

Solid State Lighting US Manufacturing Trends

John Tremblay | May 2014 | Manufacturing R&D Workshop May 2014



OSRAM Business Units

Revenues €5,288.7 million

Opto Semiconductors	Lamps	Light Engines & Controls	Specialty Lighting	Luminaires	Solutions
 	 	 	 	 	 
<ul style="list-style-type: none">- LED components- High-power laser diodes- Infrared components	<ul style="list-style-type: none">- Halogen lamps- Energy saving lamps- High-power discharge lamps- Low-pressure discharge lamps- LED retrofit lamps	<ul style="list-style-type: none">- Traditional control gears- SSL drivers, modules, light engines- Light management systems	<ul style="list-style-type: none">- Automotive (forward exterior lighting, signal exterior & interior lighting)- Display/optic- Lamps for special applications	<ul style="list-style-type: none">- Luminaires for professional and private applications- Torches, table lamps etc.	<ul style="list-style-type: none">- Customer-specific solutions, e.g.: frontage illumination

> 120 countries where OSRAM had operations at the end of the fiscal year 2013

OSRAM

US Locations

- 7 Manufacturing Plants, 3 SSL
 - Exeter NH – LED Components
 - Hillsboro NH – Automotive SSL
 - Versailles KY– Fixtures and Modules
- 3 Additional Locations
 - SSL HQ Americas - Danvers MA
 - SSL Development - Danvers MA
 - Research – Beverly MA



US Manufacturing Trends

Discussion points & Indicators

Time April 2013



“Manufacturing is Back – But Where are the Jobs?”

Post-recession, U.S. manufacturing growth is outpacing other advanced nations*;

- 500,000 manufacturing jobs created in the USA over the past three years
- U.S. factories access to cheap energy, (oil and gas from the shale boom)
- Energy and resource-intensive industries do better
- New made-in-America economics is centered largely on cutting-edge technologies
- New US factories are “superautomated” and heavily roboticized;
- Employees typically are required to have computer skills and specialized

