



**Report on the 2011 and 2012
NASA Ames Research Center (ARC) / Alaska State Cargo Airship Workshops**

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Abstract

This presentation summarizes the “Cargo Airships for Northern Operations” workshop that was held August 24 – 25, 2011. This workshop co-sponsored by NASA ARC and the Alaska State Department of Transportation, was initiated by Alaska Lt. Governor Mead Treadwell to investigate the potential benefits of proposed cargo airships for the Alaskan economy and societal needs. The workshop provided a brief background on the technology and operational aspects of conventional airships and hybrids followed by presentations on issues affecting cargo airship operations such as weather management, insurance, regulations, crew duty/rest rules, and available support infrastructures. Speakers representing potential cargo airship users from Alaskan State and commercial organizations presented the needs they felt could be met by cargo airship services. Presenters from Canadian private and military interests also detailed applications and missions that cargo airships could provide to remote regions of Canada. Cost drivers of cargo airship operations were also addressed and tools for modeling and analyzing operational factors and costs affecting cargo airship operations were discussed. Four breakout sessions allowed workshop participants to contribute inputs to four topic areas: “Business Approaches and Strategies (financing; incentives; public/private partnerships; etc) for Airship Development and Operation”, “Design, Development, Production Challenges, and Possible Solutions”, “Regulatory, Certification, Legal, and Insurance Issues, and Operational Issues”, “Customer Requirements, and Airship Requirements”. A follow on to the 2011 cargo airship workshop is being planned for late August 2012. A status update on this second workshop will also be presented.

Background

In early 2010 a meeting was held in Anchorage, Alaska between representatives from the NASA Ames Research Center (ARC), the Alaska State government, Alaska Department of Transportation (DOT), and various local commercial firms. The meeting addressed the potential benefits of airship technology, missions, and

operations for Alaska. NASA ARC was already engaged in airship technical analysis and program assistance with the “Prototype Rigid Aeroshell Variable Buoyancy (RAVB) Air Vehicle” - Project Pelican hybrid airship program, as well as other airship investigations.

The Alaska discussions addressed the possible service solutions that large cargo

airships could offer to the commercial and governmental sectors in Alaska. The Alaskan stakeholders showed significant interest in the potential value of airships capable of transporting large and heavy supplies, fuel, equipment, and building materials into remote industrial sites and isolated villages. There was also strong interest in airships that could transport Alaskan goods, fishery and wildlife products, and enriched mine ore out of the wilderness areas in an environmentally friendly manner. Based on these discussions NASA ARC and the State of Alaska signed a Space Act Agreement (SAA) to:

“...establish a cooperative relationship between NASA ARC and the State of Alaska to collaborate in the organization of one or more State of Alaska-sponsored Heavy Lift Airship Workshop(s). The purpose of the initial workshop is to bring together government and industry experts in airship technology and applications with representatives of potential users and technology partners from the State of Alaska. The workshop will provide a forum to familiarize attendees with the state of the art and remaining technical challenges in airship development, with current and planned government and industry applications, and with the unique challenges and transportation requirements of Industry and government entities in the State of Alaska. During the term of this annex, the State of Alaska and NASA ARC will collaborate, per the responsibilities listed below to organize and execute the described initial workshop and any follow-on workshops deemed appropriate by both parties.”

As outlined in the SAA a workshop was planned that would focus on multiple needs identified by the Alaskan State government, and identified the practical applications of [9th International Airship Convention, Ashford, 2012](#)

airships. The workshop would be co-hosted by the Alaskan government, NASA ARC, and potentially other hosts at a venue in Alaska.

Workshop Planning

Planning discussions between NASA ARC and the Alaska DOT focused specifically on the event being a workshop and not a conference. The intention was that the speakers and attendees would discuss “practical approaches to developing and deploying cargo airship systems for commercial transport of goods and materials to meet the needs of remote communities and industries in Alaska, and Northern Canada”. The workshop scope was extended to include Canada due to the great number of similar transportation, business, and weather issues affecting the two regions and investigate opportunities for collaborations to address common needs in these two regions.

NASA ARC and Alaska DOT leadership guided the agenda objectives. The workshop would include participants that could share from their current experiences in meeting the challenges of transport in northern regions. Airship experts would describe both the possibilities airship cargo transport offers, and the challenges of developing practical and cost effective heavy lift airship systems. The workshop would also endeavor to bring together potential users of modern heavy lift airship services with representatives from the airship development community. Because this was seen as the first of possibly several such workshops, NASA ARC felt the need to provide an impartial technical perspective on what they termed “the art of the possible” for cargo airships. For this reason NASA ARC made the decision not to include speakers from the leading cargo airship development firms. NASA ARC wanted to give to the potential airship users at the workshop a basic understanding of the state of the art for large airship vehicles so that the user community could make informed

decisions when assessing the offerings of the airship developers.

