



# ***Improving Plant Efficiency and Quality Using Automation***

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Reliance Industries

# Reliance Group - An Overview

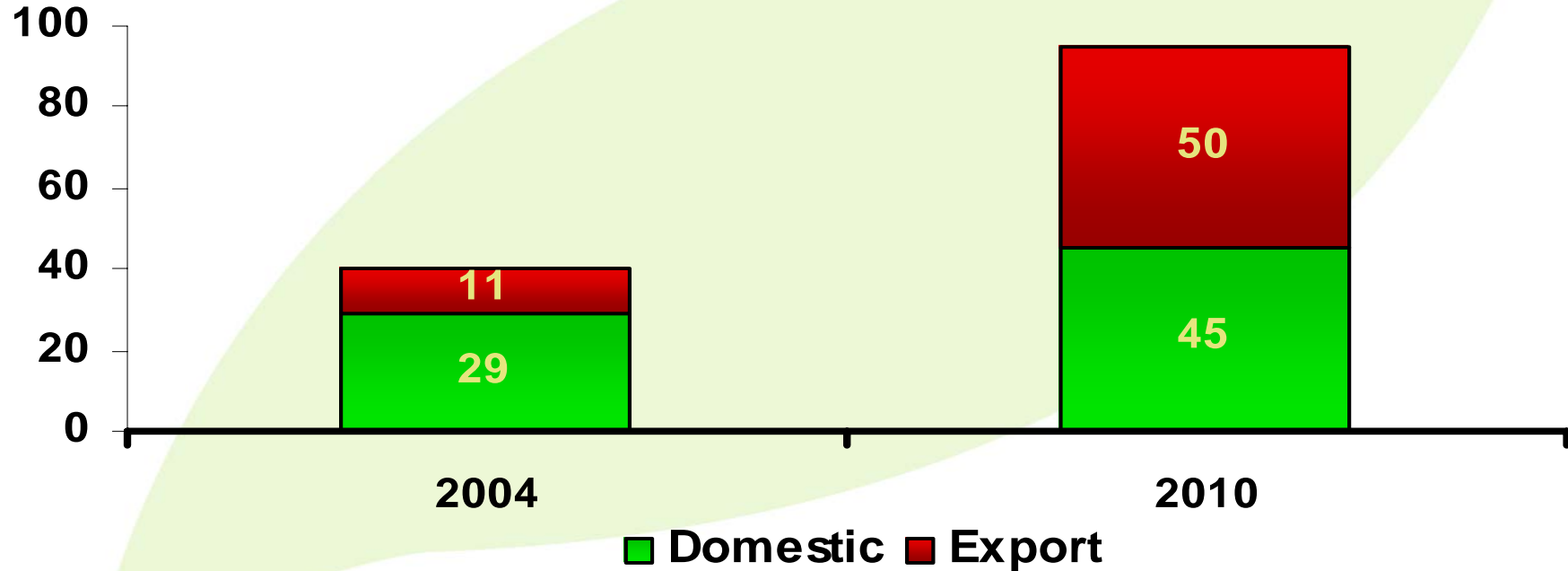


## Textile Industry Contributes

- **5% of GDP**
- **14% of industrial production**
- **21% of work force**
- **20% of export earnings**

**Employs around 35 million people**

# Indian Textile Industry



Exports to grow at a CAGR of 29%

	USD Billion
Revenue	16.7
Net Profit	1.7
Cash Profit	2.6
Exports	5.8
Market Cap	18

