



CASE STUDY

Lean-Flow Manufacturing MiTek Automation

■ PROBLEM / CHALLENGE

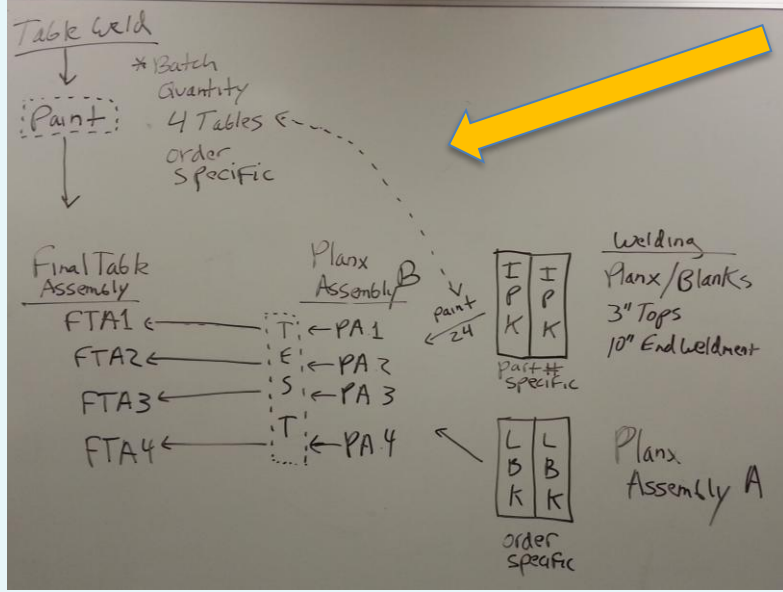
MiTek Automation is a manufacturer of large precision machinery used to make components for residential construction. In 2011, they came out of the 2007 – 2010 housing crisis with a sudden surge of demand that increased their sales by 10x (about \$4 million to \$40 million).

Unlike their competitors, during the downturn they invested in new product design and development, adding new products (see section on MatchPoint Blade Saw) and upgrading existing products that increased customers' production speed and labor productivity.

These new and upgraded products are configurable, adding significant production complexity. MiTek handled this via a batch production, job-shop arrangement, but this method could not keep pace with demand or faster customer lead-time requirements.

■ LEAN TRANSFORMATION PLAN

- **Balanced flow: Takt Time**
 - We had to transform from batch production to flow production.
 - The new Flow Cells produced one unit per customer establishing the new Takt Time.
 - This allowed each unit to be unique and built to specific customer needs.
- **Balanced flow: LBKs and IPKs**
 - To ensure swift and even flow Line-Balancing-Kanbans (LBKs) buffered the intra-cell flow.
 - In-Process-Kanbans (IPKs) buffered flow for standard and high-volume parts that are used on all units.
- **Kanban Materials Management**
 - Previous materials management kitted all parts to the batch work order
 - We converted the standard items used in all configurations to Kanban bins replenished by Materials Management.
- **Daily Order Review**
 - A daily order review was instituted to ensure machines did not idle due to lack of materials or information.
- **Paint Booth Optimization**
 - The paint booth was a constraint used by all Flow Cells and needed to be synchronized and buffered using the Theory of Constraints' Drum-Buffer-Rope.

