Dress-Code

The Revolutionary High Tech Fabric

Dr. Dario Maschietti
AMDL Srl
Dress-Code Overview

- The Dress-Code project aims to develop a process for manufacturing a High Tech Fabric (HTF) for:
  - Wearable electronics
  - Energy Storing systems

- Dress-Code is a flexible and lightweight fabric supercapacitor electrode as energy source in smart garments.

- Daily need of energy for power supply of mobile devices
  Dress-code power source is:
  - Standalone
  - Portable
  - Exchangeable
Dress-Code Overview

LONG LIFETIME

GREEN

FAST

SOCIAL
Dress-Code Market Opportunity

✓ The wearable technology market revenue $4.3 billion as of 2012. Expected $14.0 billion by 2018 (estimated CAGR of 18.93% from 2013 to 2018).

✓ The global smart fabrics market revenue $708 million as of 2012. Expected $2.03 billion by 2018 (estimated CAGR of 17.7% from 2013 to 2018).

✓ Dress-Code addressable market is:
  ❖ Wearable technologies (e.g. Smartphone protective battery case)
  ❖ Smart apparel

✓ Our forecast for the global smart fabrics market penetration is 10%

✓ Dress-code positioning in the market is:
  ❖ Wearing apparel
  ❖ Outdoor fabrics
  ❖ Energy storage systems

✓ Other possible applications: Supercapacitor devices for Space application (ECSS Qualified)
Market Entry

✓ Plan to roll out service:
  - Door to door audits
  - Workshops
  - Internet
  - Papers on Technical & Scientific magazines

✓ What you will need
  - Dress-code demonstrative sample
  - Dress-code datasheet & process specification
  - Dress-code certifications

✓ Tools and resources to ramp up sales
  - Social media technology tools
  - Internet video conferencing tools

✓ Purchasing decision drivers for customers
  - Innovation
  - Product quality
  - Technical expertise
  - Competitive price

✓ Strategic partners

✓ Sales timeline:
  - 1 year: No sales. R&D
  - 2 – 3 year: Gadget Sales (e.g. smartphone protective battery case)
  - 4 year on: Active Dress-code fabric garments
Partners and collaborators

✓ Current Partner:

CNR-IIA, Roma (IT):
- Exclusive Partnership Agreement

✓ Potential Partner and its value:

Revolution Fibres, Auckland (NZ):
- Manufacturing Services:
  - Lab-scale controlled needle-based, and needle-less electrospinning,
  - Small-medium scale production (up to 1m width)
  - Large scale (2m)
- A large textile company interested in the production of Dress-Code based apparel

✓ Current customer agreements:
- No Current Customer Agreement
- Investigation for a customer to produce gadgets (e.g. Smartphone protective battery case)
**Competitive Advantages and Differentiators:**

- **GREEN ENERGY:** Renewable energy, coconut shell derived
- **TECHNOLOGY:** Porous activated carbon electrodes
- **LIFETIME:** Millions of charge/discharge cycles
- **SOCIAL:** Energy transferred and shared among people

**Competitive Advantages and Differentiators:**

<table>
<thead>
<tr>
<th>Competitive Advantage</th>
<th>Smart Fabric</th>
<th>Trousers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Storage</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Green Energy</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Technology</td>
<td>Supercap Fabric</td>
<td>Li-Ion Battery</td>
</tr>
<tr>
<td>Cost</td>
<td>N/A</td>
<td>&gt; $340</td>
</tr>
<tr>
<td>Capacity</td>
<td>≥ 1500mAh</td>
<td>2400mAh</td>
</tr>
<tr>
<td>Lifetime</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Social impact</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

1. For features **Yes** or **No**;
2. For benefits a ranking of 1 – 5 (1 = **Low**, 5 = **High**).
Barriers to Competition

Dress-Code Patent (end of the first year)

Certifications

OEKO-TEX® Standard 100

Sustainable Textile Production (STeP)
Management Team

Dr. Andrea Maria di Lellis
AMDL Srl - CEO

✓ Researcher & Electronics Designer

✓ Wide experience in space missions

✓ For further information go to:
http://www.amdl.biz/people.html
Management Team

Dr. Roberto Pilloton
CNR-IIA - Senior Scientist

✅ Electrospinning Technology (COST MP1206) & Nanocomposite Materials for Sensors

✅ Transducers and Devices

✅ Biosensing

✅ For further information go to: http://www.iia.cnr.it/index.php?option=com_content&view=article&id=697&Itemid=92&lang=en
Dress-Code: The Team

Dr. Andrea Maria di Lellis
Project Manager – R&D Tech Coordinator

Dr. Roberto Pilloton
R&D Chemical Team Coordinator

✓ Advisory board

- Dr. Nicola Pirrone
  CNR-IIA Director

- Dr. Laura Ragazzi
  CNR-IIA Ceo Uff. Rel. Ist.

