Pollution and climate change threaten to make life on this planet unbearable and unsustainable.
Pollution and climate change threaten to make life on this planet unbearable and unsustainable. We need technological solutions to address our pollution Problem.
Pollution and climate change threaten to make life on this planet unbearable and unsustainable.

We need technological solutions to address our pollution problem.

Electric Vehicle performance is limited by operating temperature.

Polytherm Solution = Lower Temperature = Longer life and improved performance.
Idea: make thermal interface materials
Customers: all electronics segments
Market: Billions

Interviews:

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>103</td>
</tr>
<tr>
<td>In Person</td>
<td>68</td>
</tr>
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</table>
PolyTherm

Bara Cola, PI
Assoc. Professor in Mechanical Engineering

Jon Goldman, Mentor Principal at GT VentureLab

Matt Smith, EL
PhD student in Materials Science & Engineering

Team 607
<table>
<thead>
<tr>
<th>Key Partners</th>
<th>Key Activities</th>
<th>Value Proposition</th>
<th>Customer Relationship</th>
<th>Customer Segments</th>
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<td>Original design manufacturers</td>
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<td>Military electronics manufacturers</td>
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<tr>
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<td>People/grad students</td>
<td>Reduced package weight and size</td>
<td>Channels</td>
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<tr>
<th>Cost Structure</th>
<th>Revenue Streams</th>
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<tr>
<td>Value driven</td>
<td>Material sales</td>
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</tr>
<tr>
<td>Fixed cost</td>
<td>Engineering consulting</td>
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<tr>
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## Original (fairly lame) Business Model Canvas

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Like everybody, we talked to everybody
The Value of Video Calls

- Consumer Electronics
- 100k for Research

Team 607
What we(thought) we learned

- Consumer Electronics
- Avionics
- Servers
- LEDs
- Power Electronics

Team 607
What we(thought) we learned

- Consumer Electronics
- Avionics
- Servers

- LEDs
- Power Electronics

Team 607
What we(thought) we learned
### Intermediate Business Model Canvas

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<td>Reduces thermal resistance by 50%, allowing LED brightness to increase by 10%, increasing sales by 1%</td>
<td><strong>Get</strong>: tradeshows, conferences, SEM, Site visits, sample testing</td>
<td><strong>Users/Influencers</strong>: thermal engineers LED manufacturers</td>
</tr>
<tr>
<td></td>
<td><strong>Keep</strong>: Site visits, tech support, conferences</td>
<td><strong>Decision makers</strong>: Director/Manager of engineering at LED manufacturer</td>
</tr>
<tr>
<td></td>
<td><strong>Grow</strong>: co-creation/design</td>
<td><strong>Influencers</strong>: consultants in energy efficiency</td>
</tr>
<tr>
<td>Reduce assembly time by 50%, reducing labor costs by 5%</td>
<td></td>
<td><strong>Military electronics manufacturers</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Consumer electronics manufacturers</strong></td>
</tr>
</tbody>
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**Channels**

- Direct sales
- Wholesale distribution
So we went to an LED conference

Priorities
1. Cost
2. Packaging
3. Performance
4. Reliability

The LED market needs the best thermal materials!
So we went to an LED conference

Before
The LED market needs the best thermal materials!

Priorities
1. Cost
2. Packaging
3. Performance
4. Reliability

After
The LED market needs the cheapest thermal materials
What we thought customers need

- Heat Sink
- TIM
- Electronics Module

Supplier 1: $20
Supplier 2: $2
Supplier 3: $180
What customers told us they need

“The only reason I’m at this conference is to find out how to pre-apply a TIM to a heat sink. Our customer will drop us if we don’t find a solution.”
Current Solutions

Gap Pad
- High resistance
- Easy to install

Thermal Grease
- Low resistance
- Hard to install

Our Solution
- Easy to install
- Low resistance

Cost?
We have a material that is ~2% or less of the cost of a fixture.
### Final Business Model Canvas

#### Key Partners
- Template manufacturer
- Distributors
- Heat sink suppliers
- Thermal engineering design firms
- Polymer supplier

#### Key Activities
- Fabrication
- Applying material to heat sinks
- Thermal design

#### Value Proposition
**LED:** Increases revenue by 1% by reducing thermal resistance by 50% and heat sink size by 10%
**POWER:** Increases revenue 5% by reducing thermal resistance 50% and allowing for 5% more power per module
**BOTH:** TIM materials pre-applied on heat sinks/substrates will improve margins 5% through 50% reduced assembly cost and 15% reduced failures.

#### Customer Relationship
**Get:** tradeshows, conferences, SEM, Site visits, sample testing
**Keep:** Site visits, tech support, conferences
**Grow:** co-creation

#### Customer Segments
**Users/Influencers:** thermal engineers LED manufacturers & power module packagers
**Decision makers:** Director/Manager of engineering at LED manufacturer & power module customers

#### Channels
- Direct sales
- Wholesale distribution

#### Key Partners
- Template manufacturer
- Distributors
- Heat sink suppliers
- Thermal engineering design firms
- Polymer supplier

#### Key Resources
- Value driven
- Volume pricing

#### Revenue Streams
- Materials sales
- Pre-application of material on heat sinks

#### Cost structure
- Value driven
- Volume pricing
## Value Proposition

LED: Increases revenue by 1% by reducing thermal resistance by 50% and heat sink size by 10%

POWER: Increases revenue 5% by reducing thermal resistance 50% and allowing for 5% more power per module

BOTH: TIM materials pre-applied on heat sinks/substrates will improve margins 5% through 50% reduced assembly cost and

## Customer Segments

**Users/Influencers:**
thermal engineers LED manufacturers & power module packagers

**Decision makers:**
Director/Manager of engineering at LED manufacturer & power module customers
We are a No Go (for now)

Not punting!

More testing needed.

Technical Video
https://www.youtube.com/watch?v=ysP9orJmr_E

Lessons Learned:
https://youtu.be/Jmb3uI0fh7g