**Manufacturing Returns to USA (Jobs Not So Much)
by Barry Ritholtz - April 12th, 2013 ¹*

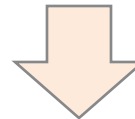
Agenda

Trends in SSL Manufacturing & impact in the US



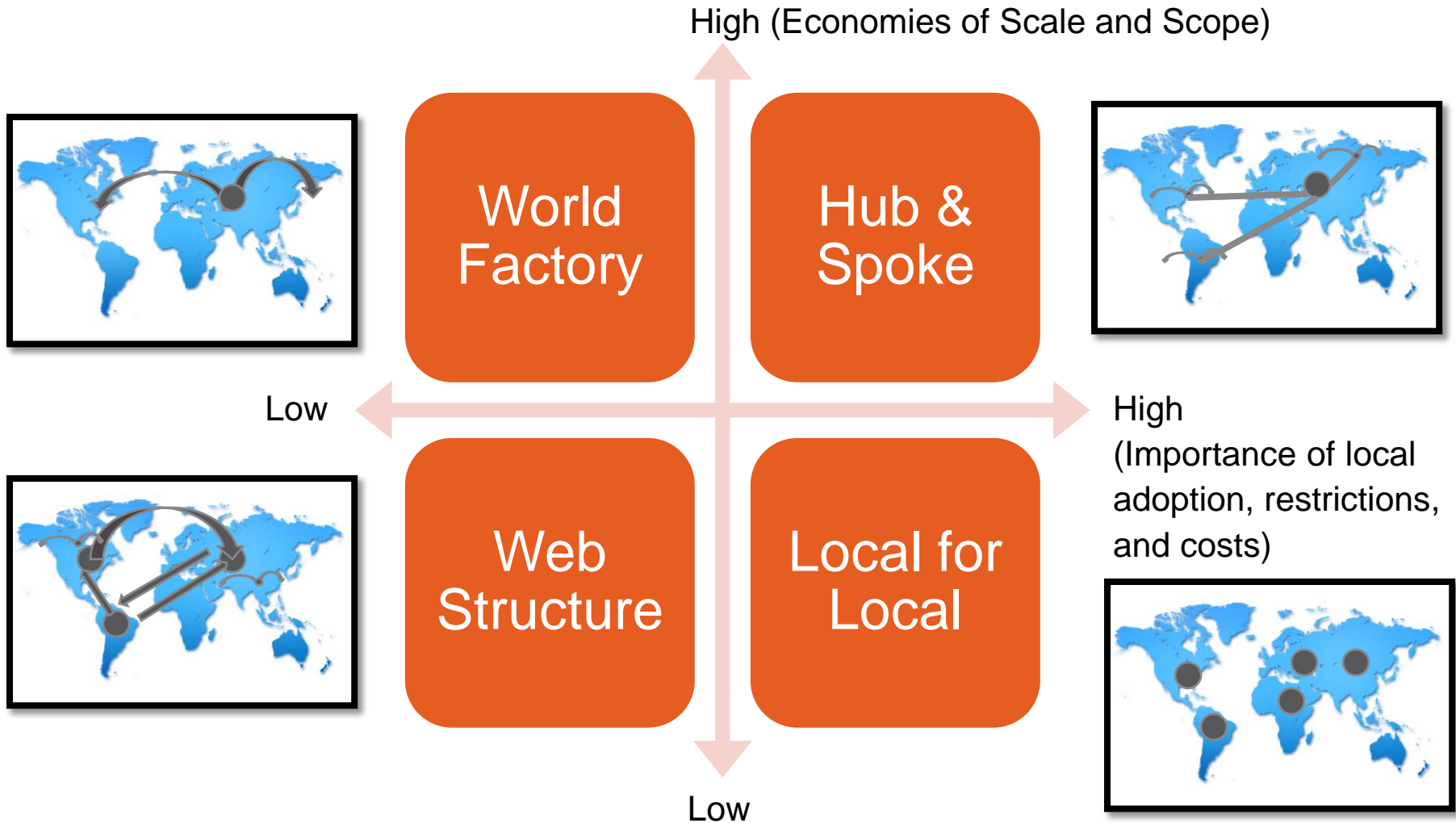
Topics

- Manufacturing Models
- US Manufacturing Trends
- Energy Savings Model



- Levers impacting SSL Manufacturing in the US

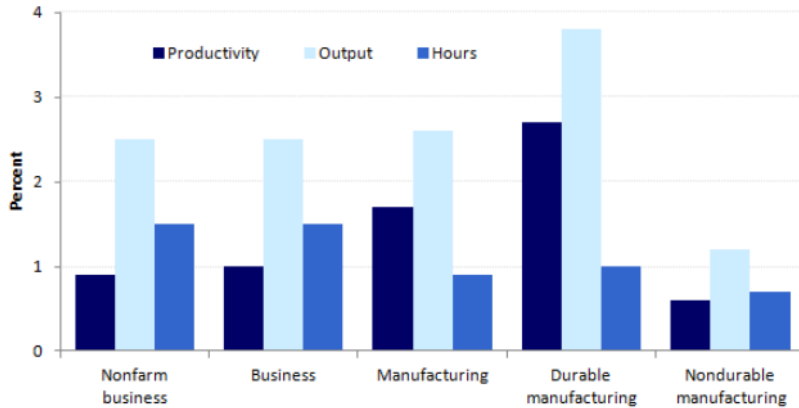
Manufacturing Models



US Manufacturing Issues

Discussion points & Indicators

Percent change in productivity, output, and hours from first quarter 2012 to first quarter 2013, preliminary