When identifying session topics it was determined that an important theme should be identifying the principal mission requirements for heavy lift airships operating in northern climates. This emphasis would be bolstered by presentations on airship technologies, the current status of airship regulatory issues, airship weather issues, the likely capabilities and limitations of heavy lift airships, and the current to near-term technology readiness of cargo airship programs. Strategies for possible funding of transport airship development was also a high priority topic since many a promising airship program has been doomed by the lack of sufficient financing.

With the exchange of insights and airship technical information the workshop participants were expected to gain sufficient appreciation of cargo airships such that the workshop could conclude with the establishment of a set of draft objectives for a larger follow-on workshop on heavy lift cargo airships in 2012. To facilitate the development of these objectives the final day of the workshop would feature a set of working group sessions organized by interest areas in which all attendees could participate and share their questions and ideas. Emphasis would be placed on sharing requirements, opportunities, challenges, and solutions.

Invitations for workshop attendees would target: commercial shipping companies, air freight companies, airship companies and aerospace vendors. US and Canadian government organizations that employ cargo transport systems, commercial construction companies, resource extraction companies (oil, gas, and mining) researchers from government and academia, Government agencies, (especially the Federal Aviation Administration and Transport Canada), military organizations, Non-governmental [9th International Airship Convention, Ashford, 2012](#)

organizations (NGO's), and humanitarian relief agencies.

Choosing the workshop dates was complicated by the scheduling of the 19th AIAA Lighter-Than-Air Technology Conference for September 20 - 22, 2011 in Virginia Beach, Virginia, and the Airships to the Arctic VI conference for December 5 - 6, 2011 in Seattle Washington. To provide potential speakers and attendees with sufficient time to make their travel plans, and to stay within the brief Alaskan summer the dates of August 24 – 25, 2012 were chosen for the workshop.

The option of asking one of the airship operators to bring an airship to Anchorage and provide the participants with a demonstration of current airship technology was considered. However, this option was quickly abandoned due to the lack of time available for an airship operator to obtain the necessary sponsorship and scout out a safe flight route to and from Anchorage. As a substitute, a local Alaskan hot air balloon operator was sought to provide tethered hot air balloon ascents, but no hot air balloon companies could be found near Anchorage. Finally, a company that owned a remote control model of their airship concept who were happy to demonstrate their model airship and be a paying sponsor of the workshop was located.

In keeping with the overall objectives of the workshop the following session topics were selected:

- Introduction to Airship Systems
- Airship Weather Management Options
- Airship Insurance, Regulations, and Other Legalities
- Delivering Responsible Resource Development
- Provision of Aviation Services to Alaska
- Transport Issues for the Alaska Oil and Gas Support Industry

- Impacts of Distance and Remoteness for Emergency Management and Disaster Relief in Alaska
- Panel Discussion on Airship Technology and Operations to meet Alaska Requirements
- Canadian Forces Perspective on Airships for Cargo Transport
- Airship Flight Performance and Operations
- Operational Factors and Costs of Cargo Airship Operations
- Economic Aspects of Transport Airship Operations
- Breakout Sessions
 - Group 1 – Business Approaches and Strategies (financing; incentives; public/private partnerships; etc) for Airship Development and Operation
 - Group 2 – Design, Development, Production Challenges, and Possible Solutions
 - Group 3 – Regulatory, Certification, Legal, and Insurance Issues
 - Group 4 – Operational Issues, Customer Requirements, and Airship Requirements

The venue for the workshop was the University of Alaska located on the outskirts of the city of Anchorage. The 900 seat Wendy Williamson Auditorium provided more than enough space for the attendees to sit in comfort while the speakers addressed them from the theatrical stage which featured a large projection screen. The sponsored lunches and receptions were held in Cuddy Hall, and nearby Rasmuson Hall provided space for the workshop exhibitors to set up their displays. The University's Wells Fargo Sports Complex provided ample room for indoor operation of the radio-controlled airship.

Perhaps the most challenging aspect of organizing the workshop was in locating speakers who were available to speak at short notice.

