

Opportunity for Washington State Leadership in the Composites Industry

A White Paper

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Proposed: That Washington State take the North American leadership role in advanced composite manufacturing and development, and establish a sustainable industry and associated supply chain within 5 years. *The state of the composites industry today is akin to the aluminum industry around World War II, and represents a seldom-seen opportunity. Increasing application of advanced composites is enabling new industries and displacing existing materials in existing industries. Understanding the nature of this opportunity, and enabled with intentional policies and actions, Washington State can emerge with a potent industrial force, long-term job growth and a significant competitive advantage. The timing is excellent.*

Summary

There is a unique opportunity to take a leadership role in an emerging, very high-value, sustainable industry, with significant long-term economic benefits. North America and the US in particular, have been developing a composites industry as a broad brush across all geographic regions with no real concentration or critical mass. Europe and Japan have recognized this industry for its potential and are much more focused and coordinated in their approaches to its development. As double-digit growth is expected, there will be excellent market opportunities and the leaders will win based on manufacturing productivity and knowledge-based production. It is *not* a given that the low-cost labor countries will dominate this industry, as their internal demands are growing so rapidly and their labor costs are also increasing quickly, similar to how Japanese labor rates increased in the 1960s-1980s.

Washington State has a particular mix of historical and fortuitous situations that allow it to be the leader. Acting in concert, now, Washington State, local government and industry can capitalize on these advantages, by gathering all the critical players, cross-pollinating with incentives and industrial programs, and “breeding” a new way of doing business that will result in sustained economic growth through growth of existing companies, attraction of others to Washington and creation of new businesses driven by innovation. This approach will rely heavily on advancing industrial/college/university training programs, as well as having incentives for technology R&D leading to highly advanced manufacturing capability with the correct mix of human and machine automation. Given the companies, capabilities, and drive in Washington State, this is feasible in a near-term (5-year) timeframe.

Capital markets are just beginning to pay attention to the advanced composites industry (as they rightly see the leading edge of a “bubble”) and Washington State could be a major attractor/focus area by becoming the early leader. This leadership then follows on to “innovation viral growth” as the existing and new talent begins to address broader applications and industries, which then cement the position in the eyes of the capital markets and allow the opportunity to create a highly stable, financially sustainable, clean, well-paid manufacturing base that is one cornerstone of environmentally sound industry that the world requires. Providing incentives that are realistic and feasible in today’s State and corporate funding environments will be difficult to achieve, but in an early growth market there may be excellent “hidden” opportunities to incentivize both the large and small companies with the State’s input.

Immediate opportunities exist in a number of large markets: aerospace, transportation, wind energy, ocean energy, military (defense applications, veterans’ rehabilitation and quality of life), medical, recreational goods, and recycled high-value materials. Even initiating the discussion about a state-level regional response to this leadership opportunity should have high-value payback for the participants, and the long-term benefits of capitalizing on this opportunity are huge for the people and economy of Washington State. This white paper is intended as a seed to initiate and stimulate this wider conversation among the industry, government and academic communities. Collaboration among all parties is needed to define and execute any strategies for large scale and sustainable benefits for Washington State. Following are bullet points capturing thoughts around the opportunities designed to help stimulate other interested parties to add their input, join the dialogue and, hopefully, participate in resulting actions.

This white paper was prepared by Geoff Wood, President of Profile Composites NA, Bremerton, WA, and by the National Center for Manufacturing Sciences (NCMS), Bremerton, WA.

Proposed Goals

- Establish Washington State as the premier manufacturing location in North America for advanced composites within 5 years.
- Develop the most advanced training available for composites technologists and manufacturing staff within Washington State within 4 years.
- Build a WA industry base that serves applications in transportation, aerospace, marine, energy (wind and ocean), recreational goods, consumer goods, recycling, and R&D.
- Create a network of excellence for both R&D and manufacturing for DoD within 5 years.
- Provide the model for technology integration within and across industries.

Why This is Critical

- Advanced composites industry is entering a massive growth period, which will last for several decades.
 - Growth is an established fact; aerospace, transportation, wind, etc., have committed their futures to composites; supplier base has reached critical mass.
- Actual constraint to competing will be cost/quality of final product, not raw materials.
- Jobs created are very high-value, have large external multipliers, and are very clean.
- Since advanced composites is a relatively new industry, there is a fairly small labor and knowledge base; fantastic opportunity to be led by WA State.
- Act now before anyone else does, and establish ourselves as THE place to go to for solutions.
- Develop and maintain competitiveness with “low-labor-cost” countries (which will be rapidly drawn into needing to service their own internal demands.)