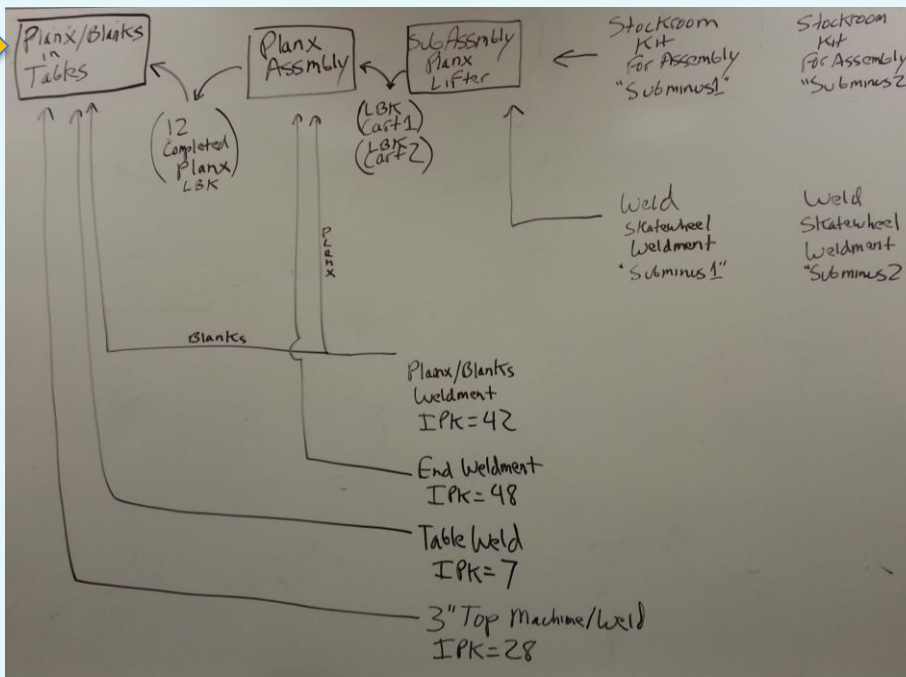


PLANX WELD FLOW CELL

- The Planx Flow Cell produced components used in the Table Flow Cell.
- High volume Planx are produced to a kanban stocking level using an IPK two-bin kanban.
 - When one bin was emptied it is replenished by the Planx Weld Cell with no scheduling.
- Low volume Planx are welded to order, feeding a LBK into the Planx Assembly workstation.
- Planx Assemblies are tested prior to installation into the Table (Final Table Assembly).
- Cells are designed and staffed to support Customer Takt Time.

TABLE (with Planx) FLOW CELL

- Tables are all produced to order and configured to customer needs.
- Tables require stockroom kitting of order-specific components, sub-assemblies, welded and tested Planx, and paint.
- A combination of IPK for high-volume standard components and LBKs for produced-to-order are used to balance flow to Customer Takt Time.



PLANX/TABLES ASSEMBLY				
4A	3A	2A	1A	PC
S459615 PLANX RETROFIT	S473150 PLANX ONLY	S450597 8 MP TBLS + PLANX	S478728 3-RT2,FR,TBLS ,CNVYR	
4B	3B	2B	1B	
			S478728 3-RT2,FR,TBLS ,CNVYR	
WELD		SUB ASSEMBLY		
3	2	3	2	
S459615 PLANX RETROFIT	S473150 PLANX ONLY	S459615 PLANX RETROFIT	S459615 TL MP TBLS + PLANX	
WORKING	NEXT	WORKING	NEXT	

PLANX + TABLES KANBAN SCHEDULING / SEQUENCING BOARD

- The physical flow of the cells was supported by a Kanban Scheduling / Sequencing Board.
- Each slot is filled with a customer order, if there is sufficient demand.
 - Orders flow from Production Control (PC) to schedule into workstations 1, 2, 3, and lastly to final assembly and test at workstation 4
 - There are two parallel assembly lines, A and B.
- Orders flow in parallel in the Weld Cell and Sub Assembly Cell to combine at Workstation 4.

MATCHPOINT BLADE SAW KANBAN SCHEDULING BOARD

The MatchPoint Blade Saw Cell has three assembly stations (Mechanical, Electrical, Final + Test), with a synchronized 3 station weld cell and 3 station sub-assembly cell. The scheduling board below is about to receive Unit 14 into the first workstation, A-3 that starts welding and sub-assembly.

Blade Saw Kanban							
3 Stage Assembly Cell			Next to Assembly Cell				
C	B	A	A-1	A-2	A-3	A-4	PC
Unit 9	Unit 10	Unit 11	Unit 12	Unit 13			
WELD			Sub-Assembly				
A-1	A-2	A-3		A-1	A-2	A-3	
Unit 12	Unit 13			Unit 12	Unit 13		