**India's largest private sector enterprise**

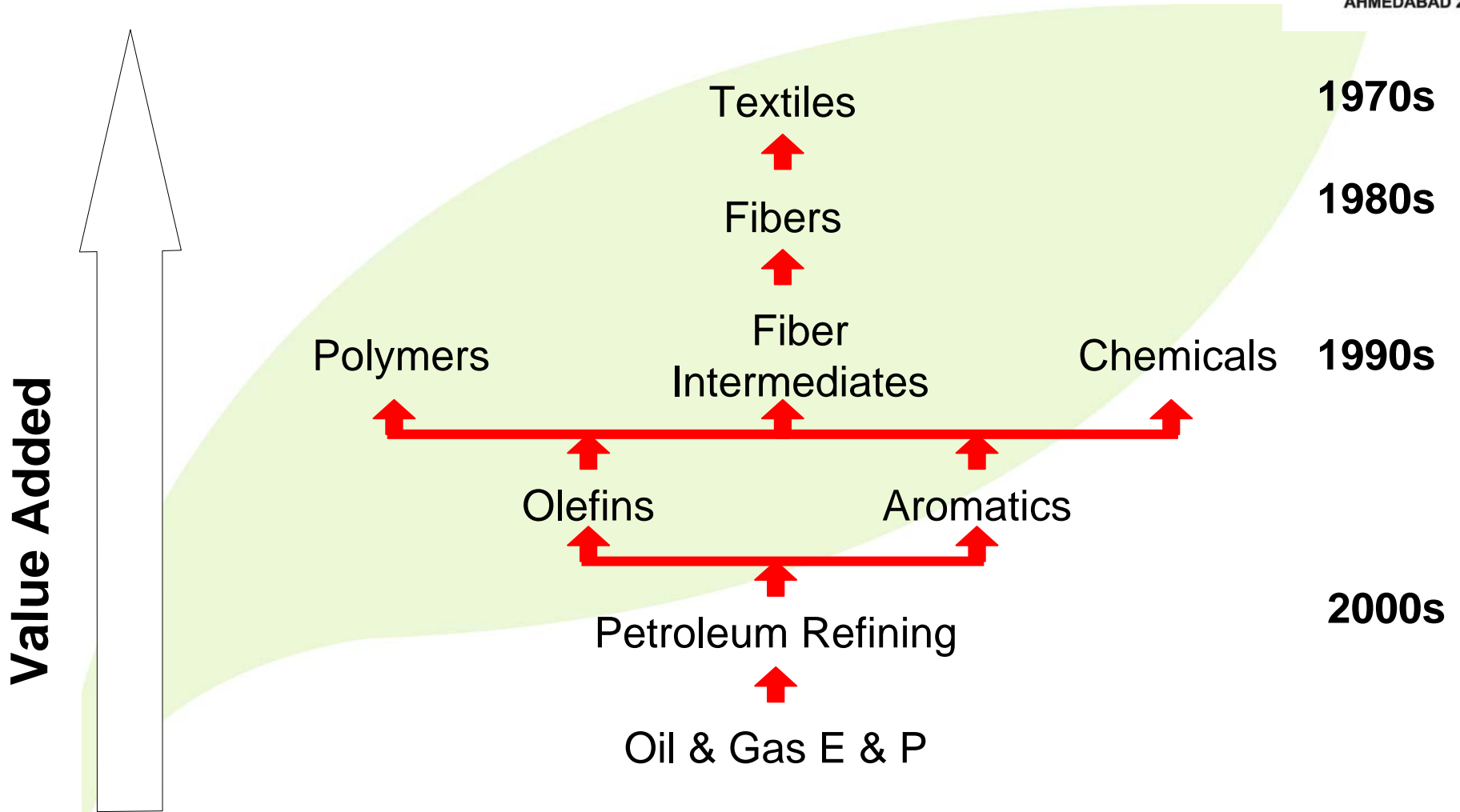
# Historical Growth

CARG	Since 1977 (%)	Last 5 years (%)
Revenues	30	36
Net Profit	34	26
Assets	34	22
Market Cap	42	25

1977 is the year of IPO

**A track record of sustained high growth rates**

# Corporate Strategy



**Backward vertical integration has been the cornerstone**

# Global Ranking: 2005

Product	Rank	Mn Tons
		Capacity
POY/ PSF	1	1.7
PTA	6	1.3
MEG	5	0.8
PX	3	1.8



**Global leadership in all major product lines**



**“To continuously grow on a sustainable basis and be the largest, the most innovative, the most profitable and the most admired polyester producer in the world”**

# Reliance Polyester Capacity



**2 million tonnes (2006)**



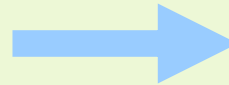
**Reliance touched 1 million ton mark in 2002**

