A Case Study: Experiences from our Demand Driven Journey

STEMCELL Technologies Inc

Presented by: Barry Katz, Senior Director, Supply Chain Operations | October 2018
Agenda

• Company Introduction & Overview
• The Problem: Improve Service Levels and Reduce Inventory
• The Solution: With an Eye on a DDAE
• Results
• What We’re Learning
Company Overview
Dr. Allen Eaves - Founder, President, CEO

A Family Owned Company

- We can move quickly in a fast moving market
- Sales are largely dependent on the new products that we develop
- New products are developed by our outstanding R&D scientists - who are essential to STEMCELL’s success!
- Planning and prioritization of new product development is done carefully and confidentially
- Leadership & decisions are focused on long-term growth and stability
Our Mission: “To Enable Life Sciences Research …”
To advance the pursuit of scientific knowledge and understanding by supplying high quality, innovative reagents, tools and services that enable life science research.

Our Vision: “... In Every Lab ...”
To have our products in all research labs around the world, significantly impacting the development of new life science discoveries.

Our Values: “... by Being Scientists Helping Scientists.”
Innovation, Responsiveness, Quality, Integrity, Collaboration
STEMCELL has Grown Organically at an Average Annual Rate of 22% for 25 Years

Annual STEMCELL Revenue
CAD millions, FYE June 30th

$1.2 Billion of Cumulative Revenue
The Promise of Stem Cell Research

Pluripotent Stem Cells

Adult Tissue Specific Stem Cells

Cells for transplantation

Cultured Cells

Drug screening and potential therapeutics

Toxicity testing

Study cell differentiation

Understand prevention & treatment of cancer/disease

Bone marrow for leukemia

Nerve cells for Parkinson’s & Alzheimer’s disease

Heart muscle cells for heart disease

Pancreatic islet cells for diabetes
Arm-to-Arm CAR-T Cell Therapy

Once Infused Patients’ Engineered T Cells Find and Kill Cancer Cells

1. LEUKAPHERESIS
2. SELECTION & ACTIVATION
3. GENE TRANSFER
4. CELL EXPANSION
5. INFUSION

STEMCELL TECHNOLOGIES
STEMCELL Major Product Lines and Services

- Cell culture media
- Cell separation reagents
- Primary cells
- Instrumentation
- Education and training
- IT solutions for transplant labs
- Global scientific society management services

Over 2,500 leading products and brands
Instrumentation

Instruments, instrument service and disposables

STEMvision

ClonaCell EasyPick

RoboSep™ -16

Tips & buffer

SmartDish™

STEMgrid™-6
Global Presence
Our Competitive Advantage - Supply Chain’s Wildly Important Goal
The global Service Level result for Fiscal Year 2016 was 88.6%.

A number of factors affected the result:
- Supplier issues
- Production issues
- **Capacity constraints**
- Lead-time variability
- Trouble planning and executing product transitions

**HOW Were We Going to Improve It**
Our External Variability Reality

- Global sourcing and demand
- Variable product shelf life (1 day to 10 years)
- Product complexity and/or customization
- Increasing product variety and changes in mix
- Biological variability from batch to batch
- Many single source & long lead time parts
- Short customer tolerance times
- Changing demand variability
- Pressure for leaner inventories
We Needed to Change the Way Looked at Things

Just Working Harder...
Only Gives You a Headache
2016 Solution Proposal

- Adopt DDMRP as planning methodology deploying Replenishment
- Update BOM configurations to support strategic inventory positioning
- Capture complete demand and supply pipeline
- Certify Planning and Procurement teams - CDDP
How did we know that DDMRP will deliver the service levels we need?
Historical simulation example

Demand pattern analysis optimizes inventory and minimizes risks to service levels
Historical simulation example

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Demand pattern analysis optimizes inventory and minimizes risks to service levels
An informed service level investment