The Workshop (Day One)

The morning sessions of day one of the workshop were organized under the theme of; "Airship Technology and Operations". Following the sign-in and continental breakfast, the workshop was opened with welcome remarks from Tom Case, Chancellor of the University of Alaska, Anchorage. In his introductory remarks Dr. Pete Worden, Center Director of NASA Ames Research Center (ARC) highlighted the capabilities of NASA ARC in providing world class R&D support for aviation and space developments for over half a century (Figures 1-2).



Figure 1. Current NASA Ames Facilities

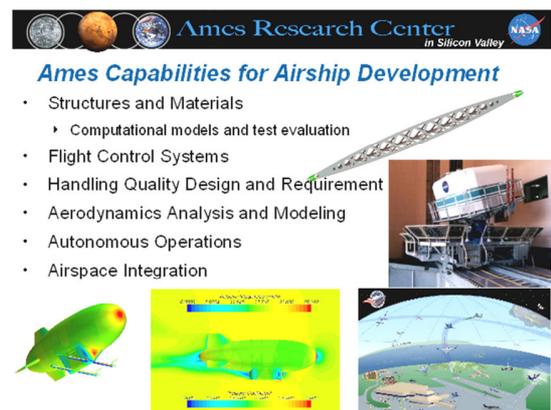


Figure 2. NASA Ames Airship Capabilities

The Honorable Mead Treadwell, the Alaska Lt. Governor who advocated strongly for the development of airship cargo hauling systems that could alleviate some of the pernicious transportation challenges that Alaskans must deal with every day, gave the keynote address.

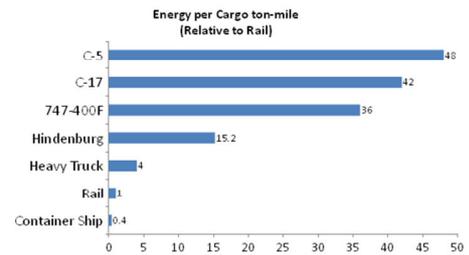
Dr. John Melton (NASA ARC) and this author provided an "Introduction to Airship Systems," which provided insight into current cargo airship design concepts and technologies. Dr. Melton provided some detail on NASA ARC's capabilities in aircraft design analysis, stress analysis, modeling and simulations as they apply to airship concept designs (Fig. 3).



Figure 3. NASA Ames Airship Simulation

He also offered some guidance on the possibilities offered by the existing airship technology database, and pointed out some of the design and development research that's needed for commercial cargo airships to advance to higher payload ranges (Fig. 4).

Relative Cargo Transport Fuel Efficiency



Advanced cargo airships will be the only aircraft capable of approaching trucks in freight fuel efficiency

Figure 4. Efficiency of Competitive Transports

Dr. Ananthakrishna Sarma (SAIC) spoke on "Airship Weather Management Options" outlining the weather issues that affected airship operations in Alaska. He described the computer-based capabilities that are necessary to develop an airship weather mitigation methodology. He concluded with a description of the modeling and simulation tools he has developed, which can provide "weather optimized flight routes" for proposed cargo airships (Fig. 5).



Figure 5. Computer Optimized Airship Weather Routing

The author's presentation on "Airship Insurance, Regulations, and Other Legalities" provided background on the current status of FAA regulations, insurance, crew duty/rest rules, available support infrastructures, and other factors that need to be updated to provide the prerequisite regulatory rules and standards for cargo airships (Fig. 6).

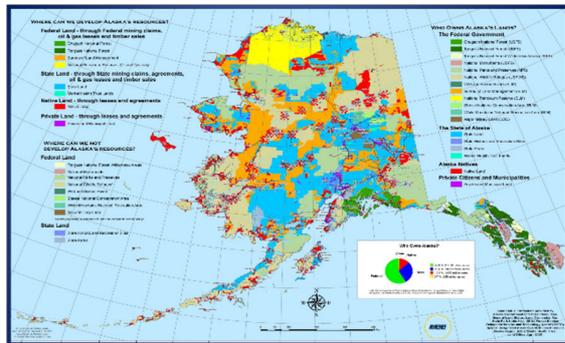


Figure 8. Land Development Owner and Authorities

He also stressed that with the weather conditions in Alaska any potential investors would need to be given a great deal of confidence that the cargo airships and all their dependant support systems were reliable and cost effective. He said the majority of potential investors, operators, and airship customers will ultimately need to see substantial demonstration of a cargo airship.

