



Tire Reinforcements Division SCM Project

**The Importance of Unifying
Planning and Scheduling with
Manufacturing Capabilities and
Its Successful Implementation**

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- **Hyosung Overview**
- **Business Pains and Solution Applied**
- **SCM with MES Integration**
- **Business Process Change**
- **Benefits**
- **Lesson Learned**
- **Steps Forward**

Hyosung Corporation Overview

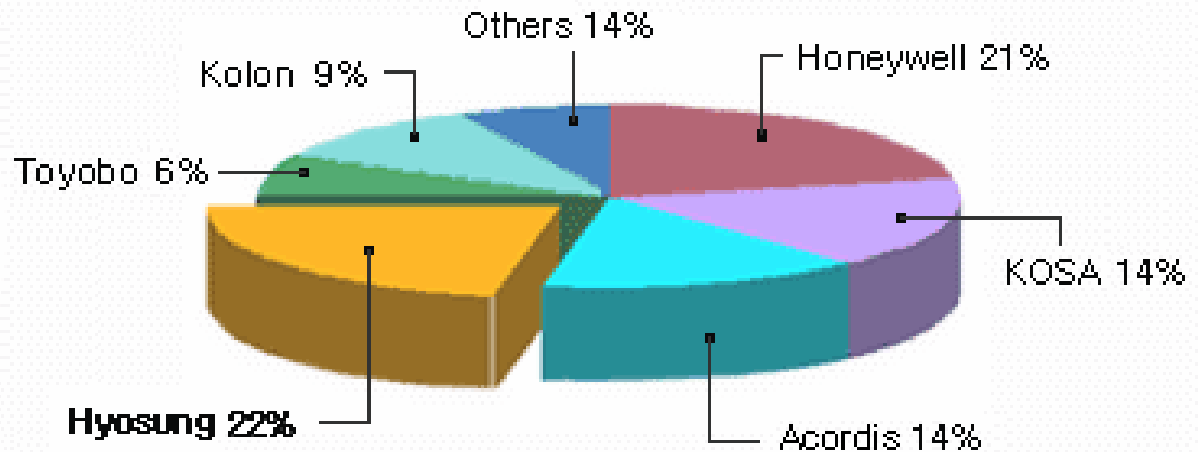
- Hyosung Corporation is one of the Korea's largest diversified conglomerates with combined revenue of over US \$ 4.06B in 2003.
- With over 35 year history in a synthetic fibers industry, Hyosung has established a global reputation for combining exceptional product quality/characteristics with industry benchmark production efficiencies.
- Hyosung now has 27 business divisions from fibers to trading and will continue to invest in and establish a leading global position in the following 5 industries: Tire Reinforcements, Spandex, PET Bottle, Banking Systems, and Power Transmission & Distribution.

Tire Reinforcements Division : Overview



- Revenue US \$ 429 M in 2003
- Worldwide top market share
- Products : PET/Nylon Tire Cord, Steel Cord, Bead Wire
- Manufacturing sites in Korea, China and US
- Globally supply to major tire makers : Michelin, GY, BS/FS, Conti etc.
- Complex operations and highly dependent demand

Top in the World (2003)
Industrial Polyester
Tire Cord Fabrics



Tire Reinforcements Division : Plant



Location : Ulsan Korea

Capacity

- **Steel Cord : 75,000 Ton/Year**
- **Bead Wire : 38,400 Ton/Year**
- **PET/Nylon Cord : 100,000 Ton/Year**

of Product (incl. SKU)

- **Steel Cord : 120 ea**
- **Bead Wire : 50 ea**
- **PET/Nylon Cord : 500 ea**



Business Pains

- Highly dependent demand to tire makers, though no date signal
 - Setup requirements in shop floor (max 6hr)
 - Alternate BOMs depends on machine groups
 - Planner made plan only with monthly total. Then production decided when they make what, without demand info.
 - Sales reps individually talked to production to reserve inventory or to push to get earlier shipment
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- ➔ Need detail demand plan with delivery date
 - ➔ Minimize setup
 - ➔ Need feasible schedule with each machine level
 - ➔ Share schedule with sales

Solutions

- Implemented MIMI ver 6.2 DM, SP, PS
 - Developed Sales Planning System separately
 - Diligent works for MIMI modeling to reflect change-over rules, alternative BOMs, work center preferences and other LP / DM configurations
- ➔ But unfortunately, system couldn't go live for long time.....