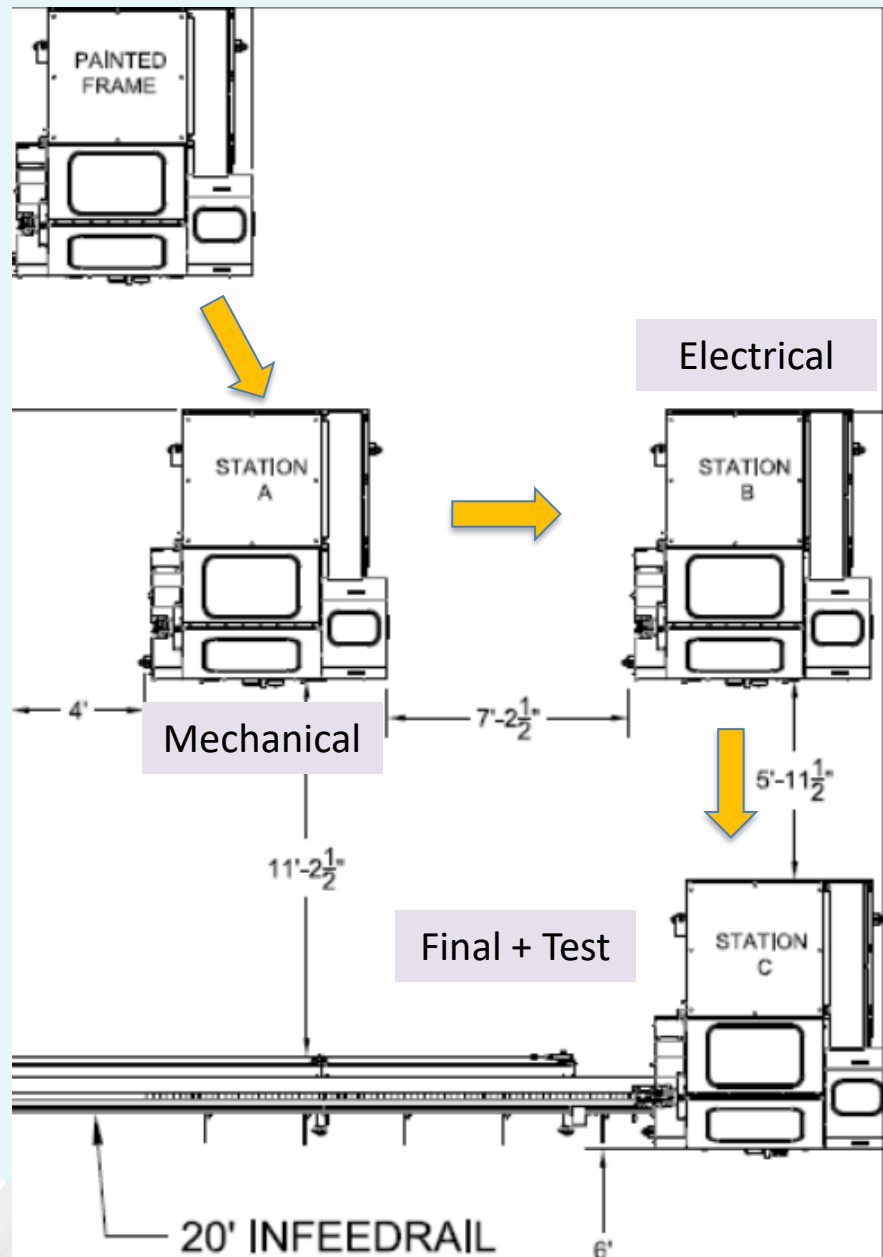
MATCHPOINT BLADE SAW KANBAN BOARD & CELL LAYOUT

The MatchPoint Blade Saw Cell had a big goal – to almost double throughput from 35 to 60 units a year. This required balancing work, staffing to Takt Time, synchronizing welding the large housings and producing each units' sub-assemblies so everything is ready for Assembly and Electrical installation.

Workstation operational definition from last (ready to ship) to first:

- Station C: Add Infeed Rail and Test
- Station B: Final Electrical Assembly
- Station A: Mechanical Assembly
- Painted Frame
 - One painted frame was always waiting to enter Station A
- Station A-1:
 - Frame seam weld and waiting for paint
 - Sub assembly – electrical
- Station A-2:
 - Frame spot weld
 - Sub assembly - mechanical

