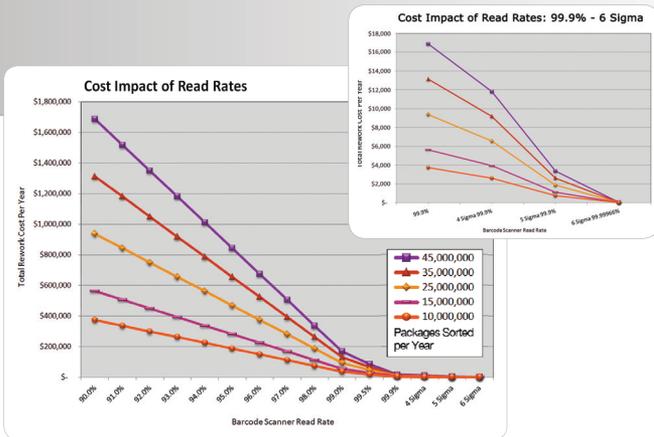


When 99% Just Isn't Enough: Benefits of Improved Read Rates in Logistics Scanning



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By Matthew D. Engle, Cognex Corporation, Strategic Market Development Manager

E-commerce is a boon to large retailers and lower-volume Internet fulfillment operations alike, but low read rates from automated sorting equipment can really reduce margins.

As shipping volumes grow along with online retail sales, both large retailers and low-volume fulfillment centers are considering a range of improvements to their automated sorting lines to cost-effectively boost their throughput and expand their operations.

For the past 30 years, Cognex has offered Automatic Identification (Auto ID) technology to a variety of industries. Auto ID systems and barcode technology are used to track components and products through manufacturing lines, and the same technology is used to automate sorting and shipping. Based on Cognex Auto ID experience, this paper will explore how improving barcode read rates with new image-based technology can shorten return on investment (ROI) of capital equipment. This analysis will be completed using two different types of retailers as examples.

Why Read Rates Matter

In order to quantify the cost impact of read rates, it's first important to understand what happens when a barcode scanner cannot 'read' a barcode. When a 'no-read' condition occurs, packages must be diverted to a station where an operator can manually key in the information or replace the defective barcode with a new barcode and resend the package back through the sorting system. This type of failed condition results in increased labor costs and reduced efficiency of automated sorting equipment.

As you might expect, low read rates cause greater potential losses as the volume of throughput increases. For example, a high-volume distribution center that processes 126,760 packages per day and averages 99% read rates has the option to invest \$100,000USD into new barcode reading systems. These new barcode readers will improve overall read rates by 0.9%. What will this investment equate to in real value for the distribution center? Before we analyze the value, some assumptions must be made. Table 1 details the assumptions made for the purpose of this example.

Table 1. High-volume Distribution Center Assumptions

HIGH-VOLUME SHIPPING SORTER TYPICAL OF A LARGE RETAILER		
Sorter speed	400	feet/minute
Average box size	20	inches
Distance between boxes	30	inches
Hours of operation/day	22	
Utilization days/year	350	
Boxes/second	1.60	
Boxes/hour	5,760	
Maximum boxes/day	126,720	
Maximum boxes/year	44,352,000	

When a 0.9% Improvement in Read Rates Equals \$100,000s in Profits

By making a \$100,000 investment into new barcode reading systems, this improvement reduces the number of packages that must be manually reworked and fed back through the sorting machine by 1,141 packages per day or 399,350 packages per year. If we assume that a typical operator making \$15 per hour requires 1.5 minutes to rework a 'no-read' package, then this investment saves \$149,756 per year, allowing the center to achieve full ROI for its \$100,000 in just eight months, and after two years, adds \$199,512 in profits. With long life cycles, the new image-based barcode readers can add hundreds of thousands to the bottom line year after year with just a 0.9% improvement in read rates. Table 2 illustrates the financial impact improving just 1.99% can have in this example.

Table 2. High-volume Distribution Center Read Rate/Labor Cost Analysis

HIGH-VOLUME READ RATE/LABOR COST ANALYSIS					
Read Rate	No-Reads	Maximum Number of Packages/Day	Total Rework Time (Man Hours/Day)	Number of Operators Required to Handle Rework	Cost of Operators (USD/Year)
97%	3,802	122,918	95.05	11.9	\$499,012.50
98%	2,535	124,185	63.38	7.9	\$332,718.75
99%	1,268	125,452	31.70	4.0	\$166,425.00
99.5%	634	126,086	15.85	2.0	\$83,212.50
99.9%	127	126,593	3.18	0.4	\$16,668.75
Four Sigma	89	126,631	2.23	0.3	\$11,681.25
Five Sigma	26	126,694	0.65	0.1	\$3,412.50
Six Sigma	1	126,719	0.03	0.003	\$131.25

A Four-month Return on Investment (ROI) for a \$30,000 Investment

In a low-volume distribution center the sample numbers are smaller, but no less important to their operations. In this example, the center processes 82,368 packages per day. However, if barcode scanners fail to automatically read just 2% of the packages passing through the sort machine, that equals 1,647 packages per day, or 494,100 packages per year requiring manual rework. As a result, daily throughput drops from 82,368 to 80,721 packages, reducing annual throughput from 24.7 million packages to 24.2 million. Table 3 details the assumptions made for the purpose of this example.

