Titanium Metal Injection Molding

Project completed for Kinetics, Inc.

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Presentation Agenda

- Background of Kinetics
- Background of MIM
- Titanium Metal Injection Molding
- Potential Market
- Investment Costs
- Expected Cash Generation
- Expected Return on Investments
- Conclusion
- Recommendations
Background of Kinetics

- Privately owned contract manufacturer
- Metal Injection Molding (MIM)
- Currently $12 million in sales
- 2nd largest in the US
- Looking to advance the industry and increase market with MIM Titanium
Background of MIM

- Metal forming process
- Ferrous metals (carbon steel/stainless steel)
- Net Shape or Near Net Shape Process
- High Strength .. near wrought
- Highly complex
- Highly intricate details
- High production volumes (millions parts/yr)
Background MIM

- MIM does NOT replace other competing technologies.
- For Complex geometries
  - Better material properties than casting or P/M
  - Lower cost than CNC machine @ higher volumes
  - Greater design freedom than P/M or screw machining
MIM Process

- Compound Feedstock
  - Fine Metal Powders
  - Binder (Thermoplastic)
  - Mix & Pelletize
- Mold
  - Create 3D shapes
- Debind
  - Remove binder
- Sinter
  - Heated to below M.P.
  - Molecular Bonding

Diagram:
- Powder
- Plastic
- Compound Feedstock
- Injection Molding
- Thermal Debinding/Sintering
Green-Debound-Sintered
MIM Parts
MIM Parts
Non-captive MIM Market

- 220M Worldwide Market
  - Expected to grow ~25% per year
- Serves
  - Medical
  - Telecommunications
  - Automotive
  - Power Handtools
  - Consumer Goods
Titanium Metal Injection Molding

• Why Titanium
  • Corrosive resistant
  • Low Weight
  • Withstand high temperature
  • Highly explosive

• Research has been done, production capable
• No MIM competitors have implemented
• Steady growth in titanium use in all industries
Titanium Market

**World Titanium Markets**

- Aerospace: 40%
- Industrial/Commercial: 31%
- Military: 15%
- Consumer: 10%
- Medical: 4%

**Material Usage by Market: ($ in Millions)**

- Aerospace: $802.80
- Industrial/Commercial: $622.17
- Military: $301.05
- Consumer: $200.70
- Medical: $80.28

Total: $2,007.00 (in millions)
Potential Market

• No hard numbers for Finished Titanium Parts (i.e. medical, automotive, aerospace)
• Numbers for raw material usage only
• Kinetics not limited by Titanium market, limited by ramp up capabilities
• Forecasted net sales based on Kinetics history
Investment Cost

- Development costs
  - Process
  - Feedstock
  - Facility
- Capital Equipment Costs
  - Furnace
- Liquidity of company
Expected Cash Generation

- Net Sales Forecast
- Cost of Sales
- Gross Margin
- Depreciation
- Net Cash Generation
Development Costs

- Process Development (labor)
- Feedstock Development (labor)
- Facility Development (labor)
- Material Costs
- Supplies
- Outside contractors
Cash Flow

- Years
- Total Investment (in millions)
- Net Cash Generation (in millions)
Expected Return on Investments

- Kinetics “Hurdle Rate” is 10% (MARR)
- Calculating NPV of cash flows
- Payback Period is 4.18 years.
- IRR of project is 26.8%
Conclusion

- IRR > MARR
- Payback period is acceptable for company
- Competitive advantage
- Expected gross margin is above company average for sustaining and growth
- Accept Project!
Recommendations

• Better potential market research
• More precise net sales forecast
• More precise information from other industry leaders
• Co-development with potential titanium customers
• Results based only on economic analysis
Questions?