MATCHPOINT BLADE SAW FLOW CELL LAYOUT



TWICE-WEEKLY ORDER REVIEW

SO/WO	CUSTOMER	LINE #	SCHED. SHIP DATE	PART NUMBER	ID#	FRAME #	QTY	DESCRIPTION	CONFIRMED	ENG	MFG. ENG	W.O. RELEASED	FAP	MACHINE SHOP	WELD	PAINT	STOCKROOM PARTS STAGED	ASSEMBLY	CREDIT HOLD (YES or NO)	TRUCK ORDERED	SHIPPED
ALPA								#/NA													
R&D JOB	ALPA LUMBER		12/01/13	ENG				#/NA	C	C	C	C	C	C	C	N/A	C	I	N/A		
1161973			12/27/13	64130	3235027		2	C-FRAME M8N	C	N/A	N/A	C	N/A	I	I						
S451500	MITEK CANADA (NORTHERN TRUSS)	1	01/10/14	67710-501-575V	3228966	244	1	ROOFTRACKER II ASSY, BC PLATFORM, 575V	C	N/A	N/A	C	C	C	C	C	C	C	I	NO	C
S451500	MITEK CANADA (NORTHERN TRUSS)	2	01/10/14	31240-501	3228968		11	MATCHPOINT TABLE, FRAME ASSY	C	C	C	C	C	C	C	C	C	C			
S451500	MITEK CANADA (NORTHERN TRUSS)	3	01/10/14	31290-501	3251322		11	END EJECT ROLLER ASSY	C	C	C	C	C	C	C	C	C	C			
S451500	MITEK CANADA (NORTHERN TRUSS)	17	01/10/14	31238-501	3228989		44	10" PLANX BLANK ASSY MATCHPOINT TABLE	C	N/A	N/A	C	C	C	C	C	C	C			
1162760			01/16/14	64130	3243459		2	C-FRAME M8N	N/A	N/A	N/A	C	C	I	I						
S428708	TITAN TRUSS	1	01/17/14	89060-501	3203683	008	1	BLADE SAW ASSEMBLY KIT FOR REPLACING BLADE ON BLADE SAW	C	N/A	N/A	C	C	C	C	C	C	I	NO		
S428708	TITAN TRUSS	2	01/17/14	SB202KIT	3259279		5		C	N/A	N/A	C	N/A	N/A	N/A						
S428708	TITAN TRUSS	3	01/17/14	89555-501	3216753		1	WASTE CONV, INCLINE 230V, BLADE SAW	C	C	C	C	C	C	C	C	C	C			
S428708	TITAN TRUSS	4	01/17/14	89540-501	3203688		1	IN FEED RAIL ASSY, 20FT BLADE SAW	C	N/A	N/A	C	C	C	C	C	C	C	I	NO	
S428708	TITAN TRUSS	5	01/17/14	89065-501	3203690		1	BLADE AUTODECK, 10FT LG, 5 STRAND-20FT LUM, 230V	C	N/A	N/A	C	C	N/A	N/A	N/A	C				
S428708	TITAN TRUSS	10	01/17/14	89061-901	3205673		1	BLADE SAW SPARE PARTS KIT	C	N/A	N/A	C	N/A	N/A	N/A	N/A	C	N/A			
1162761			01/22/14	HF2522004	3243460		2	C-FRAME M8B													
S415523	WISCONSIN BUILDING	1	01/24/14	44310-501	3250805		13	PLANX RETROFIT, KIT 6"PLANX, 21"X28"C-C, RG, TBL	C	C	C	C	N/A	N/A	N/A	N/A	C				
S415523	WISCONSIN BUILDING	3	01/24/14	42185-510-240V	3243747		46	PLANX, 6 X 167-1/2", 240V, 3PH CE ASSEMBLY	C	N/A	N/A	C	C	C	C	C	I				
S415523	WISCONSIN BUILDING	5	01/24/14	68957-601	3243750		11	PLANX READY BLANK ASSY, 6 X 167-1/2"	C	N/A	N/A	C	C	C	C	I	C				
S415523	WISCONSIN BUILDING	7	01/24/14	42250-501	3243752		1	PLANX SERVO CONSOLE, MASTER	C	N/A	N/A	C	N/A	N/A	N/A	N/A	C				
S415523	WISCONSIN BUILDING	8	01/24/14	194534	3243754		1	PLANX SERVO SPARE PARTS KIT	C	N/A	N/A	C	N/A	N/A	N/A	N/A	C	N/A			
S415523	WISCONSIN BUILDING	10	01/24/14	44306-501	3250581		13	PLANX RETROFIE, WELD/T	C	C	C	C	I	I	I	I	N/A				
S415523	WISCONSIN BUILDING	11	01/24/14	44508	3272465		13	6"PLANX, 21"X28"C-C, RG, TBL PAINT RETROFIT TABLE	C	N/A	N/A	C	N/A	N/A	N/A	I	N/A				
S415523	WISCONSIN BUILDING	12	01/24/14	84678-501	3276771		7	CYLINDER, ASSEMBLY, AUTO EJECT, LONG, THROW	C	C	C	C	I	I							

TWICE-WEEKLY ORDER REVIEW SUPPORT OF FLOW MANUFACTURING

Ensuring products in the Flow Cell kept moving required systematic communication across Sales, Engineering, Purchasing, Production and Accounts Receivable. New orders are added to the bottom and work their way up and to the right

- C (green) = operation is completed and on-time
- I (yellow) = the order is currently at these operational steps and is on-time
- H (red) = the order is 'stalled' at this workstation typically due to late arrival of components from suppliers or internal cells, lack of information from Sales or Engineering, or production problems.

RESULTS

- Reduced manufacturing cycle time for the most popular kit product (MatchPoint Blade Saw) from 11 weeks to 6 weeks.
- Increased throughput of the MatchPoint Blade Saw from 35 per year to 60 per year.
- Decreased backlog from 14 months to 8 months even as demand grew.
- Increased 'Earned-to-Actual' labor efficiency from 55% to 85 - 90%.