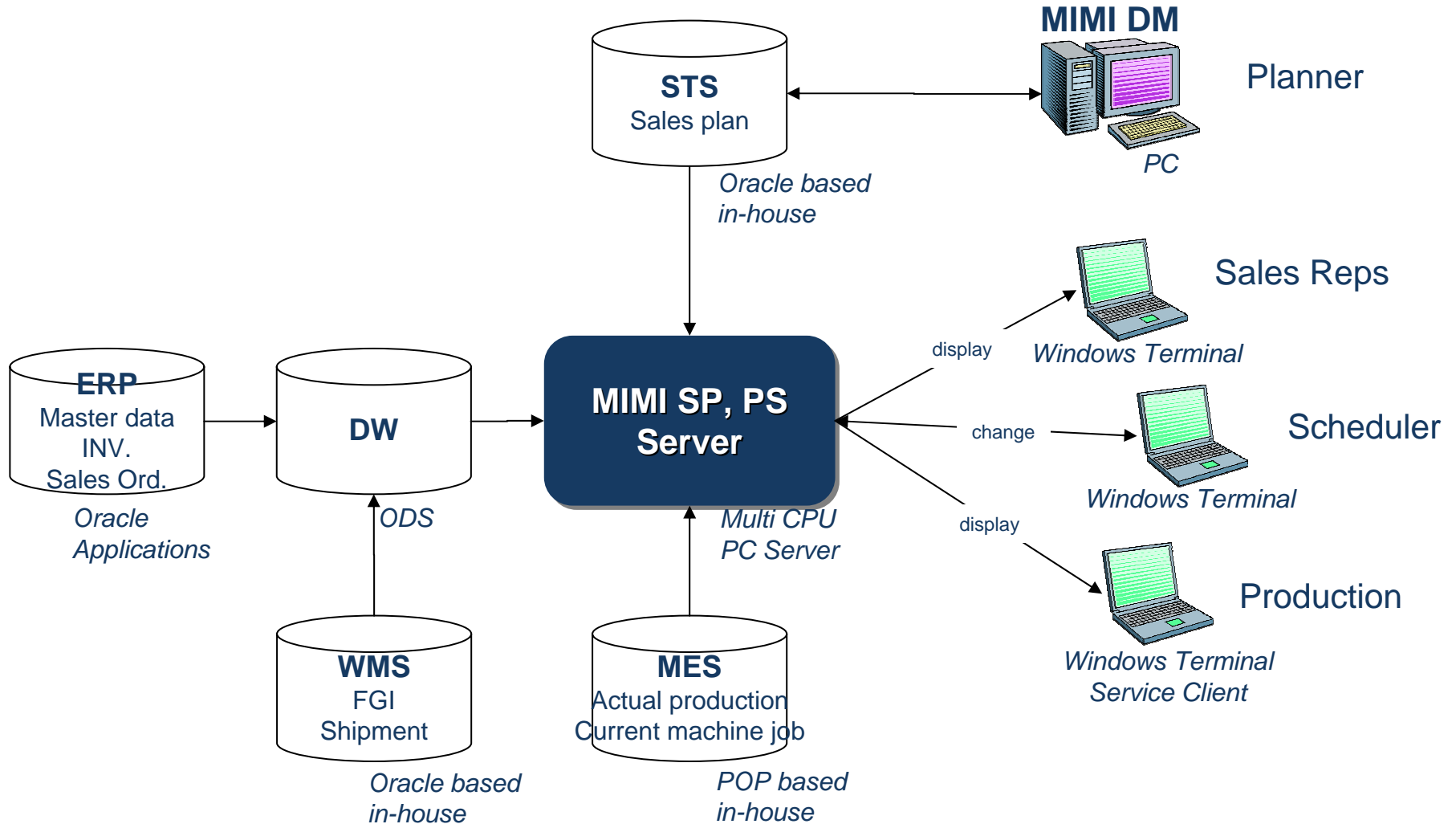
Remained Issues

- Economically optimized production plan was not accepted because plant was measured only by utilization & quality
- Good-looking schedule generated but never executed
 - ➔ Endless argues about schedule quality : which is better?
 - ➔ Snap shot plan (once a month) in such a detail (each machine level) was no longer valid because of demand change and actual production change
- Low system performance. Worst case it took 2 days
- Data issues
- Change management & process re-alignment
 - ➔ Organizational resistance to reserve control and extra capa.