**10 KTA (1982)**

# Major Polyester Manufacturers

## Yesterday

- DuPont
- Hoechst
- ICI
- Rhone Poulenc



## Today

- Reliance
- Nan Ya
- Far Eastern
- Yizheng

## Reliance Industries Limited

### Quality Policy

We at RIL are committed to total customer satisfaction in terms of quality and services for the entire range of our products. Our continued commitment to excellence and innovative efforts help us stay ahead as market leaders



Mukesh D. Ambani

- Six Sigma quality management
- ISO 9002 Certified
- Labs for quality control and process control
- Processing facilities for applications & customer support
- Product development support

## Total Customer Satisfaction

- To support such a growth scale and to do it effectively by increasing operating efficiencies and product quality AUTOMATION is a must.
- Business processes involves key processes, support processes and sub-processes. Typical business processes include
  - Procurement
  - Product development
  - Production
  - Order delivery
  - Distribution
  - Customer support

# Automation helps to

- Receive customer order through SAP.
- Plan raw materials through SAP.
- Measure usage of raw materials.
- Sense, monitor , compare and correct the process parameters of the chemical and physical processes involved.
- Sense online quality measurement and integrate with offline measurement and use for product grading and release.
- Store and despatch product.

# Automation also helps to



- Monitor machine reliability/run hours/uptimes/vibration levels.
- Based on PM schedules through SAP indicate which machines are to be stopped/ spare parts changed/overhauled.
- Define manpower requirement based on machine reliability.
- Processes can be monitored from any remote location through use of interfaces and data transmission ,helps in reducing manpower.
- Manpower productivity can be measured and , every unit of product can be identified by the crew which produced it.this can also be used to define training needs of operating persons.



- Monitors receipts based on flow meters, tank level indicators, weighbridges, updates using SAP system
- Monitors daily/hourly usages using plant instrumentation. Gives feedback to SAP.
- Controls usage based on product requirement
- Gives warning if usage ratios are deviating.
- Raises purchase requisitions if stock is depleting based on desired stock levels.



- Processes can be chemical or physical in nature.
- Chemical processes will involve reaction rates / absorption / evolution of heat / phase separations.
- Physical processes will involve flows, mass transport / heat transfers. separation with settling, centrifuging, leaching, distillation etc.
- All these can be efficiently measured and controlled using automation and auxiliary tools like model simulations, image comparisons

- Automation can measure quality on line and do product gradation.
- It can take offline quality releases and integrate it with process automation and grade the product produced today where
  - raw material was put into process at earlier time periods.
  - there was some deviation from a desired value in any point in process during the production period.
- Based on results and statistical analysis it can tell whether overall process or parts of it are stable or not.
- By integration of Laser systems even Visual checks can be done on products.

