Service Parts Planning
Using Lateral Supply

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Stanford – Oct 2004
Business Environment

- Semi-conductor equipment Industry
- Business to Business; High-Tech
- Close cooperation suppliers, customers, technology partners
- Technology Push: Help customers with shrinking IC patterns; this provides competitive edge
- Time to market is everything
- Market is highly volatile and cyclical
- In this industry ASML manufactures, sells and maintains micro lithography equipment
- ASML is seen as a technology leader in this business segment
Micro Lithography Equipment

**Main Technology**
- Fine mechanics
- Optics
- Software

**Purpose**
- imaging IC patterns unto a silicon wafer

**Price**
- Multi million dollar equipment
### Characteristics Service Parts

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>parts per week</td>
<td>500</td>
</tr>
<tr>
<td>WW Stock locations</td>
<td>50</td>
</tr>
<tr>
<td>Part numbers (SKU)</td>
<td>10,000</td>
</tr>
<tr>
<td>Service tools (SKU)</td>
<td>3,000</td>
</tr>
<tr>
<td>Part changes / yr</td>
<td>300</td>
</tr>
<tr>
<td>Part Cost (USD)</td>
<td>5 – 500,000</td>
</tr>
</tbody>
</table>

### Inventory Planning
- Based on Math models
- Quarterly Planning

### Input in Planning Model
- WW demand
- Configs of all machines
- Contractual Parameters
- Cost Parameters

### ERP System
- SAP, fully customized
The Challenge

**Business needs**

- Part Availability > 90 % from nearest depot
- Parts Waiting Time < 45 min / machine / week
- Local delivery < 1 hour; intercontinental < 36 hrs

**Requirements for the Planning Models**

- Balancing stock cost with machine uptime
- Customization to enable different customer contracts
- Make use of flexibility in transport when minimizing stock cost

**Cooperation ASML - TU Eindhoven**

- 2 PhD-s taking up the challenge since 2002
The Problem on Hand

- **Supply of spare parts**
  - Central Stock (Neth., USA)
    - Reg. repl.: 1 week
    - Emerg. Shpm.: 1 day
  - Lateral Supply: 6-12 hours (within same continent)
    - Local Warehouse
      - Customers with contracts
  - Customers with contracts
    - Direct sales
      - Reg. repl.: 1 week

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# Results

<table>
<thead>
<tr>
<th>Performance measures</th>
<th>Target</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>parts waiting time (hours)</td>
<td>2.5</td>
<td>4</td>
<td>2.2</td>
</tr>
<tr>
<td>Fill Rate Emergency Supply</td>
<td>95%</td>
<td>86%</td>
<td>91%</td>
</tr>
<tr>
<td>Fill Rate Regular Supply</td>
<td>80%</td>
<td>85%</td>
<td>82%</td>
</tr>
<tr>
<td>Transport cost</td>
<td>38</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Inventory cost</td>
<td>62</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>Total cost</td>
<td>100</td>
<td>61</td>
<td></td>
</tr>
</tbody>
</table>

- Great Results
- Enough Challenges Left