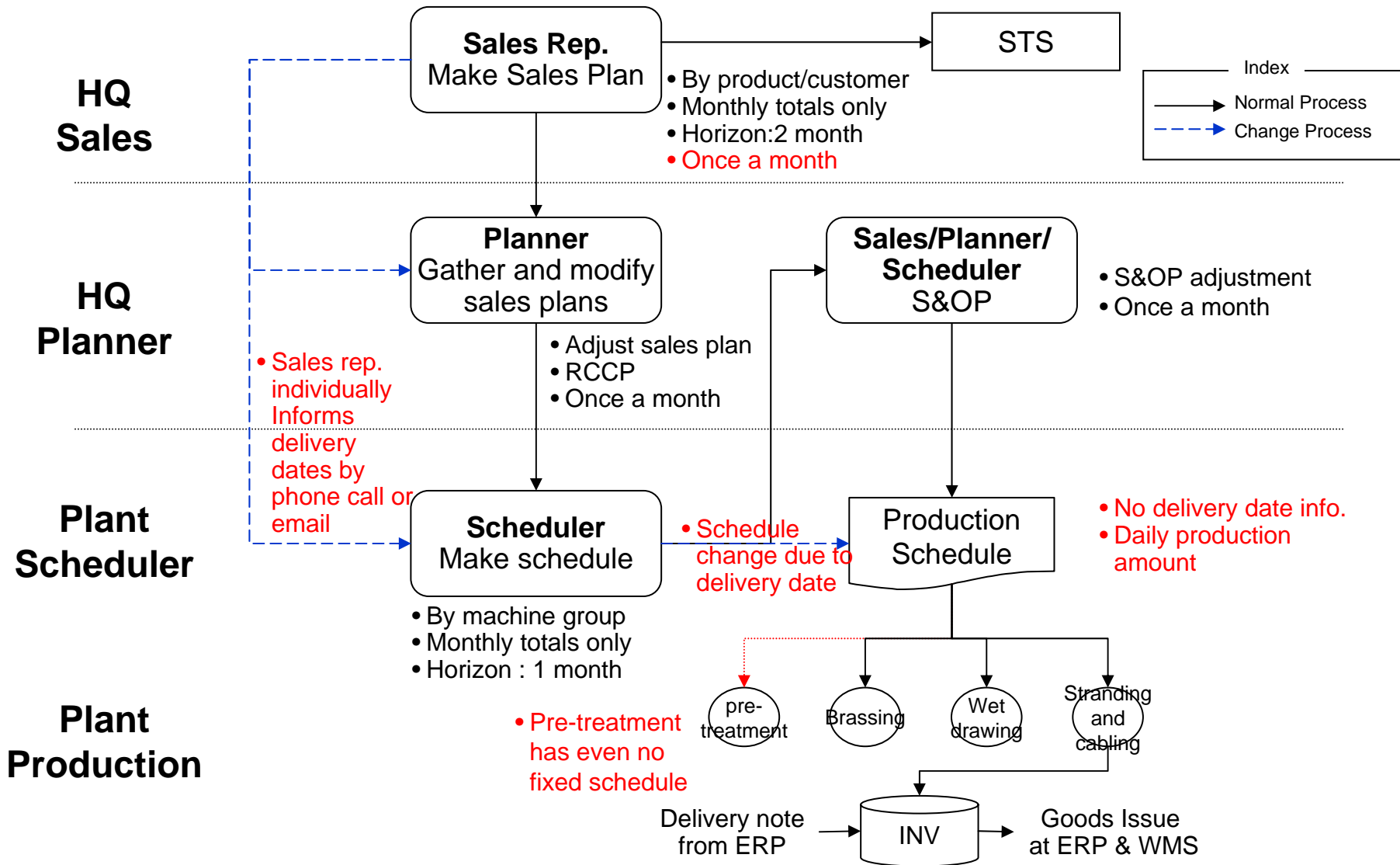
Approach : Tight Integration with MES

- Refined LP logic to maximize capacity utilization yet best product mix
- Proved MIMI schedule quality by thousands of simulation
- Integration with MES(POP) system and STS(Sales Target System)
 - ➔ Daily interface from STS to get most updated delivery dates
 - ➔ Daily interface from MES to adjust schedule after actual production changes
 - ➔ Daily rolling schedule with fully automated process
- Performance tuning. Now it takes LT 2 hrs...Thanks to Aspen
- Data cleansing
- Change management & process re-alignment