Source: U.S. Bureau of Labor Statistics. ²

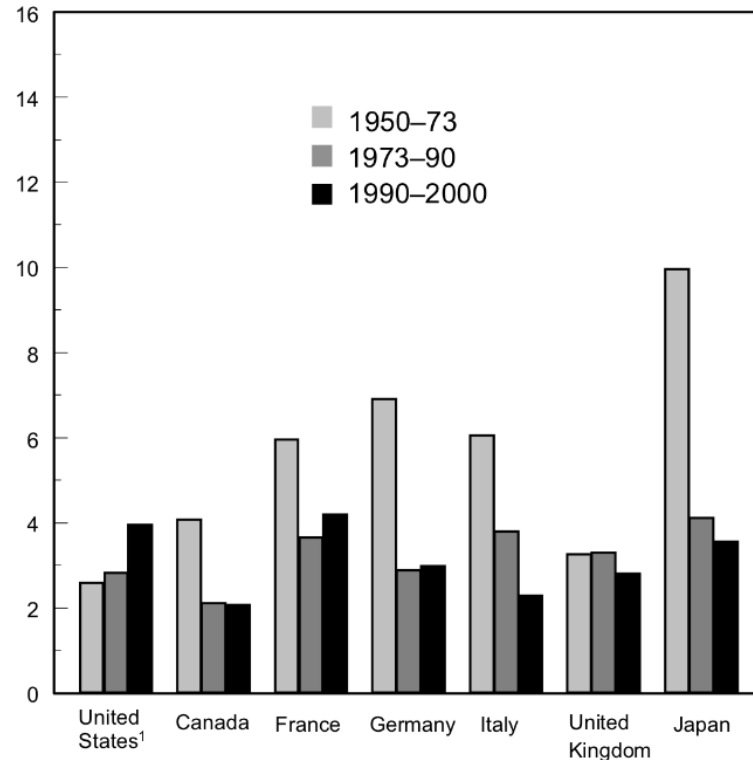
Productivity, Output, and hours

Q1 2012 to Q1 2013

- Productivity up
- Output up
- Hours up

Average annual growth rates (percent)

Panel 1. Productivity

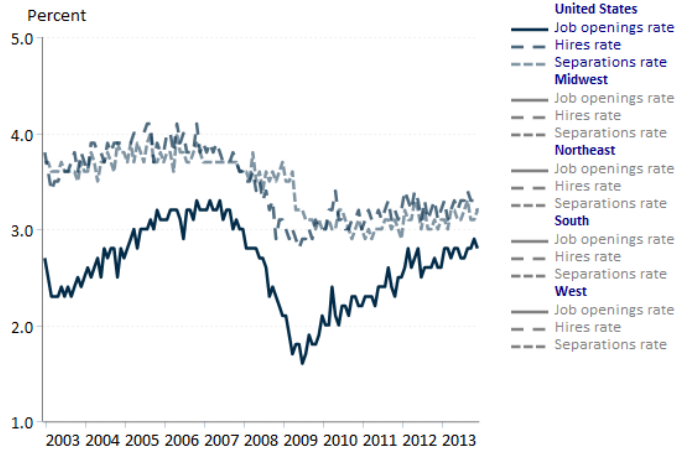


Comparing 50 years of labor productivity in U.S. and foreign manufacturing
 Aaron E. Cobet and Gregory A. Wilson³

US Manufacturing Issues

Discussion points & Indicators

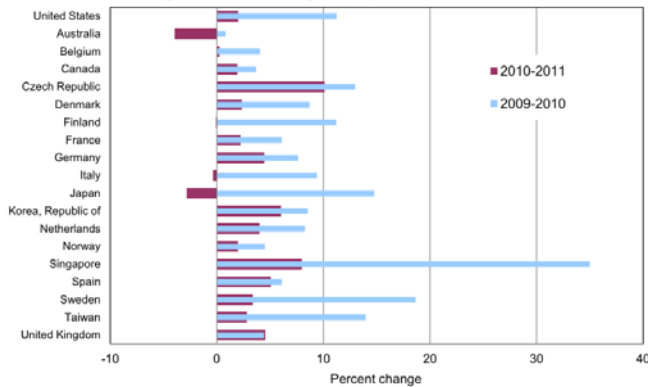
Job openings, hires and separations rates by region, seasonally adjusted, January 2003-December 2013



Source: U.S. Bureau of Labor Statistics.
Click legend items to change data display. Hover mouse pointer over lines to view data.



