

# Case Studies

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# Service Offerings

**Zebulon Solutions offers variety of technical and business services:**

## Technical Services

### Product Design

- ❖ Turnkey product design
- ❖ Design services
- ❖ Independent design analysis

### Technical Analysis

- ❖ Tolerance analysis
- ❖ Failure mode effect analysis
- ❖ DFX analysis

### Product Industrialization

- ❖ Production test development
- ❖ Tooling support
- ❖ Project engineering
- ❖ Supply chain development
- ❖ Process development

## Business Services

### Program Management

- ❖ Project, program or portfolio management
- ❖ Turnkey or partial
- ❖ PMO setup

### Fractional Executive

- ❖ Technical and operational executives on a fractional and / or interim basis
  - VP Eng / CTO
  - VP Ops / COO

### Business Analysis

- ❖ ROI analysis
- ❖ Risk analysis
- ❖ Business plan financials

# Case Studies

Product	Market	Product Design	Technical Analysis	Industrialization	Program Management	Fractional Executive	Business Analysis
Optical touch panel	Other	■	■	■		■	
CO2 cleaning system	Clean-Tech		■	■	■	■	■
Solar wafer test equipment	Clean-Tech				■		■
Inventory management system	Other	■		■		■	
Wound care diagnostic device	Medical	■		■			
Kiosk	Other		■	■			
Optoelectronic module	Other			■			■
Electric bike	Clean-Tech					■	■
Portable generator	Clean-Tech	■	■				
Data storage library	Other		■				
Diagnostic instrument	Medical	■					
Premium coffee	Other					■	■
Gaming accessory	Other	■					■
Industrial LED lighting	Clean-Tech	■					
Neural network module	Other	■					
Battlefield respirator	Medical						■

## Background

- **Customer:** Late-stage, well funded startup based in Australia
- **Product:** Touch panels for consumer displays based on novel optical technology
- **Situation:** Preparing to ramp product into high volume manufacturing

## Zebulon Solutions productization engagements

### 1. System Design

- On-site system engineer

### 2. Industrialization

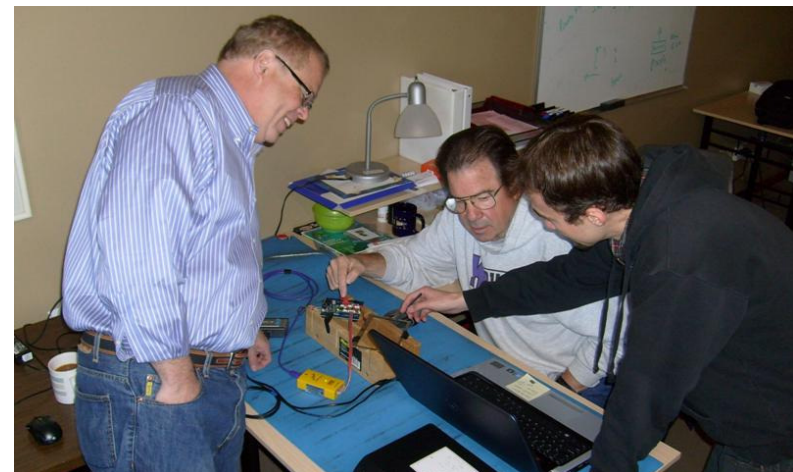
- System level tolerance analysis including optical, electrical and mechanical tolerances
- Full product DFMEA
- DFX analysis

### 3. Fractional VP Engineering

- Restructured global engineering team

## Value delivered to the customer

- Instituted rigorous engineering processes
- Detailed analysis of manufacturability
- Improved assembly processes



## Background

- Customer: Colorado spinout of a European research lab
- Product: Textile cleaning systems utilizing CO<sub>2</sub>
- Situation: POC prototype complete for Product A; design of Product B just beginning

## Zebulon Solutions productization engagements

### 1. Program management

- Managed development program for Product B

### 2. Interim VP Operations

- Set up 3<sup>rd</sup> party manufacturing

### 3. Interim CFO

- Financial analysis for business plan

### 4. Supply chain development

- Investigated global supply base both for prototypes and for manufacturing

### 5. Industrialization

- Conducted DFMEAs on both products

## Value delivered to the customer

- Coordinated global design teams
- Created complete BOM and supply chains



## Background

- Customer: National laboratory
- Product: Test instrument for screening solar wafers during manufacturing
- Situation: R&D complete; looking for commercialization partners