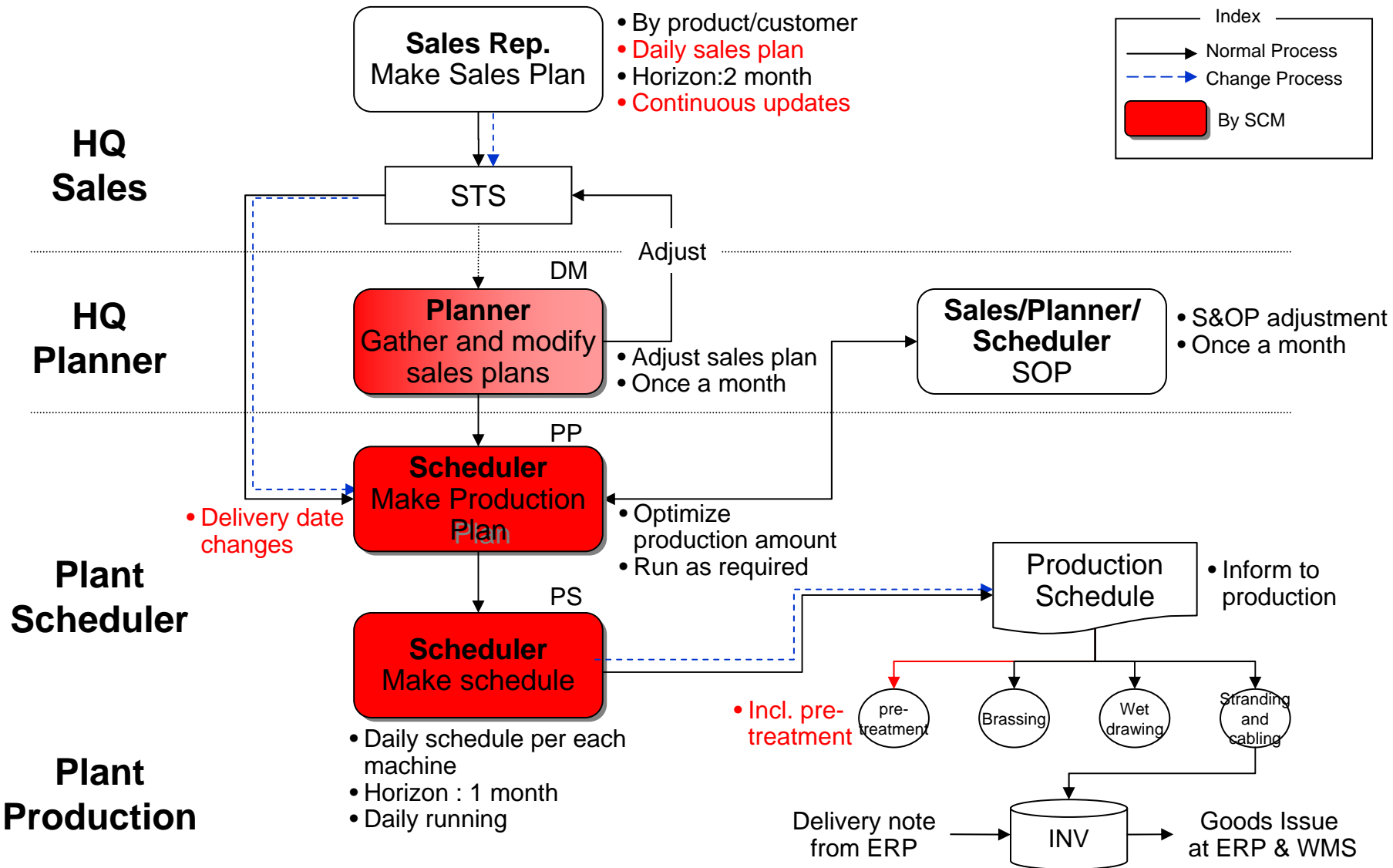
System Architecture



Business Process : Before SCM

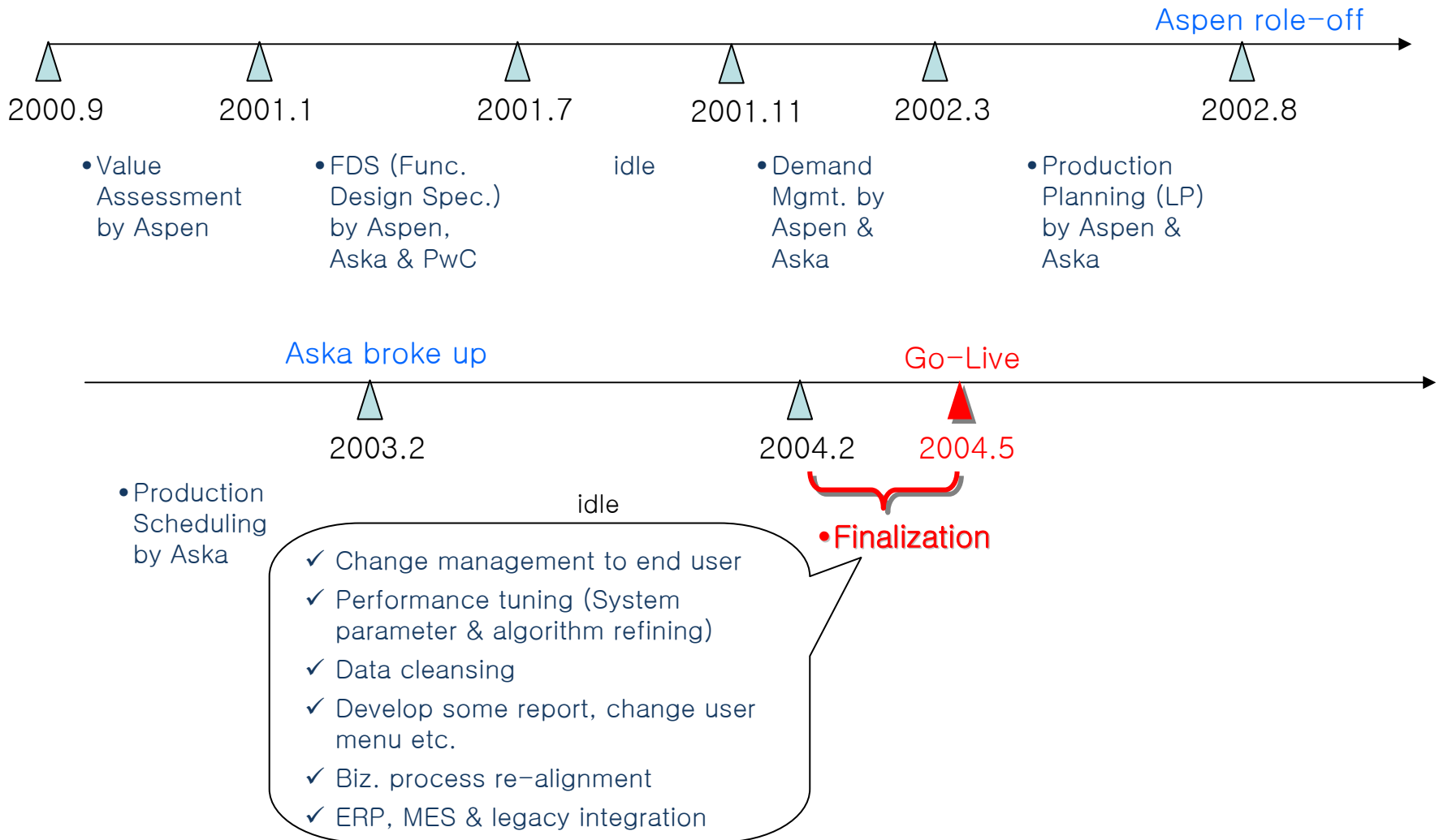


Business Process : After SCM



Project History

After long journey, system finally went live as of May, 2004.



