The Problem
Issues Associated with Manual Labor

• Work *not performed per standard instructions*

• People operate at *lower productivity than automation*

• Employees in training *reduce quality and productivity*

• Increased product variation *increases quality risk*

• Cycle times *not available in real time*
The Solution
A “GPS” for Worldwide Manual Processes

• Lighted “turn by turn” work instructions projecting the right information, at the right place, and at the right time to improve quality, productivity, and training efficiency

• Programmable by customer personnel as paperless work instructions

• Valuable cycle time data is recorded and displayed for every process step

• Light Guide Systems™ is a job creation/retention tool

www.ops-solutions.com
The Right Information, at the Right Place, and at the Right Time
The Right Information, at the Right Place, and at the Right Time
Your GPS for Manual Processes

High Lumen Overhead Projector
Human Machine Interface Monitor
Automatic or Manual Step Confirmation

Assembly Workstation
Parts Bins
Light Guide Systems™ Video (available at www.ops-solutions.com)
Key Maintenance Applications

“Where Are Your Pain Points?”

Target Areas for Light Guide Systems™

• High Work Content
• Wide Product Variation
• Regular Employee Movement
• “Mission Critical” Operation

<table>
<thead>
<tr>
<th>Assembly</th>
<th>Dimensional Checks</th>
<th>Training</th>
<th>Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remanufacturing</td>
<td>Preventative Maintenance</td>
<td>Safety</td>
<td>Part Layout</td>
</tr>
<tr>
<td>Inspection</td>
<td>Welding Processes</td>
<td>Changeovers</td>
<td>Part Kitting</td>
</tr>
</tbody>
</table>
Operational Results

Assembly
• 20-30% quality improvement potential in assembly defects

Inspection
• Inspection processes become standardized and paperless without missed steps across all personnel

Part Kitting/Sequencing
• Documented 70% productivity improvement over bar code readers without compromising quality

Training
• New personnel can be self-trained using Light Guide Systems™ and only require experienced personnel for final certification
Portable, Integrated Workstation for Assembly, Offline Training, or Inspection Processes
Operating Canvas Size Can Be Adjusted to Your Requirements

Viewable in Booth 432

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Qualifications

• Patent issued as PCT-April, 2009

• Featured in Wall Street Journal as a top Michigan based invention-August, 2006

• Featured in Assembly Magazine-December, 2008 and December, 2010

• Established vendor for GM, Chrysler, John Deere, Case New Holland, Detroit Diesel, Fox Shox

• Registered as a government vendor
The Light Guide Systems Value Proposition

Maximized OEE = Overall Employee Effectiveness

- Increased Quality
  - Standardized Processes
- Higher Productivity
  - Displayed and Archived Cycle Times
- Greater Accountability
  - Manual/Automated Step Confirmation Required
- Training Efficiency
  - Self-Trained Operators

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Mistake Proofing Manual Processes

PO Box 182, Northville, Michigan 48167, USA
Diverse Customer Pipeline

- Wide range of companies
- Various products
- Diverse applications
- Product size from small to large

PO’s to Date

Expected PO’s

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## Technology Benchmarking

<table>
<thead>
<tr>
<th>Key Buying Criteria*</th>
<th>Bar Code</th>
<th>Pick to Light</th>
<th>Pick to Voice</th>
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<tr>
<td><strong>Productivity</strong></td>
<td>●</td>
<td>○</td>
<td>●</td>
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<tr>
<td><strong>Flexibility</strong></td>
<td>●</td>
<td>●</td>
<td>○</td>
</tr>
<tr>
<td><strong>Quality</strong></td>
<td>○</td>
<td>●</td>
<td>○</td>
</tr>
<tr>
<td><strong>Scalability</strong></td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td><strong>Maintenance / Durability</strong></td>
<td>●</td>
<td>○</td>
<td>●</td>
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- ● Competitive Strength
- ○ Competitive Weakness

**www.ops-solutions.com**
The Advantages and Risks of Manual Processes in Manufacturing

**Advantages**
- Intelligent
- Highly Flexible
- Kaizen Focused
- Creative
- Self Learning
- Low Maintenance
- New financial tax incentives

**Manual Process Risks**
- Work Instructions Not Followed
- Product Variation Increases Risk
- Employee Movement/Training
- Low Productivity/High Stress

*When implemented in key workstations, Light Guide Systems™ has the unique ability to leverage the advantages of manual work while mitigating the risks.*
Light Guide Systems™ and Intra Concept for Gauging Stations

1. Standardized gauging process with the right information, at the right place, and at the right time
2. Customer programmed Visual Display Features (VDF’s) can include animated graphics, blueprints, video’s, standard time countdown, audio
3. Shared hardware with Intra to include PC and monitor
4. Step Confirmation by Operator

Optional information area for line of sight video’s, blueprints, text work instructions

Example - Animated rotating CW VDF for table rotation

Example - Animated blinking VDF for proper gauge selection

8,000 lumen projector integrated with workstation
Automotive Headliner
Detroit Diesel Block Inspection
Multi-Projector Installation

2 High Lumen Overhead Projectors

Block Inspection Station
Light Guide System™ Process Integration

PLANT INTERFACE
• I/O interface to external PLC environment
• Manual and automatic step confirmation options

LIGHT GUIDE SYSTEM™
• User friendly programming
• Up to 8,200 lumen projector
• Touchscreen HMI
• “Real Time” time study
• Multi-projector capability (up to 3)

WORKSTATION/PRODUCT
• Visual Display Features (VDF’s) concentrated on product
• Quality alerts, training videos, customer images, blueprints projected
• Visible cycle time comparison to standard time
• Audio option for operator step instructions

Integrated System Connectivity
Portable, Integrated Workstation
Offline Training and Assembly

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“REAL TIME” Time Studies
For Manual Processes

<table>
<thead>
<tr>
<th>Step Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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<table>
<thead>
<tr>
<th>Data from 10 Parts</th>
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<tbody>
<tr>
<td>Min CT</td>
</tr>
<tr>
<td>Max CT</td>
</tr>
<tr>
<td>Average CT</td>
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<table>
<thead>
<tr>
<th>AVG CT Variance to Standard Time</th>
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<tbody>
<tr>
<td>1.1 0.2 1.7 (1.9) 2.6 - 0.3 0.2 (0.8) (2.0) 1.4</td>
</tr>
</tbody>
</table>

Cycle times are recorded for each discrete step in Access and can be exported into Excel to facilitate bottleneck and productivity analysis.