Snow College
Aerospace Strategic Workforce Initiative Proposal

Snow College's Industrial Technology Department has developed a vibrant and growing program in Manufacturing Technology. Our department chair has had extensive experience as a shop foreman in an aerospace manufacturing facility that builds parts for Bell Helicopters, Northrup-Grumman, and other suppliers and manufacturers of aviation parts. In recent years, we have purchased equipment and added a faculty member to help teach manufacturing technology courses, including a course on composite materials. We have trained technicians who are employed by ATK, Klune Industries, SyberJet, and ACT Aerospace. We are in great need of enhancing our composites program within manufacturing technology. While we offer one course in composites and integrate it into our overall manufacturing technology program, we are not able to train as many students as our employer partners need, nor to the level of proficiency that our partners need.

Regional Employment Needs

ACT Aerospace is a medium-sized firm that employs 153 people in their manufacturing facility in Gunnison, Utah. The company specializes in composite design, analysis, and production for the military and commercial aerospace industries. ACT's particular forte is in hand laid-up laminate construction, filament winding, composite compression molding, and large oven curing. Each year we send four or five machinists to the ACT Gunnison facility. However, we have not been able to send students who are trained in composites, because we have a very small composites program that presently consists of one course. In short, we have not come near to supplying the number of technicians ACT needs. ACT Human Resources Director Katy Edwards reports that in 2015, ACT hired over 100 employees, and many of these employees have been hired off the street and trained by ACT at the jobsite. Because they are not trained prior to beginning work at ACT, many of the employees leave before they can be fully trained on-site. Ms. Edwards reports that ACT could use a steady stream of technicians trained by Snow College to work in ACT Aerospace and ACT-affiliated companies in the Gunnison area.

In the aerospace facility alone, ACT has a high demand for technicians to work in laser lay-up, vacuum operations, cut tables, curing ovens, autoclaves, maintenance of walk-in freezers, rivet and nut cage assembly, and adhesives mixing. These are all tasks that can be taught at our Richfield campus as we expand our program. In addition to ACT Aerospace, Snow College regularly places students at Klune Industries in Spanish Fork and SyberJet in Cedar City. Both companies are asking for more graduates to meet their growing demand for composite material production.

The aerospace industry in Utah puts $5.4 billion into Utah's economy every year.[1] Utah is considered to be one of the most attractive states for aerospace manufacturing. The PwC network of professional services firms ranks Utah third in the nation for aerospace manufacturing attractiveness.[2] The average aerospace manufacturing technician in Utah earns $52,000 a year. The aerospace industry is the second-fastest growing industry in Utah, growing at an annual rate of 9.5 percent.[3] ACT Gunnison and other aerospace companies are in desperate need of technicians that we can train. We need some financial help to get us started.

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[1] Utah Governor's Office of Economic Development, Spring 2010. *Accelerating Utah's Aerospace and Defense Industry*, 5. Business.utah.gov/wp-content/uploads/Final-Final-AD-Report/6.10.pdf.

[2] "2016 Aerospace Manufacturing Attractiveness Ratings," PwC, July 2016. Accessed September 14, 2016. http://www.pwc.com/us/en/industrial-products/publications/aerospace-manufacturing-attractiveness-rankings.html?utm_source=Area%20Development%20Site%20%26%20Facility%20Planning%20Newsletters&utm_campaign=b95a9206b7-SFP_This_Week_357&utm_medium=email&utm_term=0_94850a8d43-b95a9206b7-302588781&goal=0_94850a8d43-b95a9206b7-302588781.

[3] Department of Workforce Services, 2015 job growth figures.

Our Needs in Composites Technology

A few years ago, we purchased small freezers and a small oven, constructed some cut tables, and secured materials for shop work from local composite companies as part of our newly created manufacturing technology program. Currently, we offer courses in the following:

- Industrial printreading
- Manufacturing and automation technology
- Robotics
- Geometric dimensioning
- The manufacturing process
- Composites
- Quality control

In order to meet the demands of industry, we are going to need course offerings that combine elements of some of these existing courses along with new courses that can lead to a one-year certificate of completion in composite manufacturing technology. This degree will be stackable, leading to completion of an associate of applied science degree in manufacturing technology, and transferability to four-year institutions for completion of a bachelor's degree. We have consulted with our industry partners to determine their specific needs and create courses accordingly. We believe we can produce 50 students a year who will complete either a certificate or degree to help our industry partners. Based on our early assessments, we will need courses developed that include training in the following areas:

Course Name	**Semester**	**New/Existing Course**	**Credit Hours**
Introduction to Composites (material cutting, adhesive technology, refrigeration storage	Fall	Existing	2
Composite Technology II (vacuum processing, vacuum table operation, laser lay-up)	Fall	New	3
Industrial Safety	Fall	Existing	1
Manufacturing Processes and Design	Fall	Existing	3
Aerospace Manufacturing I (aerospace quality control and standards training)	Fall	New	3
Applied Technical Math	Fall	Existing	3
Composite Technology III (autoclave operation, paint prep, and painting)	Spring	New	3
Aerospace manufacturing II (inventory control, packaging and shipping, work order training)	Spring	New	2
Expository Composition	Spring	Existing	3
Business Communications	Spring	Existing	3
Numerical Control Operations	Spring	Existing	2
Total for certificate of completion			**28**

With this certificate of completion in hand, students will be able to work at jobs at ACT Aerospace, Klune Industries, ATK Orbital, and Boeing Corporation, working in the following areas:

Laser Ply Placement
Filament Winding
Large oven curing
Paint and adhesive application

Composite compression molding
Autoclave curing
Laminate construction
Resin transfer molding
Inventory control
Packing and shipping

In addition to the education students receive from us, ACT Aerospace has agreed to provide them with internships and service learning opportunities working on their production floor in Gunnison to gain real-time experience in a commercial setting that makes component parts for aircraft manufacturers. Courtney Robinson, an engineer at ACT will work with Alan Hart, our chair of industrial technology, to arrange all student work at ACT and to evaluate their progress. All of our applied technology programs work closely with industry partners in advisement committees. We will work closely with ACT and Klune in our advisement meetings to insure that we are meeting their needs by programming to meet industry demand.

Stackable Credentials

As shown above, students will be able to complete required courses and earn a certificate of completion in one year. High school students from Sevier and South Sanpete School Districts will be able to complete the certificate of completion during their junior and senior years in high school, making them eligible for employment (by current industry standards) at our industry partners manufacturing sites upon graduation from high school. We have agreements to bus students to Snow College from Gunnison High School, South Sevier High School, and North Sevier High School. Richfield High School Students can walk to our facility, since we are located adjacent to one another.

The certificate of completion in composite manufacturing will allow students to continue and complete an Associate of Applied Science in manufacturing technology, which will introduce them to other manufacturing processes and technologies which are also in high-demand by high-tech manufacturing companies. The associates degree allows qualified technicians to work in supervisory roles on the manufacturing floors. This degree is also stackable and will enable students to transfer to four-year institutions and receive the following degrees:

Degree Program	**Institution(s) Where Offered**	**Total Completion Time**
Engineering CAD/CAM	Southern Utah University	4-5 years
Manufacturing Engineering Technology/Plastics and Composite Emphasis	Weber State University	5-6 years
Mechatronics Engineering Technology	Utah Valley University	5-6 years
Technology and Engineering Education	Utah State University Southern Utah University	4.5 to 5 years

The completion times required for bachelors degrees in these programs require about the same amount of study time as if they were taking courses directly from the universities, with the exception of the UVU

Mechatronics program, which would require an additional year of study for a transfer student compared to a student who starts at UVU.

Building Our Program

In order to fully meet the demands of industry, we are going to need financial assistance to develop our program in a way that is efficient, given the fact that we have both post-high school and high school students taking our composite courses. This means that we need a full-time faculty member devoted to composite education in addition to the two full-time faculty members we currently employ in manufacturing technology. We will also need state-of-the art equipment to train on in order to meet industry needs. While we have modest composite technology resources, it is not enough to meet the demand of industry.

