Highly Efficient Use of R&D and Prototyping Budgets

VPE Technical Specialties

- Processes for metal joining, thin film coating, heat treating and fabrication
- Design of experiments – for processes and assembly fabrication
- Assemblies and devices having high temperature applications
- Use of and joining of exotic metals and ceramics
- Brazing – vacuum, hydrogen, induction, fast ramp heating
- Diffusion bonding, TLP (Transient Liquid Phase) bonding
- Design for efficiency and quality in production
  - Complex assembly techniques and fixtures
  - Microchannel device processing and assembly
- Testing and analysis
**R&D FOR DEMANDING CUSTOMERS AND MISSION-CRITICAL APPLICATIONS**

- Fortune 50 conglomerate – development of implantable battery seals
- Aerojet – development of cleaning processes for reactive metals
- LLNL – development of pulse purge cleaning technology
- GE – development of a ruggedized sapphire window for harsh environments

**RANGE OF R&D SERVICES**

- Component, subassembly or turnkey product development
- Contract research services
- R&D preceding production by either customer or by VPE
- Prototyping, proof-of-concept demonstrations
- Design of Experiment (DOE)
- Specific process development or problem solving
- Technology transfer programs
- Production equipment, production line development
- Complete R&D solutions using both in-house and subcontractor expertise

**PROCESSES, EQUIPMENT, FACILITIES**

- Brazing furnaces for: vacuum, partial pressure, hydrogen and argon
- Systems and furnaces for diffusion bonding and induction brazing
- Thin film coating by electron beam, ion plating, and sputtering
- Heat treating – many specialized processes
- Techniques for fabrication of complex fixturing and assemblies
- GTAW welding and capacitor welding stations
- Cleanrooms, cleaning cells, flow benches
- Metallurgical testing and analysis
- Wet lab, metrology, variety of inspection equipment
- 60,000 sq ft of design, lab, QA and production space

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**IN-HOUSE TESTING AND ANALYSIS SERVICES**

- Advanced testing and analysis services to support both in-house R&D and production QA and also offered as an external service to customers
- ISO 9001-2008 certified
- Examples
  - Metallography laboratory analysis
  - Residual gas analysis
  - Helium leak detection
  - Pressure testing
  - Strength of materials
  - Failure analysis

**WORKING WITH VPE**

- Minimize R&D, prototyping, production costs, and time-to-market through innovation
- In-house metallurgical expertise to solve difficult problems as they arise
- Complete solutions – using both in-house resources and well qualified subcontractors
- Contract flexibility - from cost-plus to partnering
- Highly responsive technical interaction with prospects and customers – engineer-to-engineer

**OVERALL CAPABILITIES OF VPE**

- Contract R&D, prototyping, and turnkey product design
- ISO 9001-2008 certified manufacturing and processing services
- Many joining processes, including precision brazing and diffusion bonding
- Thin film coating, heat treating, comprehensive analysis and testing lab
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