Steven Hatter, Alaska Deputy Commissioner Department of Transportation, Aviation Division gave an address titled, "Provision of Aviation Services to Alaska". In parallel to Mr Balash's commentary, Mr. Hatter shared his unique perspectives on the difficulty of delivering aviation services in a state where approximately one-third of the population lives off the road system and relies on aviation as the primary means of travel. He described the extensive provisions necessary for the delivery of commerce and health services to remote or isolated Alaskan communities. He pointed out the high cost of establishing and maintaining rural Alaskan airports at present, and the escalating costs that may force a cutback on the number of future rural airports (Fig. 9). Cargo airships may offer timely airborne support capability to bolster the services of the few remaining rural airports in years to come.

- Expensive to construct runways in rural Alaska
- Equipment, labor, material and supplies must be barged or flown in
- Gravel \$600/cubic yard;
- Heavy equipment & machinery – stranded capital
- Intensive logistics, planning & dispatch window



Figure 9. Rural Capital Projects in Alaska

Captain Bob Pawlowski of the Legislative Liaison to the Denali Commission spoke about the "Transport Issues Development Projects in Alaska's Rural Communities". He said any cargo airship operation to support housing development programs in rural Alaskan areas must be able to demonstrate their cost effectiveness, and this means that they must be less expensive than existing conventional air transport options. One of the major challenges to cost effectiveness is that the communities to be served are quite small, typically 300 or less in population. Capt. Pawlowski offered some application areas where he believed cargo airships could be of great value. These included:

- Transporting seafood to major market customers, (The hauling is seasonal and the airships would have to follow the fisheries movements.)
- Fuel distribution for winter resupply. (Most communities only have enough fuel on hand for their own needs thus no extra fuel is available for economic expansion - Fig. 10.)
- Distributing propane liquefied gas to communities. (Suggested the airship could be a flying propane station.)
- Rural power systems support. (Large airships could pick up modular power station units and fuel tanks to set up new power resources for remote communities.)
- Wind turbines could be more easily moved by airships. (Electrical transmission lines, towers, general

support structures for electricity and broadband communications systems.)



Figure 10. Fuel Re-supply to Shore Fuel Storage Site

Captain Pawlowski also touched on the need for remote electricity and fuel resources to support economic expansion of the natural resources in Alaska. He pointed out that efforts are underway to set up the Donlin Creek mine, which has the potential to extract 33 million ounces of gold annually and provide a thousand jobs to local residents (Fig. 11). The expected level of electrical power required is however causing the mine developers to consider employing a small nuclear reactor as a power source.



Figure 11. Donlin Creek Mine

This extreme power shortage is exacerbated by the fact that the mine will have very limited days of accessibility by road and only 100 days of accessibility by water each year.

John Madden, Alaska State Director, Division of Homeland Security, Department of Military and Veterans Affairs gave a sobering talk on the “Impacts of Distance and Remoteness for Emergency Management and Disaster Relief in Alaska”. He explained how the size and remote nature of Alaska presents many unique challenges for surveillance, emergency management, and disaster preparedness, mitigation and recovery. He pointed out that the population of Alaska is slightly larger than that of Washington, DC and that if Washington, DC had the same population density as Alaska, Washington would have just 64 people within its city limits. The cost of living in Alaska is greater than the other 49 states. Alaska has 3 million lakes and more wetlands than all the other states combined. Since the founding of the State of Alaska in 1959 the State Governor has had to declare a state of disaster somewhere in the State on an average of once every 90 days. Mr. Madden called Alaska the “State of Disaster”, and urged the development of large transport airships that could move resources in quickly to deal with the disasters experienced by Alaskan citizens.

To include the Canadian perspectives Mr. Stuart Russell from Braden Burry Expediting (BBE) was invited to speak on the subject of “Airships and Arctic Logistics”. He gave a short survey of BBE’s experience in conducting air-freight operations in northern Canada over the last 20 years. The principal civilian air cargo transports are the two Lockheed Hercules (C-130) aircraft owned by First Air airline (Fig. 12).



Figure 12. BBE Unloading Civilian Hercules Cargo Aircraft at Yellowknife, NWT, Canada

Mr. Russell said that airships could help with northern transport in several ways. They could provide regular re-supply instead of shipping large amounts of supplies annually for stockpiling, or using expensive ice roads, which means lower costs due to the frequent re-supplies, and less seasonal risks. Using modern cargo airships would allow retirement of older, high fuel consuming aircraft, which would lower the cost per ton/kilometer of air-freight. The cargo airship's reduced ground infrastructure requirements and costs would open up new opportunities for exploiting geographically "stranded" resources.

