SBIR - Small Business Innovation Research

"The SBIR program, established by the U.S. Congress in 1982, offers a total of over $1 billion in federal grants annually to fund Research and Development (R&D) by small businesses over a three year period. SBIR allows small firms to pursue innovative ideas that venture capitalists will not consider, bankers feel are too risky, and startups find too expensive. Over 4,700 awards totaling $1.1 billion were distributed in fiscal year 1997.

The goal of SBIR is to stimulate conversion of research findings into commercial applications. SBIR grants provide small businesses with excellent opportunities to fund the development of new products, new applications for existing technologies, and improved manufacturing processes. Each participating company retains full patent rights of the technology developed using the SBIR award. In turn, the government may obtain royalty-free use of the patent".

Three Phases

I - demonstrate feasibility
II - develop prototype
II - take product to market

Two Phase I's in progress, working on Phase II submittals now:

1. Automated precision machining
2. In-situ QC

Two new Phase I's will be submitted:

3. Diamond turning machine for production of accelerator cells
4. Production of net/near net shaped parts

1. **Title: Real Time Interferometric QC –** RedCone Research

Purpose: Measure accelerator cell dimensions while part is on diamond turning lathe. Performs mechanical QC of most features on 100% of the accelerator cells.

Description: Accelerator cell is optically measured while still turning on lathe, in the period of time after the turning is complete and before the lathe stops to remove the part. What is done with the data is up to us.

Phase I objective: Develop prototype optical head to verify technique. Simulate part on diamond turning lathe.

Specifications:

- Measurement accuracy of . lmicrons
- Measures flatness, parallelism, outside diameter, location of HOM holes and slots, portions of iris profile
- Checks placement of part in lathe chuck => checks for burrs
- Can be used on lathe or for stationary QC (i.e. CMM).

Phase II objective: Develop small optical head and integrate head into a diamond turning lath. Develop data analysis software and user friendly interface optimized for the measurement of accelerator cells.

2. **Title: Precision Machining Center for Precision Machining Accelerator cells –** Robertson Precision

Purpose: Develop and optimize an automated machining center and process that turns **and** mills accelerator cells to the precision required to minimize diamond turning times.

Phase I objective: Purchase equipment for temperature control of environment. Machine 80 cells to measure machine tolerance and 25 cells to demonstrate that sequential machining is possible **and** practical. Use human to simulate autoloading.

Specifications:

- Human will load and unload parts without touching machine controls. Will attempt to simulate autoloading.
- Determine machine errors in temperature regulated environment/
- Precision turn both sides of accelerator cell to 10 microns oversize with 2 micron tolerance by machining cells sequentially, i.e. 1,2,3…..50.

Phase II objective: Purchase a twin-spindle/twin-turret/multi-axis machining center with gantry loading. Optimize process for precision machining of accelerator cells.

3. **Title:** Automated Diamond Turning Lath for the Production of Copper Accelerator Cells

   Purpose: Develop a low cost diamond turning machine targeted for high volume production of copper accelerator cells for the Next Linear Collider. The machine will feature automatic part loading and unloading, integrated part inspection and a user friendly controls interface.

4. **Title:** Production of net/near-net shaped copper parts for NLC accelerator cells

   Purpose: Build a working prototype of a machine to stamp and coin copper cells. Process will replace rough and perhaps precision machining by producing a substrate with less than 25 micron tolerances.