **Average improvement of 10%** in frame yield
   ❑ Optimization of the complete frame production process

❑ **Eliminates inventory and reduce material handling costs**
   ❑ Floor space has been freed up to expand production

❑ **Cut Delivery Time to customers by half**

❑ **Increased Machine Productivity**
   ❑ Cut-Path Optimization Algorithms

Main Benefits Driven by NESTERwood – Contd.

❑ **RollingNest** – Creates a continuous cutting environment by nesting frames one after the other on the same sheet

❑ **Reduced Labor** associated with manual pre-nesting process
   I.   End-to-End Process Automation; less manual touch points results in less human errors

❑ **Reduced ecological footprint** without compromising productivity or efficiency
   I.   Reduced inventory levels and material consumption
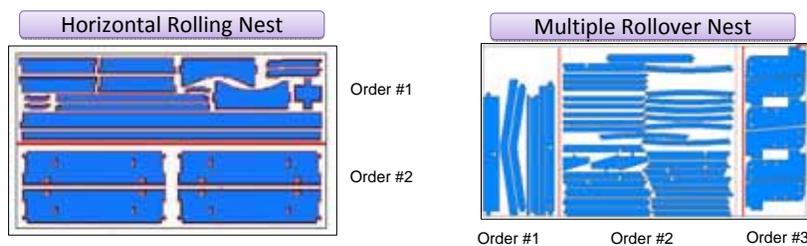   II. Reduced material waste and waste handling costs

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Produces Frames from Less Material in Less Time
NESTERwood's RollingNest - Create a Continuous Cutting Environment

example

❑ Orders stop/start within the same sheet
❑ Supports both vertical and horizontal nest rollovers

Horizontal Rolling Nest

Order #1

Order #2

Multiple Rollover Nest

Order #1   Order #2   Order #3

❑ Utilizes optimum mix of sheet sizes from available inventory
   ❑ Automatic sheet selection with multiple sheet sizes and multiple head-selection
   ❑ Enables more than one roll over

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TPO System Implementation Process

Managing Change:
Safe, Solid yet Flexible and Fully Supported

❑ **First Step – Gradual Implementation:**
- ❑ Integration with ERP – JD Edwards
- ❑ Integration with Gerber CAD (or AutoCAD for wood-frames)
- ❑ Implementing Ethan Allen's production rules into TPO system

❑ **Second Step – Centralized process fully supported:**
- ❑ First installation by the TPO team
- ❑ Training by the TPO team
- ❑ Test and review with cooperation of Ethan Allen's and TPO's team

❑ **Third Step – Gradual Deployment:**
- ❑ System deployment to all work-cells in all plants, cell by cell
- ❑ Training machine operators by Ethan Allen's project team
- ❑ Managing the Change

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TPO Statistics at Ethan Allen
(July 2010)

❑ The system is fully operational for:
- ❑ **Fabric Cutting -** ~1.5 year
- ❑ **Plywood Cutting - ~**6 years

❑ Supports cutting operations in both Maiden, NC and Silao, Mexico

❑ Over 8000 customer orders processed per week
- I.   Over 400 frame styles
- II. Over 3000 fabric choices for our customers
- III. Over 5,000 full rolls and short ends in inventory to manage
- IV. All production runs are one customer at a time

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New York Times Column Lauds Ethan Allen's Ability to Adapt

❑ Ethan Allen is cited as an example of a **company transforming the way it does business as a result of 'The Great Inflection'** - the recent mass diffusion of low-cost, high-powered, innovative technologies.
(The Do-It-Yourself Economy, Thomas L. Friedman, New York Times, Dec. 12th, 2009)

❑ Farooq Kathwari, Ethan Allen's CEO quoted he is leveraging technology
   ❑ To cut costs and improve quality
   ❑ To retain his competitive position in world markets.
   ❑ To maintain sufficient cash to survive

"Five years ago…it would take about 20 hours of labor time to make a high-quality custom sofa. Now, due to our investments in technology and a smaller work force that is more highly skilled, the labor time to make this sofa is about three hours."

"Our associates recognize that reinvention is vital to our survival."

Thank you for joining us

For more information please contact:

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