Table 3. Low-volume Distribution Center Assumptions

LOW-VOLUME SHIPPER TYPICAL OF INTERNET FULFILLMENT CENTER		
Sorter speed	400	feet/minute
Average box size	20	inches
Distance between boxes	36	inches
Hours of operation/day	16	
Utilization days/year	300	
Boxes/second	1.43	
Boxes/hour	5,148	
Maximum boxes/day	82,368	
Maximum boxes/year	24,710,400	

Using the same 1.5 minutes for a \$15 per hour operator to rework a package, and an overall read rate failure of 2% of packages equate to more than 41 hours per day in additional labor at a cost of \$185,175 per year. If the fulfillment center invests \$30,000 in new image-based barcode readers that will improve read rates by 1% it will save \$92,587 in labor each year, realizing 100% ROI in just four months while increasing line throughput by 823 packages per day.

If the line was running at 99%, and achieved 99.5% as a result of the upgrade, the savings is still more than \$46,000 per year, allowing the center to achieve full ROI for its \$30,000 in less than eight months, while increasing throughput to 81,874 packages per day. Table 4 illustrates the financial impact improving just 1.99% can have in this example.

Table 4. Low-volume Distribution Center Read Rate/Labor Cost Analysis

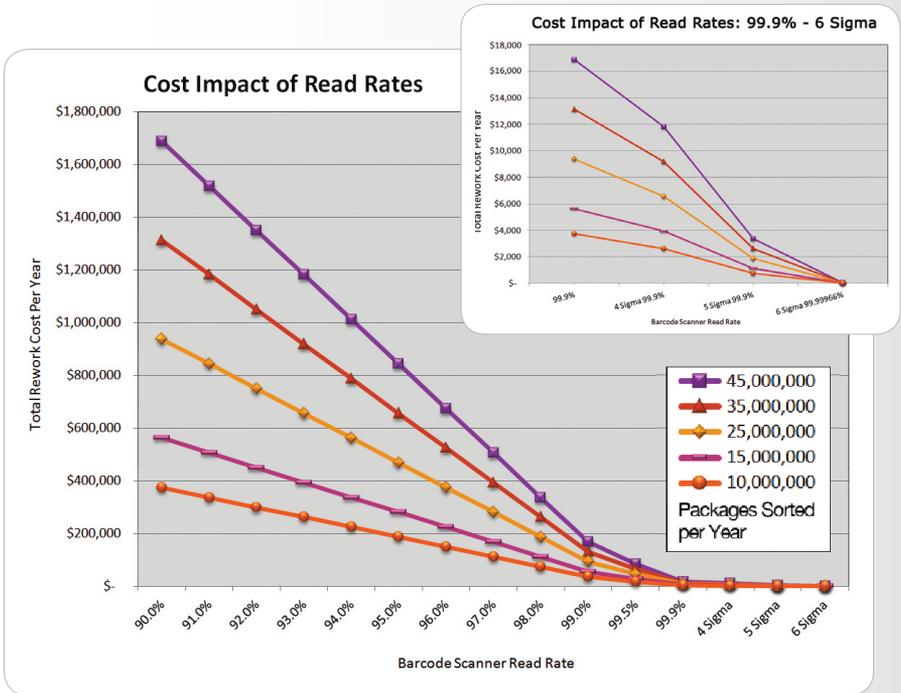
LOW-VOLUME READ RATE/LABOR COST ANALYSIS					
Read Rate	No-Reads	Maximum Number of Packages/Day	Total Rework Time (Man Hours/Day)	Number of Operators Required to Handle Rework	Cost of Operators (USD/Year)
98%	1,648	80,720	41.20	5.15	\$185,175.00
99%	824	81,544	20.60	2.58	\$92,587.50
99.5%	412	81,956	10.30	1.29	\$46,350.00
99.9%	83	82,285	2.08	0.26	\$9,337.50
Four Sigma	58	82,310	1.45	0.18	\$6,525.00
Five Sigma	17	82,351	0.43	0.05	\$1,912.50
Six Sigma	1	82,367	0.03	0.00	\$112.50

Read Rates Drive Savings, Efficiency

As the numbers show, capital equipment improvement programs that increase read rates are solid investments that have short ROI schedules and have positive impact on profits over time. As distribution centers look to improve profit and throughput and position themselves for expected higher demands in years to come, new image-based barcode readers can help to achieve these goals.

For more information about how a new generation of image-based, area-array ID readers can drive incremental improvements in your logistic operations, read *"Image-based Barcode Readers Transforming the Logistics Industry"* and/or visit www.cognex.com/logistics.

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About the Author

After joining Cognex in 2005 as Product Marketing Manager, Matthew D. Engle worked in the field as a Sales Engineer before becoming Strategic Market Development Manager for Cognex Corporation's ID Products Business Unit. He holds a bachelor of science in electrical engineering from the University of New Hampshire and an MBA from Babson College.



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