Chart 3. Percent changes in manufacturing output per hour



Job Opening Rate in US

2013 back at 3%

Changes in Output per Hour

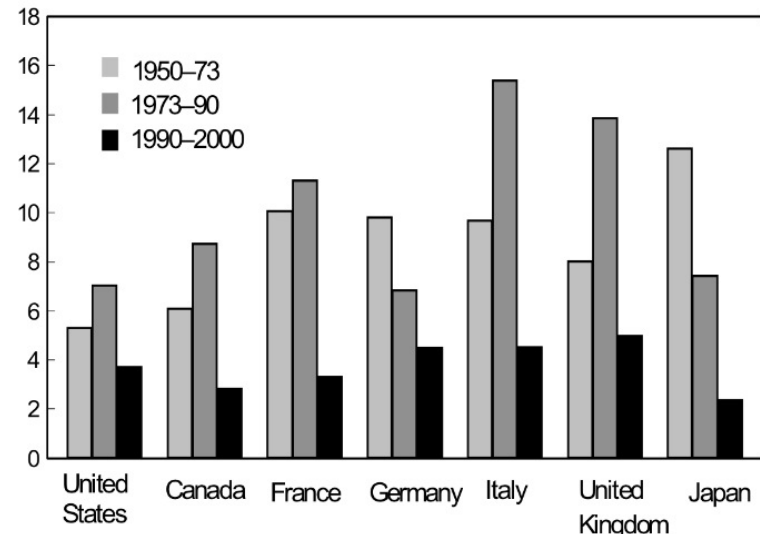
> 10% in US 2009 - 2010

> 2% in US 2010 – 2011

Hourly Compensation down

Average annual growth rates (percent)