Snow College proposes the following budget for the use of Strategic Workforce Investment funds:

Requested Budget

Need	Estimated Cost	Justification
Large Oven	$10,000	We currently have two small ovens. To properly train students in composite manufacturing, they need a large oven that can handle the volume and will be similar to the ovens they use on the job.
Rivet guns, tools, nut cages	$4,000	These tools are used in the assembly portions of the manufacturing process.
Materials to build our own tools	$1,000	Metals and other materials are needed to build tools and molds needed for students to form manufactured products.
Vacuum pumps and vacuum table	$4,000	We can purchase used pumps and tables. The pumps are used to extract air from materials being cured, and vacuum tables are used to filter parts being drilled and cut out in the workplace.
Walk-in freezer	$10,000	Part of the manufacturing process requires a large freezer that stores materials used in the production process. Our current freezer system cannot accommodate the amount of materials we will need to have on hand on the shop floor.
Autoclave	$150,000	The industry standard is an ASC process system autoclave. We would purchase a small, industry standard autoclave that is used. Autoclaves temper and strengthen composite parts in the manufacturing process through a high-tech heating method. This is essential to the aviation industry.
Laser Lay-Up	$25,000	We can purchase a quality used product. This tool is essential for designing models and for production of composite products. Aerospace industries use laser layup systems to develop templates and assure quality control in the production process.
Cut table	$15,000	We can purchase a quality used product. Used to cut prep-reg composite products. Composites are no longer cut manually because of the risk of

		costly mistakes and the need for precision in manufacturing.
New faculty position	$70,00	Projected salary of $45,000 to $50,000 and benefits of $20,000.
Faculty training	$5,000	Money needed to support travel, lodging, and meals while faculty members train alongside composite workers at actual manufacturers' sites.
Other Materials/supplies	$5,000	Needed to cover unexpected costs, supportive equipment and materials.
Total one-time costs	**$229,000**	Equipment, training and materials.
Total ongoing costs	**$70,00**	One new faculty position.

Snow College Commitments and Leverage

Snow College began growing composite technologies several years ago within our manufacturing technology program. Alan Hart, our department chair, had many years of experience working with ACT Aerospace, and he knew we needed a program to meet market demand. He hired an additional faculty member and set up a modest shop that has two small freezers and a small oven, and he worked out a contract with an area producer to receive composite materials for the program. He set up a new course and had this very small program approved by his division dean and the College's Curriculum Committee. We are committed to developing this program to suit industry needs and propose the following:

Scholarship students. In addition to existing scholarship moneys that are available to select students who have above-average skills and academic records, we will waive Snow College application fees for high school students who want to study in the program, and give them the concurrent enrollment tuition break by charging them only $5 per credit.

Tuition waivers. We will waive tuition costs or partial costs, as per Utah System of Higher Education guidelines, for students possessing exceptional ability and skill.

Marketing. The College will make special attempts to advertise our manufacturing technology program, and especially the composites courses and certificate of completion program. These opportunities will be advertised on our College web page and will be included in printed materials that are sent to Department of Workforce Services offices, teachers, counselors, and parents in our six-county service region. In addition, we will include our manufacturing technology program in our college open houses, in our high school visits, and in specialized literature that we will print to reach prospective students.

Curriculum development. We will create new courses, especially to accommodate the certificate of completion program, leading to the two-year associate's degree as an encouraged and stackable option. In addition, we will train high school students in composite technology so that upon graduating from high school, they will be prepared to take jobs requiring their skillsets.

Building our own tools. One of the requirements of a good composites program is the production of goods manufactured according to industry standards and specifications. This requires tools in which to mold and manufacture composite products. We will build our own tools so students can build parts to specifications that will duplicate the processes used by ACT Aerospace and other aerospace and defense contractors.

Site visits, internships, job shadowing. Any important part of student success is giving them as much exposure to job site training as possible. We are interested in providing internships and job shadowing opportunities for our associate degree students, and on-site training for all of our students from an ACT engineer-teacher, Courtney Robinson. ACT is supportive of Mr. Robinson providing training for our students, and he is very interested in working with our students. All internships and job shadowing projects will be set-up and evaluated by our instructors to maintain quality and rigor.

Facility development. We are committed to making space for the increased equipment and floor space needed for a composite facility. Currently, our manufacturing technology program is located with our machine tool technology program. We will be converting space from a discontinued program in auto body repair and using this space to house the composites program. There is more than enough room for all of the equipment in that program and there is also classroom space available.