Based on lab releases and product volumes and data on storage

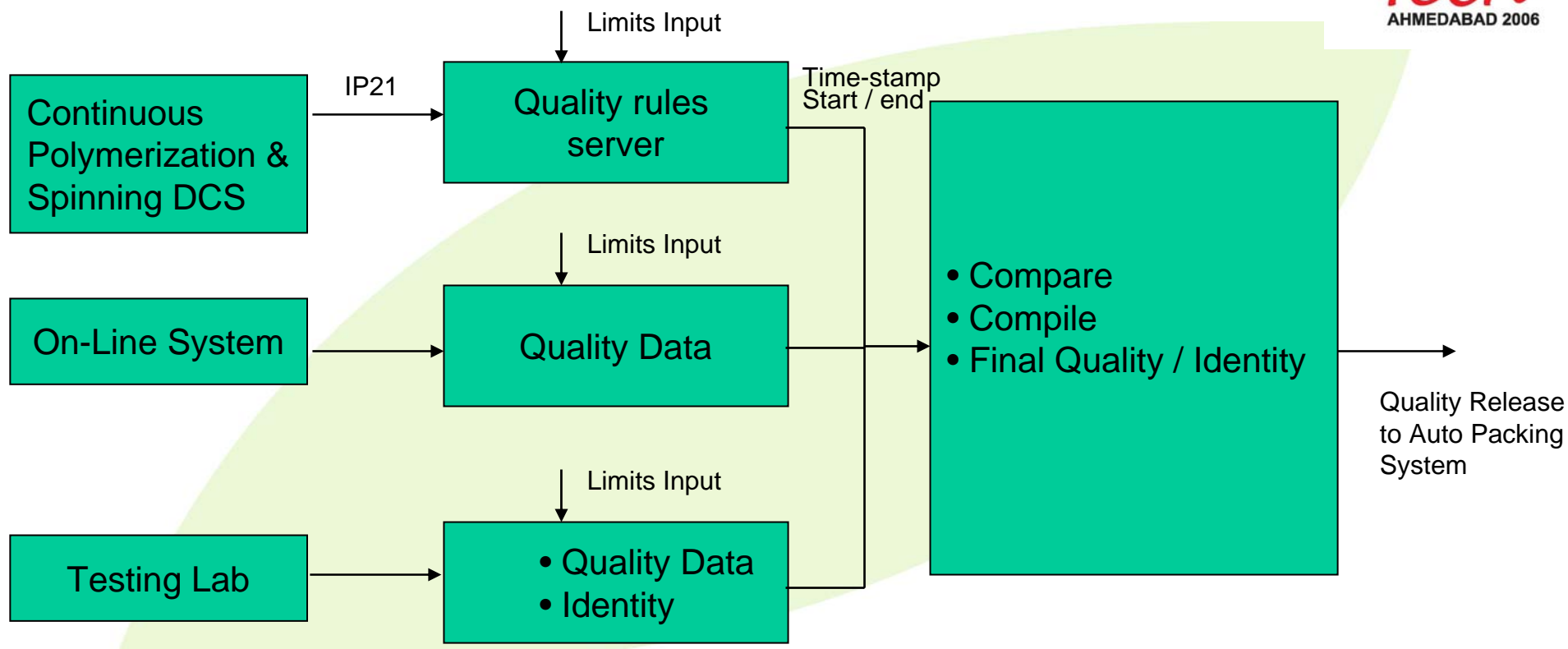
Automation can

- Move the product to areas and keep track of the product.
- Automatic stacking and retrieval systems-ASRS- As order comes in it can from the order, decide what product to be picked up and knowing the location, pick it up and take it to despatch, pack, box, wrap, palletise, and take it to despatch gantries for sending out by truck/rail or containers as the case may be.
- Keep an inventory and give alarms on low / hi stocks / non moving products etc.

- Measure usages- raw materials, energy, water, products and by products produced, wastes generated.
- Calculate efficiencies based on usages of raw materials, energy, spare parts, machine run hours.
- Point out steps in process which are main weak points in terms of usages etc.
- Benchmark between various sites finding the most suitable operation.
- Inventory control in terms of raw materials, products, additives, packaging materials ,stores and spares.

- Gradation without subjectivity.
- Gradation not subject to “**Chal jayega**” syndrome
- Untouched by human hands, no oil stains / fingerprints; No mix-ups of different grades of products.
- Process parameters monitoring can be used for product gradation even in absence of online monitoring-use of soft sensors.Product by Process can be really implemented.
- Product traceability; All history of processes and Lab releases available, product can be traced to its origin even when it is consumed at customer.

# PROCESS – MONITORING IN RELIANCE POLYESTER



- IP21 protocol to send process data from process - DCS on continuous basis.
- Quality rule book to be defined by operator.
- Quality routine to be run in server to determine the quality segregation.
- Quality server to indicate the time stamp for quality segregation and grading.
- Use the time stamp and unique doff numbers on m/c for product segregation.

- Monitoring of processes for eliminating reasons of Quality defects.
- The product released by such integrated system can
  - accept Increase in texturing machine speeds
  - has reduced texturing breaks
  - has reduced OLT rejects
  - reduced customer complaints.
- Product by process is capable of eliminating routine lab testing.
- Improvement in product quality / consistency.
- Reduction in testing waste.
- Improved packing system utilization.
- Effective predictive maintenance for process pumps, ceramic guides, finish applicator tip changes etc.
- Improved product image and premium on products.