Benefits : Qualitative

From an interview with plant scheduler

➤ **Production Schedule with Demand Information**

- Improved order fill rate
- Reduced production change due to delivery change during month

➤ **Higher Quality of Schedule with Low Work Load**

- Daily production control per each machine
- Reduced work load of scheduler
- Even in emergency situation, scheduling rework is much faster

➤ **Improved Visibility**

- Shared schedule provides good communication basis between plant and sales
- Easier to adjust delivery dates for sales reps since he can foresee 1 month horizon with details

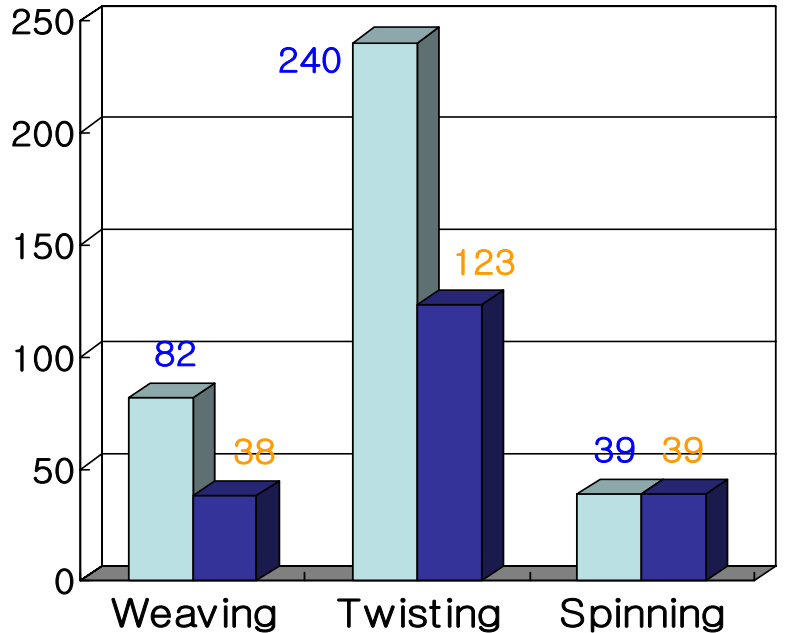
➤ **Tight Inventory Management**

- Inventory level reduced from 2 month DOS to just 5 days because of market demand (*unfortunately not 100% because of SCM*)
- No big troubles under such a drastic reduce of inventory level

Benefits : Reduced Change over

Actually SCM helped to reduce number of change-overs

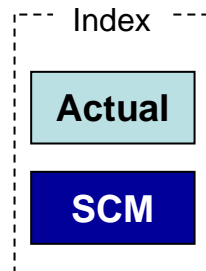
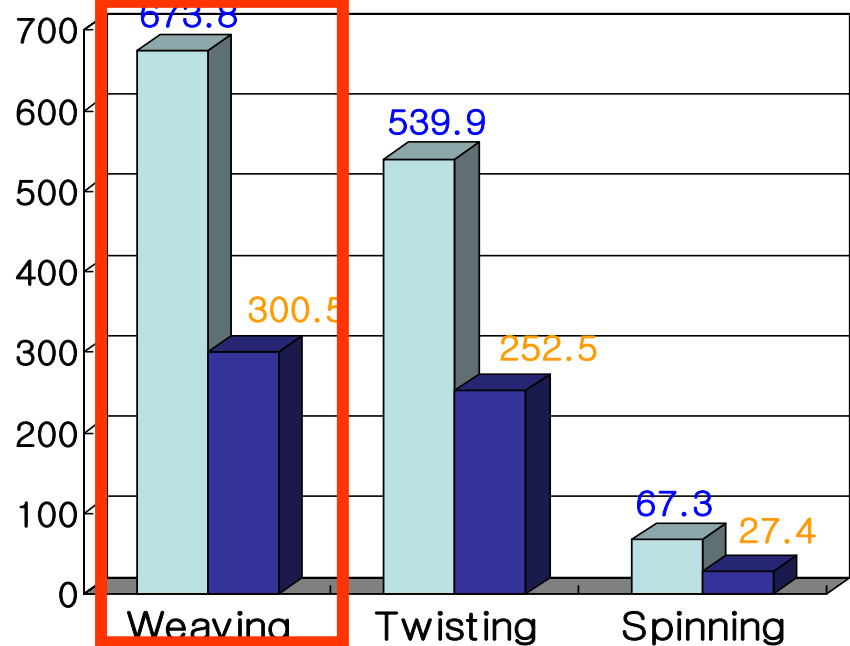
<# of change over>