Placement. Snow College's career services director, Lisa Laird, is located on the Richfield campus. She is committed to working closely with prospective employers within our six-county region and with employers outside our immediate area as well. She has a strong track record of bringing employers to campus to visit our facilities and classes and is a strong believer that our composites program will be successful and will be able to place students.

ACT Commitments and Leverage

ACT Aerospace is committed to working closely with Snow College in preparing students for employment and in providing the resources for students to continue their education. Snow College will work closely with ACT in developing an effective curriculum that will benefit our students and meet ACT's needs. This relationship will also help prepare students for other employment opportunities that exist in our area in addition to the aerospace field, including prosthetics, firearm manufacturing, and aircraft ground support manufacturing, along with other industries relying on composite manufacturing.

ACT has a program of continuing education for qualified employees. Technicians who have a good performance record have a tuition reimbursement plan that will allow them to return to Snow College to take additional courses and pursue an associate degree. While the certificate of completion program is attractive to ACT, they also have a desire to attract students with associate degrees to work at their company. They plan to use their tuition reimbursement plan to help qualified employees complete the associate degree in manufacturing, and in some cases, continue with their education through the Utah State University distance centers in Ephraim or Richfield.

ACT has also volunteered to give us scrap materials left over from the manufacturing process and materials with expired use dates that can still be used in shop floor training. They will also notify us of updates to work order forms, industry standards and so forth, so we are ever ready to deliver well-trained students to the workforce.

Return on Investment

Snow College receives frequent requests from manufacturers across the state for students trained in composite manufacturing. We are confident that we can send 50 students per year to our partner ACT and to other composite manufacturers in the state. As mentioned above, ACT hired over 100 employees in 2015 year alone at their facility in Gunnison. Based on a variable payscale, 25 graduates per year would result in the following return on investment:

Hourly Rate	Annual Salary Per Student Placed	Total Salary Earned per 25 Students Placed	Initial State Investment	Value Added Beyond State Investment
$12.00	$24,960	$624,000	$299,000	$325,000

$13.00	$27,040	$676,000	$299,000	$377,000
$14.00	$29,120	$728,000	$299,000	$429,000
$15.00	$31,200	$780,000	$299,000	$481,000
16.00	$33,280	$832,000	$299,000	$533,000

Please note that these returns are based only on single-year returns and do not reflect cumulative, multi-year returns.

Our six-county service area has been in a steady state of economic contraction for some time. Manufacturing jobs are rare in our region. With a trained workforce in composites, other companies are more likely to locate facilities in the area. Brett Ashton, and investor and consultant to the aviation industry in Sanpete County has had close contact with an aircraft manufacturing firm located in Fountain Valley, California. They have expressed interest in the possibility of setting up a composites assembly site in this region if the economy supports their expansion plans and if we can provide a trained workforce. In addition, SyberJet has expressed some interest in opening an assembly facility near the Richfield airport in Sevier County. As we have studied the need for composites manufacturing, we have learned how vital carbon fiber manufacturing is to the economy and how much this product will be used in many other applications in the years ahead. Carbon composites are replacing stamped steel sheets in the manufacturing of durable goods, like home appliances, car bodies and construction materials. It is also being used in solid manufacturing in the production of beams, struts and supports, tubing, medical machinery and other products that previously used metal parts. We see the development of this program as a high-tech option for Utahns seeking good paying jobs. The following are products made with composite materials produced in Utah, or by companies headquartered or represented by regional offices in Utah:

Aircraft fuselage, wings, tail sections and interior panels
Military drones and missile body molds
Boat hulls and decking
Outdoor fencing and decking
Sports equipment (baseball/softball bats, rackets, helmets and other protective gear)
Fishing rods
Gunstocks and barrels
Water tanks
Orthopedic surgical devices, prosthetics
In-ground swimming pools
Bicycles
Shipping and packaging containers
Asphalt and concrete fiber composites
Thermoplastics (both short and long fiber)

Conclusion

We are grateful for this opportunity to propose the building of our composite manufacturing program. We are confident this will be a boon for employment in Central Utah and for the state generally. We are also grateful to ACT Aerospace in Gunnison for their willingness to work with us in building a strong composites program. ACT's presence in Central Utah is a major boost to our economy and provides jobs and benefits to many families. Their continued success is in Snow College's best interests and benefits the state as well.