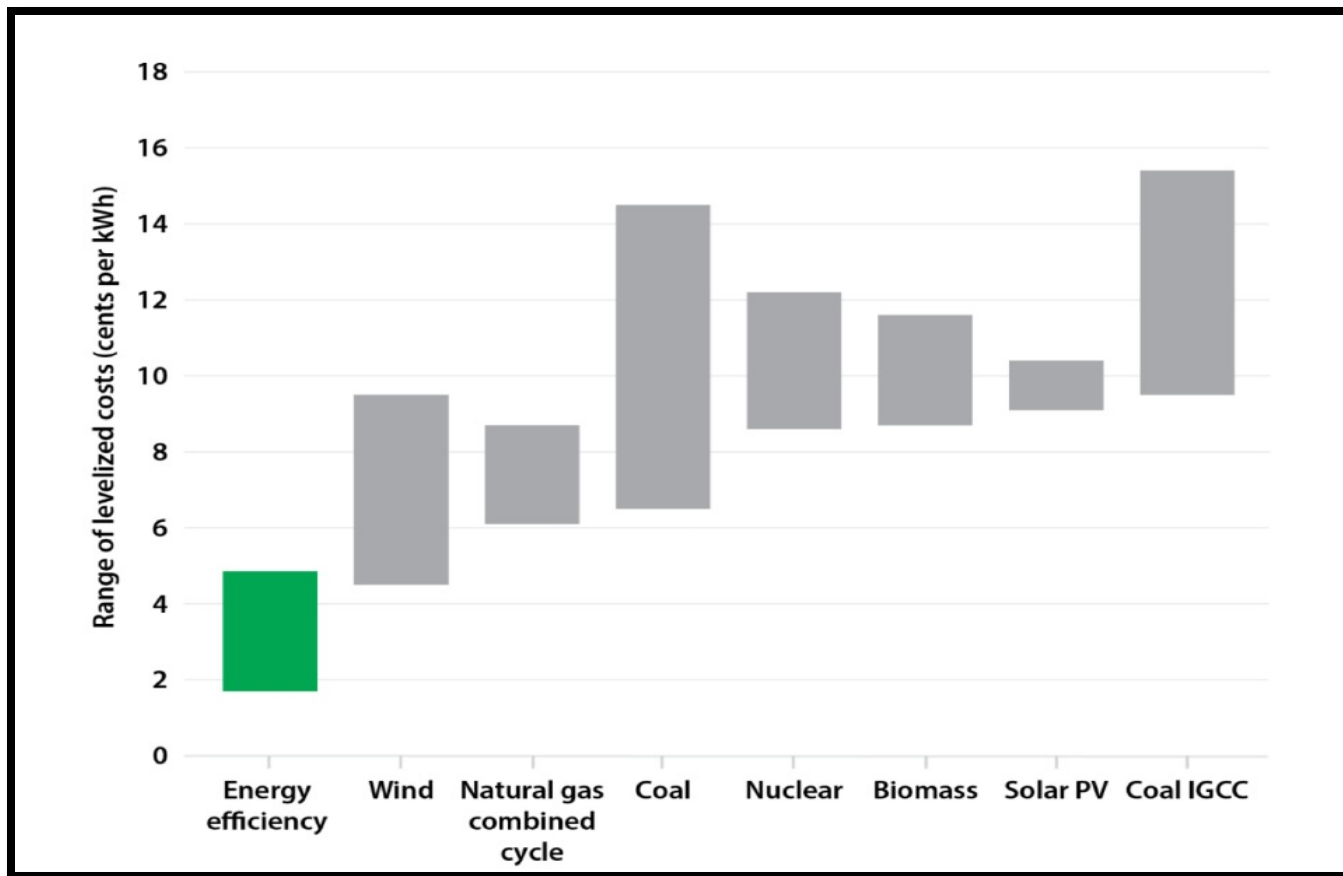
Panel 5. Hourly compensation



Comparing 50 years of labor productivity in U.S. and foreign manufacturing Aaron E. Cobet and Gregory A. Wilson³

Energy Savings Model

- Energy Savings programs continue to be lowest cost alternative for Energy Reduction



- Government Funding
- State Funding
- Utility Rebates

The Best Value for America's Energy Dollar , Maggie Molina

Agenda

Trends in SSL Manufacturing & impact in the US



Topics

- Manufacturing Models ✓
 - **Hub and Spoke**
- US Manufacturing Trends ✓
 - **Positive & Incentivised**
 - **Keeping costs in check**
- Energy Savings Model ✓
 - **SSL has solid value proposition**



- Levers impacting SSL Manufacturing in the US

Levers of SSL Manufacturing (in the US)

- **Cost of “Inventory” on the water – Importing products**
 - Purchase parts globally
 - Regional Assembly
- **Design Cycle and Product Life Cycle**
- **Supply Chain management and control**