## Zebulon Solutions productization engagements

### 1. Business Analysis

- Collaboration with the national lab and a local university
- Detailed market assessment
- Investigated commercial feasibility and licensing options

### 2. Project management

- Managed multi party project team

## Value delivered to the customer

- Market assessment report detailing market opportunities
- Detailed ROI and sensitivity analysis

## Background

- **Customer:** Privately held company in Silicon Valley
- **Product:** RFID based niche industry specific inventory management system
- **Situation:** Design complete and prototyped but many bugs, esp. at system level

## Zebulon Solutions productization engagements

### 1. Design assessment

- *Second set of eyes* assessment of existing design
- Uncovered several substantial design flaws
- Unearthed major cost reduction possibilities

### 2. Interim VP Engineering

- Took over entire engineering team on an interim basis
- Re-architected system to improve reliability
- Prioritized *musts vs wants* and focused team on pending launch
- Defined validation and production test requirements

## Value delivered to the customer

- Saved months of time and money by early detection of design flaws
- Identified millions in annual cost reductions, both near and longer term
- Provided realistic schedule for senior management to plan toward

## Background

- **Customer:** Medical device startup
- **Product:** Vision system for analyzing certain medical conditions
- **Situation:** Bench prototype and full software

## Zebulon Solutions engagement(s)

### 1. POC design

- Developed POC designs of key subsystems including battery charging circuit, audio circuit and laser drivers

### 2. Industrialization

- Investigated local outsourced manufacturing documents
- Developed requirements and specifications documents for outsourced design

## Value delivered to the customer

- Requirement documents
- Product design specifications
- Supply chain definition

## Background

- **Customer: Multinational startup with angel funding**
- **Product: Kiosk that manufacturers a simple, custom product**
- **Situation: Two prototypes built; shaking out the production design in advance of launch**

## Zebulon Solutions engagement(s)

### 1. Design Validation Test

- Analyzed product for potential failure mechanisms
- Developed design validation test requirements
- Developed design validation test plan to meet the requirements
- Collaborated with design team to help fix potential reliability issues

## Value delivered to the customer

- Design validation test requirements
- Design validation test plan

## Background

- **Customer: Silicon Valley venture funded startup**
- **Product: Optoelectronic module for use in military and consumer applications**
- **Situation: Prototypes built and qualified; booked first big order**

## Zebulon Solutions engagement(s)

### 1. Quality System

- Established baseline quality processes, procedures and checklists
- Set up a baseline quality system along lines of ISO 9001

### 2. Inventory Management

- Set up a spreadsheet based inventory management system for prototypes
- Evaluated and selected 3<sup>rd</sup> party inventory management system to bolt onto existing QuickBooks financial system

## Value delivered to the customer

- **Quality system up and running**
- **Inventory management for both prototypes and production**

## Background

- **Customer:** Ten-year-old privately held manufacturing company
- **Product:** High end electric bicycles
- **Situation:** Existing product in low volume manufacturing

## Zebulon Solutions engagement(s)

### 1. Interim CFO

- Cleaned up past three years of Quickbooks accounting
- Cleaned up inventory errors
- Developed a five year forecast incl P&L, B/S and cash flow
- Analyzed various business cases
- Prepared financials and business plan for investors

## Value delivered to the customer

- CEO gained much deeper understanding of his past, present and forecasted financials
- Cleaned up financials
- Full business plan for future investors
- Earned a presentation slot at the prestigious *Angel Capital Summit*



## Background

- **Customer:** Angel backed stealth mode startup in San Francisco
- **Product:** Portable generator for developing markets
- **Situation:** Proof of concept prototypes developed; ready for alpha

## Zebulon Solutions engagement(s)

### 1. Mechanical DFX review

- Conducted thorough review of key mechanicals
- Recommended changes to design
- Suggested modification to improve drop test results
- Suggested materials options

## Value delivered to the customer

- Reduced product and tool costs
- Improved manufacturability
- Increased ruggedness

## Background

- **Customer:** Late-stage venture funded startup in California
- **Product:** Next generation ultra-large data storage library
- **Situation:** Product functioned properly but required endless hand tweaks

## Zebulon Solutions engagement(s)

### 1. Cost reduction analysis

- Full tear down of product
- BOM analysis
- Identified 20+ opportunities for cost savings
- As part of the CR activity, Zebulon Solutions proactively identified opportunities to dramatically improve yield and lower costs, which led to...