Service Level vs. Average $ On Hand

Days Stocked Out vs. Average $ On Hand

$4,597  44
$4,869  43
$5,349  27
$7,067  12
$8,265  0

0%  20%  40%  60%  80%  100%

0%  20%  40%  60%  80%  100%

R23  R53  R75  R113  R150

84%  86%  90%  94%  100%
Multisite System Design & Integration

Global Presence
Multisite System Design & Integration

Global Presence
Global Presence

Multisite System Design & Integration
Buffers For Our Distribution Network

- Suppliers
- Canada
- Offsite
- USA
- France
- Australia
- Singapore
- China
Buffers For Our Distribution Network
Buffers For Our Distribution Network
System Design – BOM Structure
# Stats

**Raw Materials = 2,800**  *  **In Process = 1,400**  *  **Finished Goods = 4,100**

<table>
<thead>
<tr>
<th></th>
<th>3 R+ Instances</th>
<th>Planning Locations</th>
<th>Buffered Part Locations</th>
<th>Non Buffered Part Locations</th>
<th>Supply Order Lines/Year</th>
<th>Demand Order Lines/Year</th>
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<tbody>
<tr>
<td>North America</td>
<td>24</td>
<td>6,100</td>
<td>27,000</td>
<td>75,000</td>
<td>199,000</td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>4</td>
<td>1,400</td>
<td>11,500</td>
<td>13,000</td>
<td>60,000</td>
<td></td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>4</td>
<td>1,100</td>
<td>14,800</td>
<td>9,000</td>
<td>25,000</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
<td>8,600</td>
<td>53,300</td>
<td>97,000</td>
<td>285,000+</td>
<td></td>
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</table>

Twice/Day = Over 60,000 Part Location Calculations
Target = Optimal Inventory Levels
Hunting Down and Controlling the Outliers

Not Enough!

Too Much!
Service Level

The service level for 2017 was 93.6%

This was better but we were stuck!
We Had Better Planning Signals But...

• We didn’t see ourselves as a System
  • Every area schedules, executes and measures themselves independently - including sales and finance.
• Silos couldn’t identify, agree on and exploit opportunities for improvement
• Labour intensive processes limits our ability to be reactive
• Lack of data consistency limits metric development
To Further Complicate Matters:

We need to Keep up with Growth

**Changes in Scale:** Create challenges for existing processes

**Increasing Complexity:** Creates difficulties to achieve system efficiencies, generate better data & improve metrics

**Lack of Visibility:** Makes it hard to Improve Service Levels & Optimize Inventory.

Can’t change what you don’t measure and you can’t measure what you don’t see!
The Financial Argument - Increase ROI

\[ \Delta \text{Visibility} \rightarrow \Delta \text{Variability} \rightarrow \Delta \text{Flow} \rightarrow \left( \frac{\text{Net Profit}}{\text{Investment}} \right) \rightarrow \Delta \text{ROI} \]

**Variability** is defined as the sum of the differences between our plan and what happens.

**Visibility** is defined as relevant information for decision making.

A Demand Driven Operating Model

STEMCELL™
2018 Solution Proposal - A Demand Driven Operating Model

Goal
Reduce and Control Variability & Reduce Lead-time

DDOM Desired Results -
● Identify and decrease internal variation
● Increase service levels with the same cost of operations
● Lower average inventories
● Reduce the time to reliably replenish

Increase Velocity = Improved System Flow
Demand Driven Scheduling and Execution
2018 Solution Proposal -

- Complete our DDOM Design model- December 2017
- Began implementation - January 2018
- Developed routings that accurately reflect what we do
- Identified and challenged our policies, work practices, behaviours and metrics which block flow
- Added strategic layers to our BOMs
- Deployed DBR+ as our system scheduling/prioritization/execution tool
- Started to Transact as we act
- Continually Measure, remodel, improve, measure, remodel, improve, ETC.
Metrics in our Demand Driven Operating Model