Benefits

- Tens of thousands of skilled labor jobs in the field.
- Burgeoning creative and intellectual property (IP) base as technology knowledge develops and expands.
- New corporate expansions drawn to labor base and knowledge base in WA State.
- Closer interaction of an advanced supply base will resolve many issues developed during the early years of composite development.
- A critical aspect of the “green-industry” movement worldwide would be firmly established in WA State.
- A coming total overhaul of the international transportation industry to ever greater use of advanced light weight materials would see solutions in WA State companies.
 - Demand in this area is simply driven: Excess Weight = Added Fuel Requirements = Higher Costs = Noncompetitive/unsustainable.
- The “established” advanced composite players will learn and grow from new infusion of thoughts, technologies, and materials, improving their bottom line, and vice-versa.
- University programs will expand and develop with highly focused efforts, gaining leadership positions across the US for both College and University level training.
- Grant fund availability could improve as the education system grows.

How This Can be Accomplished

- Recognize that *manufacturing productivity*, supported by *innovation* in processes and materials, is the key to winning in this industry.
 - Focus on workforce development. A highly educated workforce is critical.
 - Establish basis for highly capable and productive workforce in a joint manufacturing/training environment.
 - Implement robust knowledge-based manufacturing processes, with appropriate levels of automation.
 - Seek and facilitate teamwork among existing advanced composite materials and technology suppliers.

- Grow technology readiness inside and across companies able to adopt.
- Incentivize productivity in advanced composite manufacturing for both companies and workforce.
- Target “natural fit” industries as first adopters and connect to capital markets with incentive packages for both companies and investors.
- Facilitate development of and interactions among local industry/education partnerships.
- Convene a group including industry, government, labor and education to identify and articulate systemic issues, strategies and opportunities – a Washington composites industry VOICE.
- Identify a state level Point of Contact to enable and maintain focus on the composites industry and enable coherent interaction.
- Engage the materials supply chain in their crucial role in growth of small and medium sized companies.
 - Determine what can be done to incentivize major composites industry players like Toray, SGL/BMW and Boeing to participate in technology sharing with partner companies (non-competitive Joint Ventures, for example).
- Encourage establishment of a Recycle Industry in high-value 2nd generation carbon fiber composites. This is a large emerging, inevitable and unfulfilled need, representing opportunity.
 - Make it happen here by working within the supply chain and SMEs.
 - Have the technology development as part of a regional R&D center with availability to all WA State companies.
 - Work with the large users (Boeing, etc.) to recover/reuse their waste in downstream applications, and set-up a materials clearing house for continuity/ease of distribution.
 - Work with fiber suppliers such as Toray and SGL/BMW to recover value-added product into their other supply chains.
- Tune University/College education and training to provide an adequate supply of technical professionals.
 - Recognize uniqueness of advanced composites and separate it from traditional materials science/metallurgy. Benchmark what some have done for plastics.
 - Integrate with all aspects of industry for high-value education, and specific education focus that helps keep people in field (as opposed to generic education with a few composite courses).
 - Have strong incentives in place for faculty and attract new faculty from industry talent pool, not only from other University/PhD programs.
- Make R&D facilities, knowledge and prototyping resources accessible for workforce development and launch of new businesses/products.
 - Develop incentives for large companies
 - Target government/private foundation grants
 - Encourage/facilitate collaboration among local industry/education partnerships.

- Create the “Pacific Northwest Composites Consortium” as a formal enabling framework for intercompany and industry/government collaboration. This would be implemented through a highly credible and experienced not-for-profit cross-industry R&D consortium, such as the National Center for Manufacturing Sciences (NCMS).
- Send targeted messages of “composites leadership” -
 - internal to Washington State, to encourage local industries that might be considering transitioning to applications of composites, and to students and existing workforce to encourage participation in this “future oriented” industry, in Washington
 - externally, to help attract the establishment/relocation of businesses in the State.

Potential Incentive Approaches and Benefits

- Background
 - Small companies need cash flow and access to talent and specialized resources – while looking forward to positioning for acquisition/growth
 - Larger companies need return for their shareholders, in the form of improved sales, improved margins, and/or improved product using innovation.
- A net of connections among corporations, both large and small, facilitated and maintained with the establishment of the appropriate collaboration framework, creates further opportunities for all to collaboratively leverage and compete on federal programs from the DoD, DOE, DOT, USVA, etc.
- Partnerships facilitated by the State and the collaboration framework could provide links that allow small companies to enhance winning Federal SBIRs (Small Business Innovative Research grants), with access to talent and technology from the large companies and non-profit entities.
- Joint and licensed IP would enhance the larger company and provide a revenue stream to the partners (could be both ways).
- Growth companies would be positioned as suppliers/partners to major names, and thereby greatly enhance their visibility for potential investment, merger and acquisition, (which brings further outside capital investment into the picture.)
- This incentivizing through access to people and technology would lead Washington State to a much stronger Tier 1 and Tier 2 supplier base, thereby enhancing the productivity and benefits to the State and also to the larger OEMs.
- Any group developed to anchor this opportunity for Washington State should have the mandate to work with individuals in businesses as well as capital markets and State/Federal representatives to create the appropriate mix of workable and defensible incentive packages.

To register your interest in participating or staying in touch with this growing discussion, or to submit comments, questions or suggested additions pertaining to this white paper, you are invited to contact Michael Fancher, National Center for Manufacturing Sciences, at michaelf@ncms.org or phone (360) 782-1370.