- Dr. Paolo De Gasperis
  Ass. Sc. - Former CNR-IESS Dir.

Dr. Daniele Brienza
Dr. Dario Maschietti

Dr. Antonella Macagnano
Dr. Emiliano Zampetti
Dr. Andrea Bearzotti
1. Start Gadget Sales (e.g. smartphone protective battery case)
2. Stop BEP: Dress-Code Patent Sale (1.5M€ Price year 4)
## Annual Revenue Projections 4 Years

<table>
<thead>
<tr>
<th>Expenses</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
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</thead>
<tbody>
<tr>
<td>Labour cost</td>
<td>70</td>
<td>70</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>Raw materials</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Facilities</td>
<td>25</td>
<td>0</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>Patent</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>External Services:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CNR</td>
<td>70</td>
<td>70</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>Others</td>
<td>20</td>
<td>5</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td><strong>TOT</strong></td>
<td><strong>201</strong></td>
<td><strong>151</strong></td>
<td><strong>196</strong></td>
<td><strong>205</strong></td>
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<table>
<thead>
<tr>
<th>Revenue</th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>EDISON Start</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gadget sales</td>
<td>0</td>
<td>50</td>
<td>100</td>
<td>25</td>
</tr>
<tr>
<td>Supercap Fabric Licensing / Trademarks</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1500</td>
</tr>
<tr>
<td><strong>TOT</strong></td>
<td><strong>100</strong></td>
<td><strong>50</strong></td>
<td><strong>100</strong></td>
<td><strong>1525</strong></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Gross profit</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100</td>
<td>37.5</td>
<td>75</td>
<td>1518.75</td>
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</table>

<table>
<thead>
<tr>
<th>Cost of Goods Sold</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Material + Labour</td>
<td>0</td>
<td>12.5</td>
<td>25</td>
<td>6.25</td>
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<table>
<thead>
<tr>
<th>Net Income</th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>-101</td>
<td>-113.5</td>
<td>-121</td>
<td>1313.75</td>
</tr>
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</table>

*All values in k€*
Revenue Streams

Supercap Fabric Licensing

Smartphone protective battery case

AMDL Revenue Stream
Investment Opportunity

✓ Investment opportunity needed if EDISON Start Award will not be achieved **OTHERWISE** for anticipating recovering of men power costs

✓ Material and Process consistently covered in the business strategy
## Work Flow

<table>
<thead>
<tr>
<th>STEP</th>
<th>Activity</th>
<th>Note</th>
<th>T w.r.t. K0 [Months]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Requirement Specification</td>
<td>Basic Capacitive Fabric requirements</td>
<td>K0 + 1</td>
</tr>
<tr>
<td>2</td>
<td>Engineering</td>
<td>Fabric Process definition</td>
<td>K0 + 3</td>
</tr>
<tr>
<td>3</td>
<td>HTF DM CAP MAI</td>
<td>Developing Model Manufacturing &amp; Assembling</td>
<td>K0 + 4.5</td>
</tr>
<tr>
<td>4</td>
<td>HTF DM CAP ET</td>
<td>HTF DM Basic CAP Electrical Test</td>
<td>K0 + 5</td>
</tr>
<tr>
<td>5</td>
<td>HTF DM CAP MT</td>
<td>HTF DM Basic CAP Mechanical Test</td>
<td>K0 + 5</td>
</tr>
<tr>
<td>6</td>
<td>HTF DM CAP TT</td>
<td>HTF DM Basic CAP Thermal Test</td>
<td>K0 + 5</td>
</tr>
<tr>
<td>7</td>
<td>HTF CAP ADR</td>
<td>HTF Basic CAP Assessment Design Review</td>
<td>K0 + 5</td>
</tr>
<tr>
<td>8</td>
<td>HTF CAP MAI</td>
<td>Engineering Model Basic CAP Manufacturing &amp; Assembling</td>
<td>K0 + 7</td>
</tr>
<tr>
<td>9</td>
<td>HTF DM ACT MAI</td>
<td>Developing Model Manufacturing &amp; Assembling (Init @ STEP 2)</td>
<td>K0 + 6.5</td>
</tr>
<tr>
<td>10</td>
<td>HTF DM ACT ET</td>
<td>HTF DM Basic ACTive yarn Electrical Test</td>
<td>K0 + 7</td>
</tr>
<tr>
<td>11</td>
<td>HTF DM ACT MT</td>
<td>HTF DM Basic ACTive yarn Mechanical Test</td>
<td>K0 + 7</td>
</tr>
<tr>
<td>12</td>
<td>HTF DM ACT TT</td>
<td>HTF DM Basic ACTive yarn Thermal Test</td>
<td>K0 + 7</td>
</tr>
<tr>
<td>13</td>
<td>HTF ACT PWR ADR</td>
<td>HTF Basic ACTive yarn Assessment Design Review</td>
<td>K0 + 7</td>
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<tr>
<td>14</td>
<td>HTF ACT PWR MAI</td>
<td>Engineering Model Basic ACTive yarn Manufacturing &amp; Assembling</td>
<td>K0 + 7</td>
</tr>
<tr>
<td>15</td>
<td>HTF COMP MAI</td>
<td>Developing of COMposite Manufacturing &amp; Assembling (Init @ STEP 14)</td>
<td>K0 + 11</td>
</tr>
<tr>
<td>16</td>
<td>HTF COMP ET</td>
<td>HTF Composite CAP + ACTive yarn Electrical Test</td>
<td>K0 + 12</td>
</tr>
<tr>
<td>17</td>
<td>HTF COMP MT</td>
<td>HTF Composite CAP + ACTive yarn Mechanical Test</td>
<td>K0 + 12</td>
</tr>
<tr>
<td>18</td>
<td>HTF COMP TT</td>
<td>HTF Composite CAP + ACTive yarn Thermal Test</td>
<td>K0 + 12</td>
</tr>
<tr>
<td>19</td>
<td>HTF COMP ADR</td>
<td>HTF Composite CAP + ACTive Assessment Design Review</td>
<td>K0 + 12</td>
</tr>
<tr>
<td>20</td>
<td>FR</td>
<td>Final Review</td>
<td>K0 + 12</td>
</tr>
</tbody>
</table>
I’LL CALL YOU BACK SOON!