The system consists of the following main areas:

- Doffing system
  - Bobbin processing, inspection and Laboratory areas
  - Interim Storage area
  - Packing area
- 
- POY Bobbins are received from Winder through Auto Doffers.
  - Transported to Automated Testing Machines through Shuttles.
  - Bobbins are stored on intermediate storage carousals.
  - Auto Release System - bobbins are unloaded automatically and placed on respective conveyors to Carton or RU packing.

# APHS

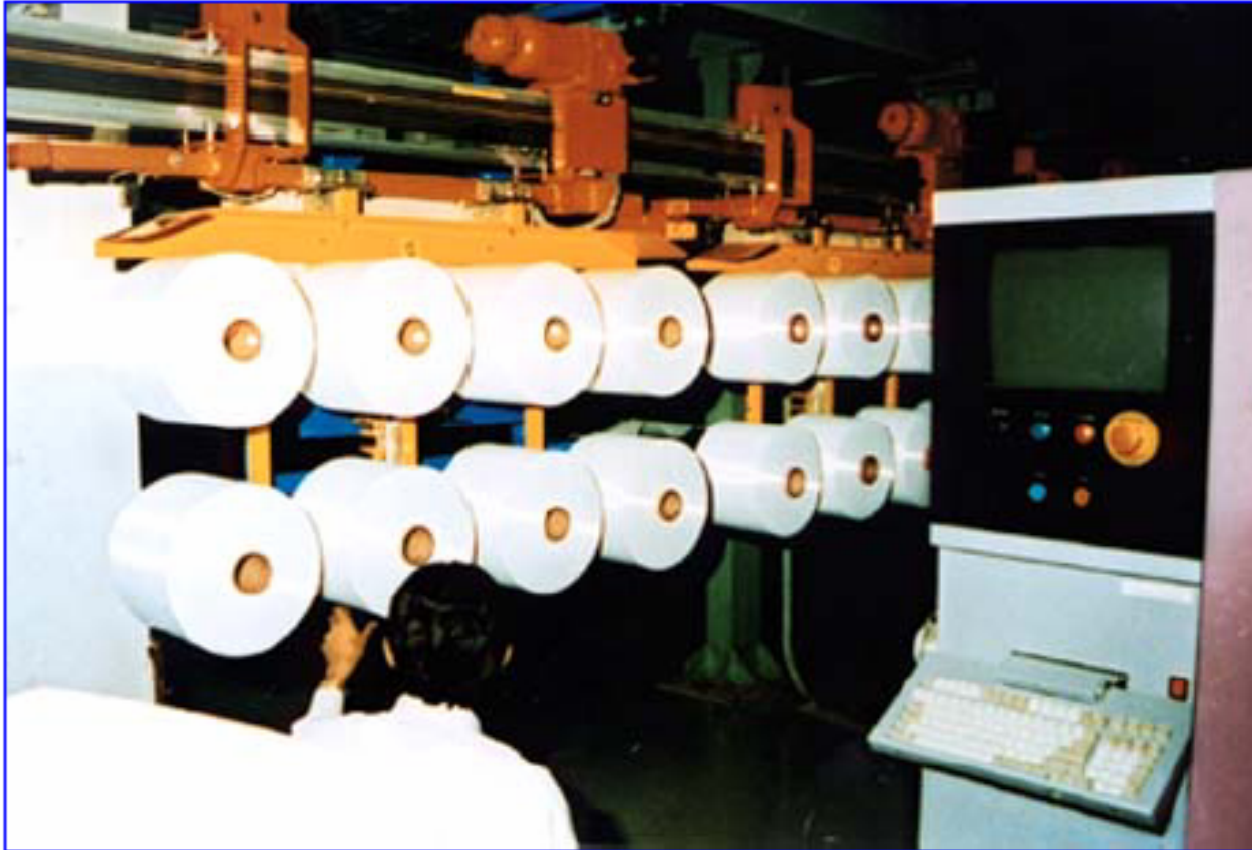
## Automatic Product handling System



*Salmoiraghi Automatic Doffers in operation*

# APHS

## Automatic Product handling System



*Bobbin-transport Shuttles in the existing Hazira Plant Textile Laboratory*