Unit : Times

	WV	TW	SP
Actual	82	240	39
SCM	38	123	39
Chg.%	▼53.7%	▼48.8%	-

<Total change over time>

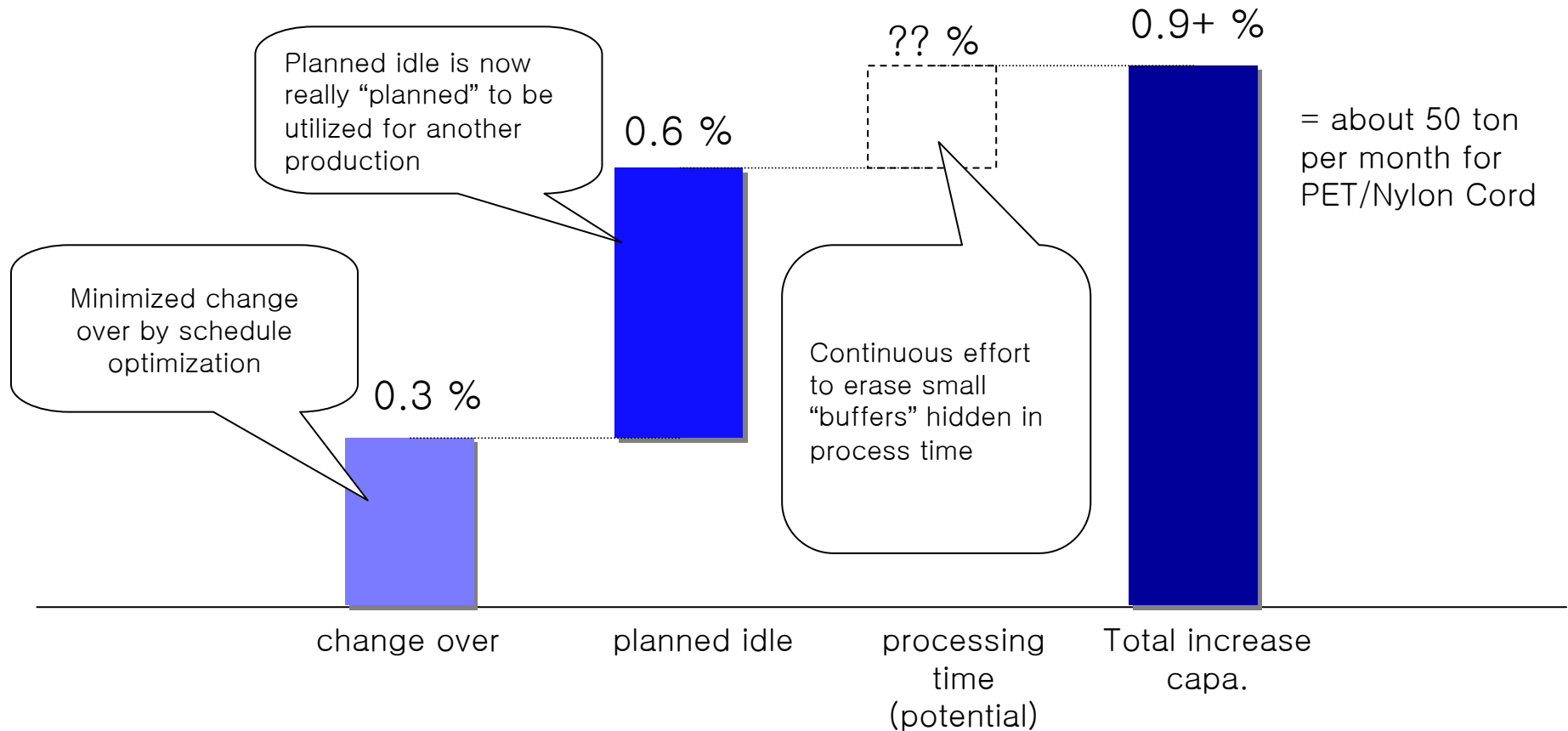


Unit : Hr

	WV	TW	SP
Actual	673.8	539.9	67.3
SCM	300.5	252.5	27.4
Chg.%	▼55.4%	▼53.2%	-

Benefits : Increased Capa.