SORRY I CAN’T CALL YOU! MY BATTERY IS RUNNING LOW

WITHOUT DRESS-CODE

AFTER FEW MINUTES

WITH DRESS-CODE

I’LL CALL YOU BACK SOON!
# Appendix: Supercap Material

<table>
<thead>
<tr>
<th></th>
<th>Units</th>
<th>SCM-X</th>
<th>SCM-Y</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Surface Area</strong></td>
<td>m²/g</td>
<td>1500-1800</td>
<td>1900-2200 *</td>
</tr>
<tr>
<td><strong>pH</strong></td>
<td>pH</td>
<td>7-10</td>
<td>7-10</td>
</tr>
<tr>
<td><strong>Moisture Content</strong></td>
<td>wt%</td>
<td>3 Max</td>
<td>3 Max</td>
</tr>
<tr>
<td><strong>Ash Content</strong></td>
<td>%</td>
<td>Less than 1</td>
<td>Less than 1</td>
</tr>
<tr>
<td><strong>Raw Material</strong></td>
<td></td>
<td>Coconut</td>
<td>Coconut</td>
</tr>
<tr>
<td><strong>Activation</strong></td>
<td></td>
<td>steam</td>
<td>steam</td>
</tr>
</tbody>
</table>

* About the half of a regular football pitch
SCOPE: Iterative tests on produced samples for identifying the optimum sample preparation process. Test categories: Qualitative

✔ Electrical Test
  • Capacitance / cm²
  • Direct / Reverse polarization breaking Voltage
  • Static and Dynamic impedance
  • Self discharging time,
  • Powering load / unload endurance cycles
  • Thermal cycling @ max power load
  • Pressure cycling @ max power load

✔ Thermal Test
  • Thermal cycling
  • Flammability

✔ Mechanical stress Test
  • tensile ultimate strength and broad control of the tensile
  • flexural strength
  • impact strength

✔ Water proofing, washing, detergent hardness, ironing
**Appendix: Test Plan Phase 2**

**SCOPE:** Final tests on produced fabric for providing the technical datasheet of the final sample. 
*Test categories: certified levels.*

- **Electrical Test**
  - Capacitance / cm²
  - Direct /Reverse polarization breaking Voltage
  - Static and Dynamic impedance
  - Self discharging time,
  - Powering load /unload endurance cycles
  - Thermal cycling @ max power load
  - Pressure cycling @ max power load

- **Thermal Test**
  - Thermal cycling
  - Flammability

- **Mechanical stress Test**
  - tensile strength
  - compressive strength
  - flexural strength
  - impact strength
  - In-plane shear strength
  - interlaminar shear strength and hardness

- **Water proofing, washing, detergent hardness, ironing**