# APHS

## Automatic Product handling System



*Typical Bobbin Transfer Station*

# APHS

## Automatic Product handling System



*Three-tiered Carousel Tower installed in the existing Hazira Plant*

# APHS

## Automatic Product handling System



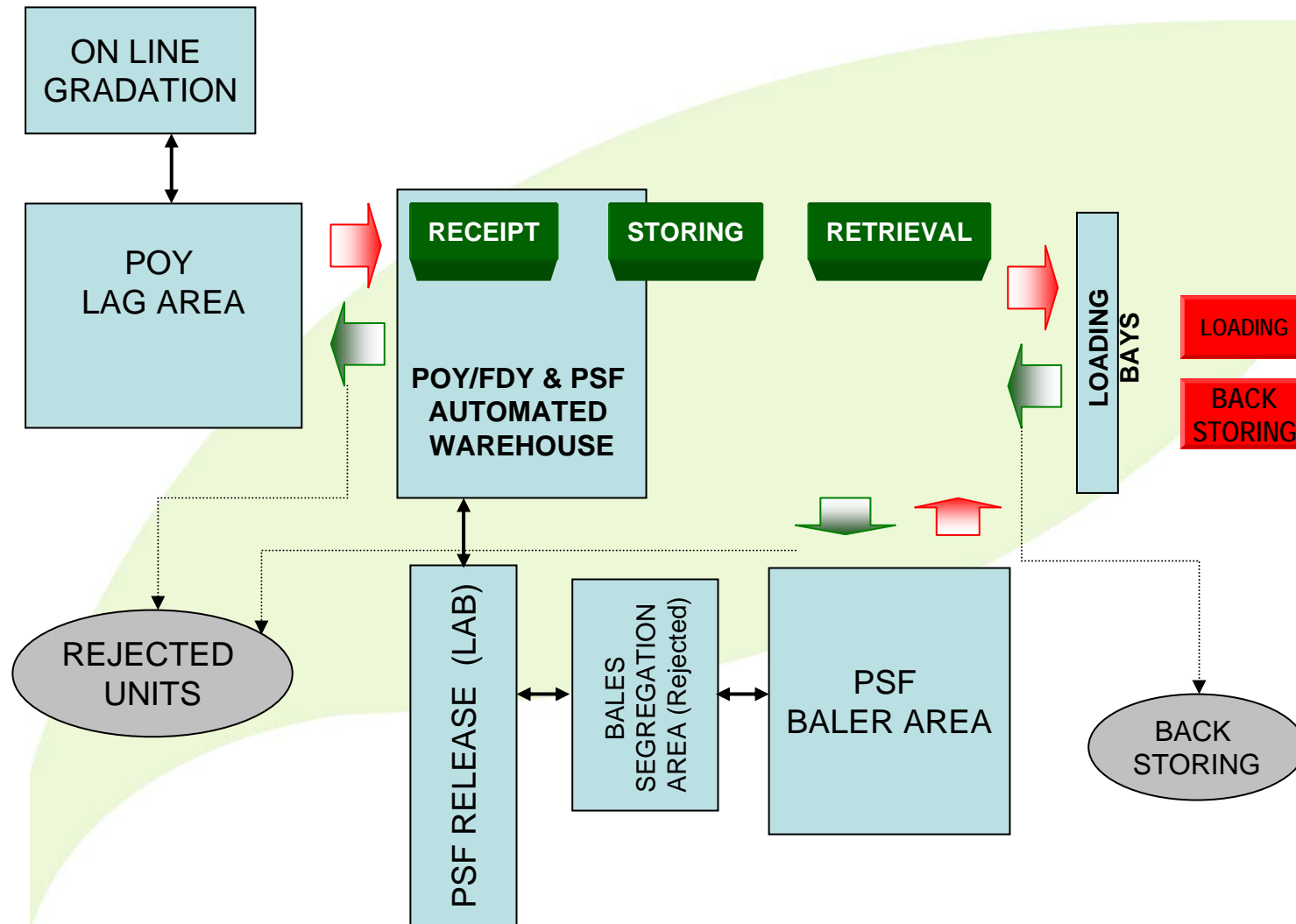
*Film-bagging machine*