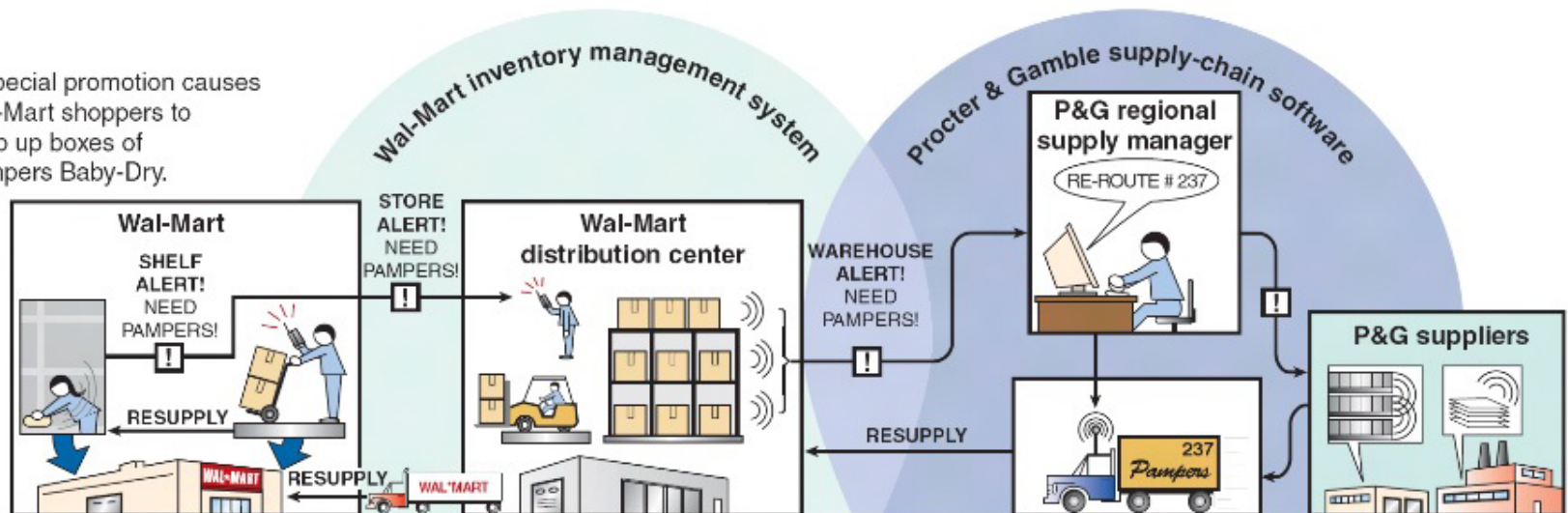


- ***Need for Technologic Process Discipline
in Manufacturing Approach***

Technology in Supply Chain – example

Radio Frequency Tags

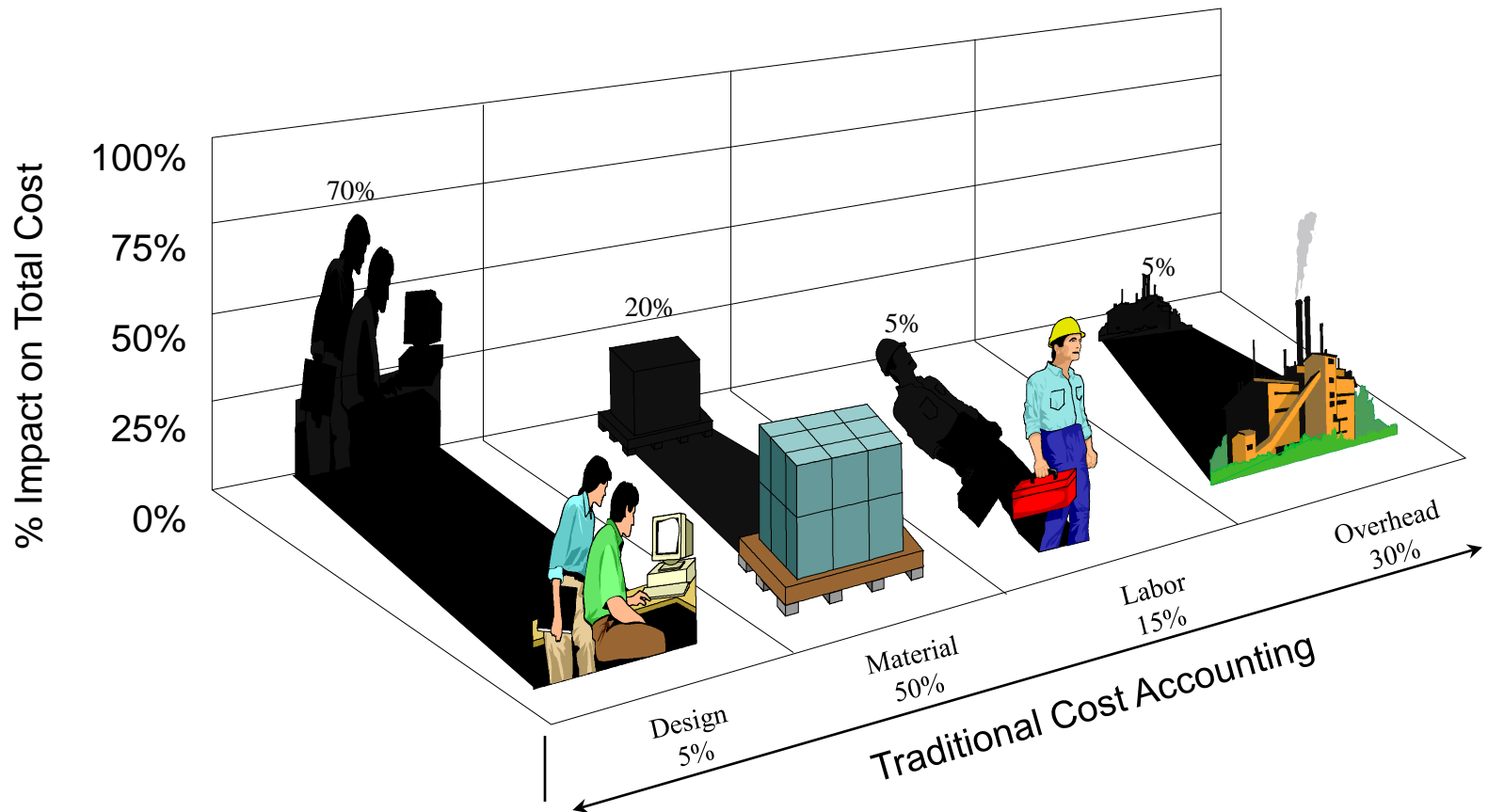
1. A special promotion causes Wal-Mart shoppers to snap up boxes of Pampers Baby-Dry.



