Optimized Installation Flow – A Strategy for substantial cycle time reduction

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Our mission was to reduce construction duration by 50% on average without adding overtime and without adding more resources.

Project (130/199) milestone celebration: reduction of 94% 37d → 2.11d
Semi Conductor Construction

Environment:
- Fierce competition
- Industrial system infrastructure installations
- Live manufacturing
- Mission critical
- Constant change

Challenges:
- Complex & congested projects
- 25 parallel projects
- Architectural, electrical, mechanical and piping
- 8 types of waste

Unique characteristics:
- 3 floors gembas
- Many chemicals, gases, ultra-pure water, exhausts, electrical power
- 50-70 different utilities and services with orbital welds
- >100 connections

Undesired project delivery effects:
- Low Productivity
- Less Predictability
- Bad Performance
- 2nd shifts, accelerations...
OIF – Optimized Installation Flow – “Touch the Project Once”

PIT Stop
Our PIT Stop
“Touch the Project Once”

PIT:
Project Integration Team
OIF Flywheel: The 7 Principles maximizing All 3 Flows
Principle #1 – Strategic Integration & Planning:
✓ Achieve organizational strategic goals using minimum resources
✓ Project Strategy: “project perspective, position and guidelines on what to do and how to do it, to achieve the highest competitive advantage and the best value from the project outcome…”
Principle #2 – Target Tactical Planning:
✓ Target per project
✓ Target constrains the pull-plan durations and leads to innovative delivery → Challenge sequential construction logic
Principle #3 – Collaborative Process:
✓ Project strategy initiation
✓ Target setting
✓ Pull-Plan development
✓ Plus & Delta
✓ Team recognitions
✓ Continuous improvement
Principle #4 – Constraint Management:
✓ Cross project critical constraints - scarce trade resources
✓ Physical constraints
✓ Information constraints
✓ Onboarding constraints
Principle #5 – Maximize Pre-Fabrication:
✓ Reduces durations
✓ Reduces num of trades in Gemba
✓ Shifts skilled personnel to work at their facility where their productivity is higher
Principle #6 – Control Installation

Project Start:

✓ Identifying when project can really start without stopping (“sound project”, “full kit”) → ALL predecessors and constraints removed

✓ Program cadence → velocity
Principle #7 – Ensure Project Installation Flow:

✓ Project tasks are performed without interruption
✓ “improve workflow reliability in order to improve operational performance” (Ballard & Tommelein. 2016)
Results – 3 Generations of Projects Delivery within 1 Program

Strategic Integration & Planning – ALL OIF

% Average Schedule Reduction

50%

Partial OIF

LPS & Two Week Buffer

Control group  Experimental group #1  Experimental group #2

<table>
<thead>
<tr>
<th>Standard Duration [d]</th>
<th>Target [d]</th>
<th>Actual [d]</th>
<th>SPI; EV/PV or Velocity</th>
<th>Schedule Reduction = waste elimination</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>3</td>
<td>2.5</td>
<td>14.8</td>
<td>93%</td>
</tr>
<tr>
<td>46</td>
<td>6</td>
<td>8.5</td>
<td>5.4</td>
<td>82%</td>
</tr>
</tbody>
</table>
Table 2: Average and Std. Dev. of schedule reduction for the different approaches. The groups were compared using a One-way ANOVA statistical test.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control group</th>
<th>Experimental group #1</th>
<th>Experimental group #2</th>
<th>F(2,196)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% schedule reduction</td>
<td>8% (23%)</td>
<td>48% (23%)</td>
<td>42% (21%)</td>
<td>72.86***</td>
</tr>
<tr>
<td></td>
<td>a</td>
<td>b</td>
<td></td>
<td>(**p &lt; .001)</td>
</tr>
</tbody>
</table>
It’s All About People, Collaboration, Teams, Trust

LPS is not enough!

Integrated Operating Strategy

PPO = What
OIF = How

Scalable, Repetitive, locally & globally
I would like to thank

✓ **Dr. Ayala Daie-Gabai**, my *wife*, for believing in and pushing me to excel, innovate, explore and collaborate

✓ **Prof. Rafael Sacks**, my *partner*, for mentoring and providing insights to myself and LCI Israel CoP

✓ **Prof. Aaron Shenhar**, my *partner*, for mentoring and strategy thinking

✓ **Vered Leshem**, my *manager*, for sponsoring my experimentations and guidance within our organization

✓ **Nate Henshaw**, my *mentor*, for challenging me to improve OIF and for deploying it company-wide in Intel

✓ **Shay Golan**, my *leader*, for offering me the PIT Leader role to introduce innovations and change in construction culture

✓ **Dan Doron**, my *guru*, for believing in me and steering my career to applying strategic thinking
Back Up
<table>
<thead>
<tr>
<th>Category</th>
<th>Before</th>
<th>After</th>
<th>Benefits / Savings</th>
<th>Safety</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurements, Pre-Fabrication</td>
<td>Spool by spool, manual &gt; 10 days (400 hrs.) by 4 workers; All EV line and exhausts are measured and manufactured on-site</td>
<td>Using 3D --&gt; 2 days (80 hrs.) by 4 workers; Only last spool is measured and installed on site</td>
<td>Time: 4 workers x 7 days</td>
<td>Cost: 320 hr.</td>
<td>Efficiency: High + allow Elec and ducting works in parallel</td>
</tr>
<tr>
<td># of spools measured on site</td>
<td>50</td>
<td>7</td>
<td>Only 7 EVs measured at CR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total welds</td>
<td>150</td>
<td>40</td>
<td>8 welding days instead of 18 welding days x 2 workers</td>
<td></td>
<td>Improved as 70 welds done in workshop</td>
</tr>
<tr>
<td>Welds in CR</td>
<td>4 days</td>
<td>2 day</td>
<td>Improved - less failure rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Installation in CR</td>
<td>10 days</td>
<td>4 days</td>
<td>High</td>
<td></td>
<td>High</td>
</tr>
</tbody>
</table>