- Planning Setup: Correct and On-Time
- Raw Materials: Purchased and Delivered On-Time
- Raw Material Inventory: Available for Use
- Manufacturing Completed: MFG, QC, QA
- Finished Goods Inventory: Available for Sale
- Order Processing On-Time: Customer Service - Distribution
- Customer Shipments

Supplier Data - Leadtime - Variability
Demand Data - Sales - Internal Use

DRIVE FOR 95
The Demand Driven Operating Model Improvement Cycle

Too much or too little

Stock Out Experienced for the Part

On Hand Below Target

On Hand Above Target

Stock Out with Demand and Stock Out Heatmaps

Buffer Review

Run Part in Simulation for last 6 months

Simulation Results do not match actuals

Validate Leadtimes - verify part is delivered on time

System Leadtime Does not match Actuals

System Leadtime matches actuals

Simulation Results match actuals - Stocks out is present

Buffer Failure

Run Simulation to Service Level Target & Update Buffer

Investigate Further

Update Leadtime

Run Simulation to Service Level Target & Update Buffer

Update the Lead-Time

DRIVE FOR 95
Benefits of Our New Demand Driven Operating Model
Visibility!!!

- **Resource Schedules are System Schedules:** Shows all work orders, when they are due, their priority, their load and status. All resources are synchronized by priority to support the Drum schedule.

- **Resource and System Load Graphs:** Show amount and age of backlog and all future load for every resource.

- **Capacity and Execution Status Visibility:** Allows us to make labour reallocation and overtime decisions and longer term capacity investment.

- **Accurately Measured Metrics:** We see the status of work. We can drill down to who is responsible for taking action and drive accountability.

- **Improvement Process:** We measure and trend operational results weekly. We have the ability to identify when, what, and where to remodel.
Visibility!!!

Most Importantly:

- **Demand Driven**: All activities and priorities are triggered based on Actual Demand with inventory and service levels determining relative priorities in Real Time!

- Now our Demand Driven Operating Model is the foundation for our DDS&OP process. Operations, Sales, Quality, and Finance are on our modeling team making Data Driven Decisions.
The Journey

Over the past two years, we have demonstrated success with DDMRP using R+ as the Planning tool.

- Increasing our Service Levels

<table>
<thead>
<tr>
<th>Service Level</th>
<th>Service Level</th>
<th>Quick Facts</th>
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</thead>
<tbody>
<tr>
<td>TTM - 20</td>
<td>Week - 21</td>
<td></td>
</tr>
<tr>
<td>93.1%</td>
<td>95.9%</td>
<td></td>
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<table>
<thead>
<tr>
<th>Period</th>
<th>Orders</th>
<th>Ship Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTM-20</td>
<td>94,221</td>
<td>196,818</td>
</tr>
<tr>
<td>Week-21</td>
<td>1,996</td>
<td>4,429</td>
</tr>
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</table>
The Journey Continues

- Increasing Service level
The Journey Continues

- Velocity Gains = Decreasing Inventory

<table>
<thead>
<tr>
<th>Inventory Value</th>
<th>Days on Hand</th>
<th>Inventory Growth (FY over FY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 25, 2018</td>
<td>April 30, 2018</td>
<td>Change May 25, 2018</td>
</tr>
<tr>
<td>$ 24,561,433</td>
<td>193</td>
<td>13.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-7.9%</td>
</tr>
</tbody>
</table>

28% Increase in Sales
The Journey Continues

- Decreasing Inventory
What We’ve Learned on our Journey

• Secure executive sponsorship and a champion
• Understand the scope of applicability and expected benefits
• Choose an implementation partner that knows how to apply DDOM
• Train everyone!!!
• Make sure the BOM definition in your system is accurate
• Routings must follow Flow and your Process
• Strong data team – ability to run trending calculations and validate settings
• Focus on data quality
• Plan for the transition – Train, Test, Communicate, & Support Everyone
• Commit Early and Hard!!!

- Just Do It -