# TRANSPORT UNIT

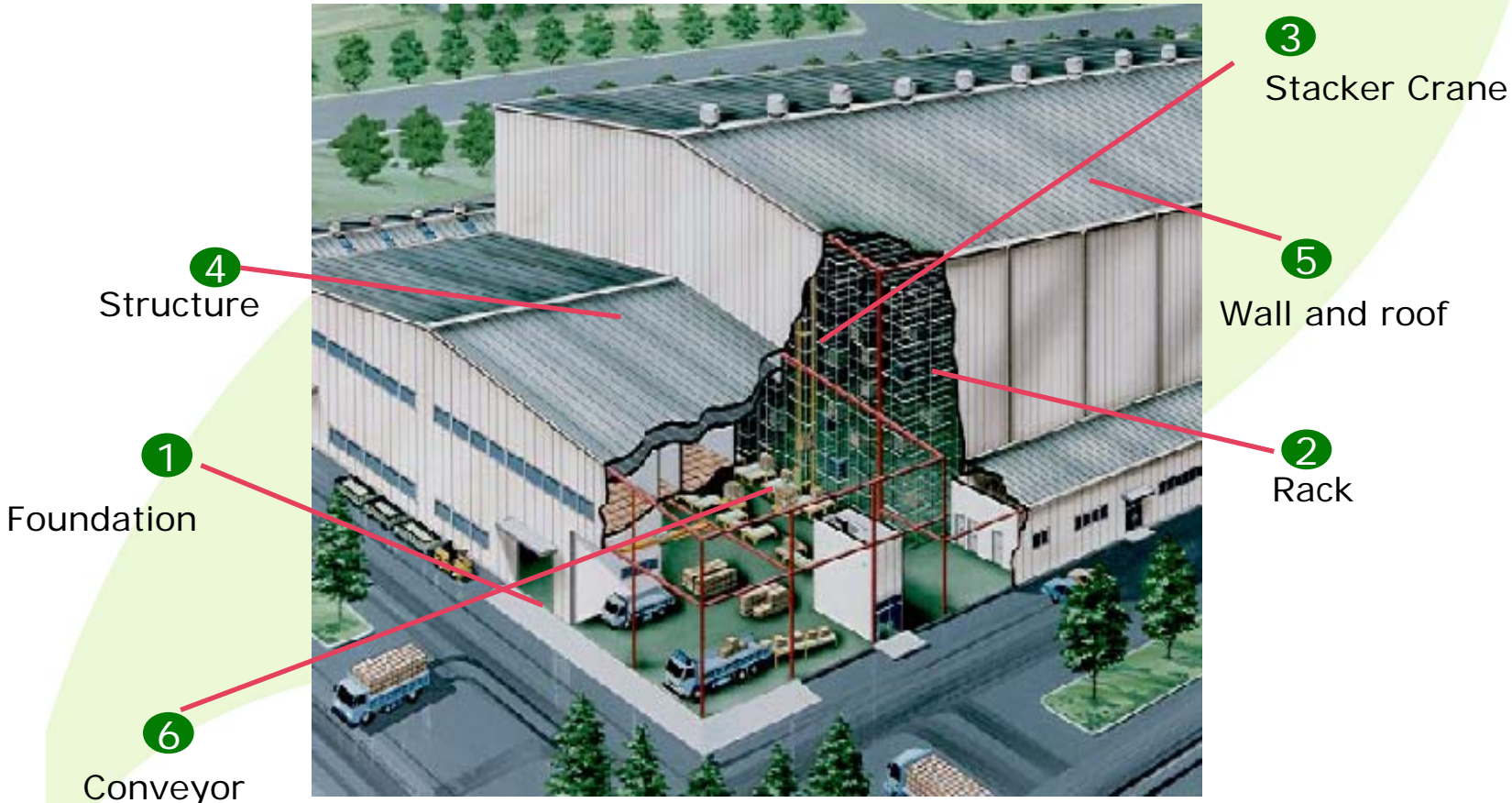


# Auto Ware House – Flow Diagram

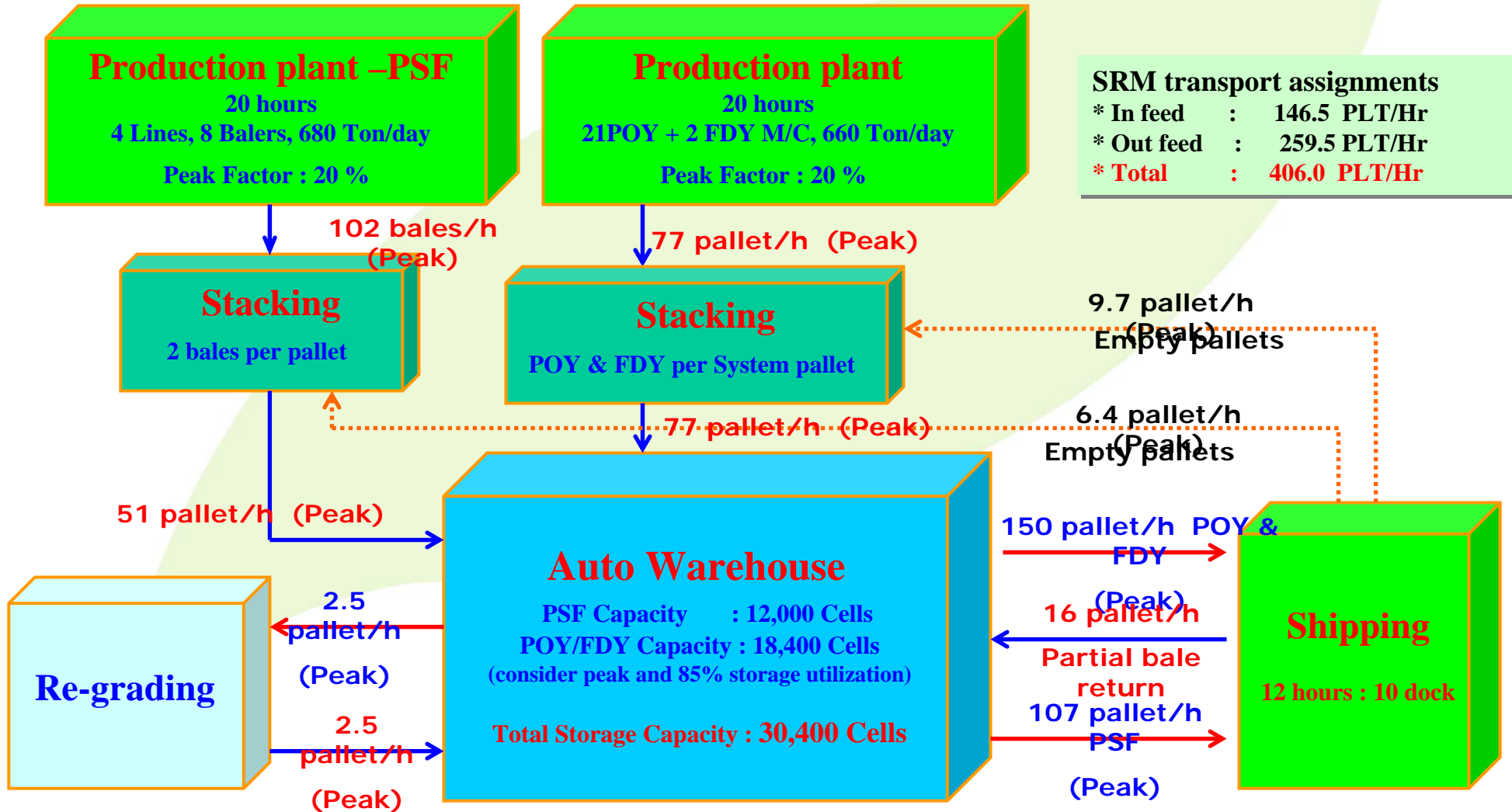




# EXTERIOR VIEW - AS/RS



# Material Flow Diagram –Auto warehousing (Peak)



## Concluding

Automation in Industry helps to improve efficiencies and quality

- By sensing
- By monitoring and comparing
- By predicting and controlling

Thanks