2. Each box of Pampers has an RFID tag. Shelf-mounted scanners alert the stockroom of urgent need for restock.
3. Wal-Mart's inventory management system tracks and links its in-store stock and its warehouse stock, prompting quicker replenishment and providing accurate real-time data.
4. Wal-Mart's systems are linked to the P&G supply-chain management system. Demand spikes reported by RFID tags are immediately visible throughout the supply chain.
5. P&G's logistics software tracks its trucks with GPS locators, and tracks their contents with RFID tag readers. Regional managers can reroute trucks to fill urgent needs.
6. P&G suppliers also use RFID tags and readers on their raw materials, giving P&G visibility several tiers down the supply chain, and giving suppliers the ability to accurately forecast demand and production.

Levers of SSL Manufacturing (in the US) -Cost

Casting the Biggest Shadow



Conclusion

- Trends indicate the US is well situated for Manufacturing Growth **
- **Manufacturing in the US will be:
 - Using high levels of advanced technology vs. high numbers of human resources
 - Tightly integrated with Supply Chain
 - Adaptive for rapid product changes
- In addition, to be successful, Manufacturing must:
 - Have ***Technologic Process Discipline***
 - ***Effective use and generation of data***
 - Highly integrated in Design Cycle of product



Many Thanks.



References

1. *Manufacturing Returns to USA (Jobs Not So Much)*
by Barry Ritholtz - April 12th, 2013

2. US Bureau of Labor and Statics
“INTERNATIONAL COMPARISONS OF MANUFACTURING PRODUCTIVITY
AND UNIT LABOR COST TRENDS, 2011 “

3. Comparing 50 years of labor productivity
in U.S. and foreign manufacturing Aaron E. Cobet and Gregory A. Wilson

4. The Best Value for America’s Energy Dollar:
A National Review of the Cost of Utility Energy Efficiency Programs
Maggie Molina, March 2014 , Report Number U1402