### 2. GD&T analysis

- Conducted rigorous GD&T analysis of key robotic subsystems
- Identified specific design modifications in advance of hard tooling

## Value delivered to the customer

- \$500K in net BOM cost savings
- Specific design modifications to dramatically improve yield and manufacturing cost



## Background

- **Customer:** Fortune 500 materials company with little electronics technology
- **Product:** Medical diagnostic instrument targeted at spinal cord injury patients
- **Situation:** Market research only; no design of any kind

## Zebulon Solutions engagement(s)

### 1. Feasibility Study

- Investigated sensor solutions
- Provided medical market domain knowledge
- Investigated system architectures
- Developed initial cost estimates

### 2. Proof of Concept

- Prototyped various sensor technologies
- Designed and build breadboard level electronics module

## Value delivered to the customer

- Functioning prototypes for internal and external demonstration
- BOM cost estimates
- Potentially patentable IP related to sensor technology

## Background

- **Customer:** Family owned coffee roaster
- **Product:** Premium fresh roasted coffee
- **Situation:** Existing product in low volume manufacturing and distribution

## Zebulon Solutions engagement(s)

### 1. Fractional CFO

- Set up Quickbooks
- Imported pre existing spreadsheet and Quicken data and cleaned up
- Trained bookkeeper on new system
- Improved process to account for diverse credit card charges
- Established simple inventory process
- Created a financial plan
- Calculated various breakeven scenarios
- Advised on optimal inventory practices



## Value delivered to the customer

- CEO gained much deeper understanding of his past, present and forecasted financials
- Low maintenance bookkeeping and inventory schemes established

## Background

- **Customer:** Startup looking for angel funding
- **Product:** Accessory for console gaming
- **Situation:** Creating a business plan ; one hand built prototype (w/ duct tape)

## Zebulon Solutions engagement(s)

### 1. Feasibility Study

- Generated a target BOM for all components and subassemblies
- Provided budgetary costs for each component
- Provided design and tooling estimates for each component
- Provide design prose for use in business plan

## Value delivered to the customer

- Enabled customer to fill in design and cost details into their business plan
- Won a monetary prize for *Best Business Plan* at a competition
- Positioned to raise angel capital

## Background

- **Customer:** Global billion dollar company
- **Product:** LED lighting product using RFID
- **Situation:** Market research only; one crude prototype

## Zebulon Solutions engagement(s)

### 1. Proof of Concept design

- Researched sensor and power control solutions
- Designed custom antenna
- Created BOM and schedule strawmen
- Built and tested breadboard product
- Designed and build six near form factor prototypes for market feedback

## Value delivered to the customer

- **Demonstratable prototypes**
- **Strawman design for budgetary purposes**

## Background

- **Customer:** Established company specializing in robotic subsystems
- **Product:** Neural network module for use in research
- **Situation:** Board level prototypes had performance issues

## Zebulon Solutions engagement(s)

### 1. Electrical design

- Redesigned decoupling , interface and power circuitry
- Re laid out PCB
- Debugged and delivered functioning prototypes

## Value delivered to the customer

- Functional product



## Background

- **Customer:** Startup seeking angel funding and DoD grants
- **Product:** Novel medical device that would save lives of troops on the battlefield
- **Situation:** Concept idea only and connections within DoD and USAMRMC

## Zebulon Solutions engagement(s)

### 1. DoD grant application writing

- Develop all details for a major grant application against a DoD BAA
- Managed multiple partners including two universities and multiple consultants
- Developed full, self consistent set of financials
- Wrote the actual grant application

## Value delivered to the customer

- **Complete multimillion dollar grant proposal**
  - They did not win this grant but were positioned for other funding
- **Background information for commercial business plan**