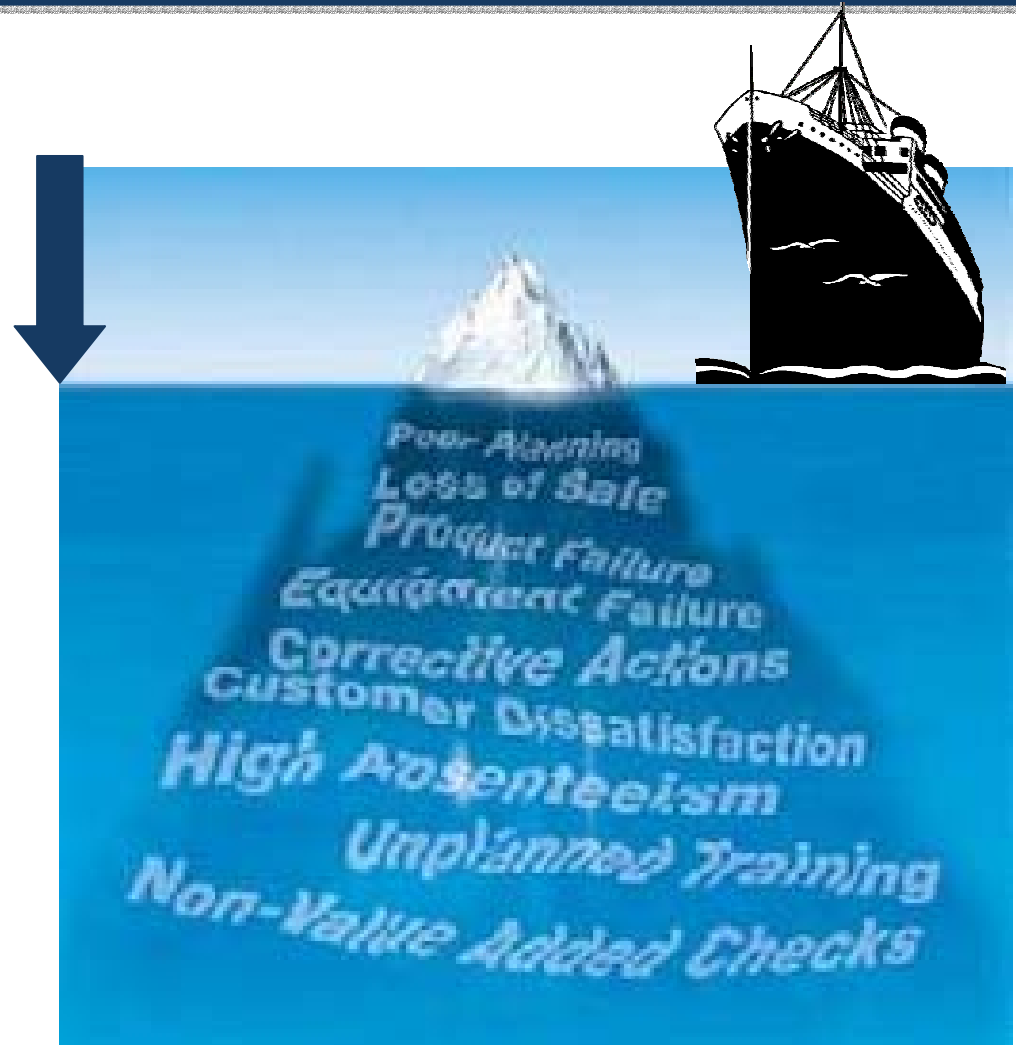
Under recent high demand market, SCM helped to find hidden capacity from change-over, planned idle and process time



Project Challenges

*Reduced INV,
Increased level of control*

Real challenge of project was willingness and encourage of organization to face revealed problems once hidden below inventory buffer or poor level of control.....



Lesson Learned

- In this type of industry with high production / demand volatility, SCM scheduling should be tightly linked with MES and Demand system
- Unified detail schedule provides good fundamental to find and improve hidden costs
- Doing SCM is not installing mathematical model to one's PC, it is changing ways of working thru organization
- Every project dealing with process changes, top management should be involved with intention.....and he/she knows the truth by instinct
- Once project went wrong direction, correction is really hard. Draw right pictures from the beginning.

Steps Forward

- Global planning optimization in 2005
- CPFRR with major tire makers (first with domestic players) in 2005
- Post project audit to measure achieved benefits at the end of this year
- Started 2nd MIMI project for PET Bottling Division from May