Following the afternoon break, a panel discussion was held on "Airship Technology and Operations to meet Alaska Requirements". The moderator was Dr. Oliver Hedgepeth, Program Director, Transportation and Logistics Management, American Military University - American Public University. The panelists were: Brandon Berge from Microflight, Greg Opas from Merrill-Dean Consulting, and Stuart Russell from Braden Burry Expediting (BBE) in Canada. Among the many topics the panelists addressed, the viability of airship technologies to meet the needs of Alaskans (and Canadians) was preminent. The panelists discussed what the right size and performance for an initial cargo airship should be. Stew Russell felt that 20 metric

tons represented a solid baseline of payload capability and that any airship that could handle that amount of freight on a reliable basis would establish the viability of cargo airships for northern shippers. He also explained that for most remote drilling teams the heaviest individual item (a portable drill) weighs approximately 11,000 lb; with all the other individual equipment units weighing less.

Windcrafter, Inc. treated the attendees to an airship demonstration flight in the nearby sports complex following the panel discussion. The airship was a radio controlled subscale model of the much larger cargo airship that Windcrafter is developing (Fig. 13). The unique design is intended to take advantage of the reduced aerodynamic drag that results from the interaction of the front and aft airfoils, which are each filled with helium. Workshop attendees were able to ask questions of Micah Warren, Vice President of Windcrafter Inc. who demonstrated the exceptional maneuverability of the flying model around the basketball court. Mr. Warren is working on lining up investors and customers, and develop a larger manned version of the Windcrafter airship concept.



Figure 13. Windcrafter Flight Demonstration in Sports Complex

Immediately following the Windcrafter demonstration, Discovery Air Innovations (DAI) sponsored a reception enjoyed by all in Cuddy Hall

The Workshop (Day Two)

The second day of the workshop began with a morning discussion addressing “Airship Technical and Operational Perspectives”. This session endeavored to present insights into future airship operations and how those operational factors would impact the technical design and performance capabilities of cargo airships.

Major J.A. (Julie) Lycon from the Canadian Forces, and Ahmed Ghanmi of the Defence Research and Development Canada, gave a presentation on the “Canadian Forces Perspective on Airships for Cargo Transport”. Major Lycon began with an explanation of the overall strategic objectives and responsibilities of the Canadian Forces in northern Canada (Fig. 14). She also gave the Canadian Forces perspective on airships, and the potential for cargo airship missions in remote areas of Canada.



Figure 14. Canadian Forces Area of Responsibility

Dr. Ghanmi presented his analysis of the potential for strategically locating cargo airships at specific facilities to provide Canadian Forces with a new option for air cargo sustainment of military facilities around the Canadian North (Fig. 15).



Figure 15. Potential Northern Hub Locations for Sustainment of Military Sites

Scott Danneker from TCOM LLC gave an educational and somewhat humorous educational treatise on “Airship Flight Performance and Operations”. His briefing focused on the basics of airship flight and ground operations and the principal factors that will govern proposed cargo airship flight operations in Alaska and Canada. He also talked about the longest un-refueled airship flight (50 hours) since the end of the US Navy airship program in 1962, and some of the issues of long duration airship flights in northern regions (Fig. 16).



Figure 16. Fifty Hour Airship Endurance Flight 1990

Greg Opas from Merrill-Dean Consulting gave a talk on “Operational Factors and Costs of Cargo Airship Operations” which highlighted how airship planners can use modeling and simulation analysis tools to

assess the operational factors and costs that define cargo airship operations. Mr. Opas clearly demonstrated that there was a need for supplementing airship design analysis with airship operational analysis (Fig. 17).



Figure 17. Airship Operations Cost Model – Cost Output

By conducting comprehensive modeling and simulation of any proposed airship operation it is now possible to accurately define the costs and mission effectiveness of proposed airship operations. The output from these analyses provides investors and customers with a far greater understanding of what the actual utility and profitability will be of any particular airship and its operational application. They also provide a realistic set of airship performance and operational requirements that will drive the design of cargo airships to more useful and desirable configurations.

Dr. Barry Prentice, Director of the Transport Institute at the University of Manitoba discussed the “Economic Aspects of Transport Airship Operations”. He outlined the ongoing transportation challenges of northern Canada and the exorbitantly high cost of all season roads and rail lines (Fig. 18).

Aircraft Type	Cargo (kg)	Cost (\$/km)	Cost (\$/kg)	Airstrip (m)
Twin Otter	955	\$6.50	\$4.09	310
DC 3	2500	\$10.60	\$2.46	925
Curtis C-46	6800	\$17.95	\$1.58	1075
DHC Buffalo	7500	\$17.00	\$1.37	925
Hercules	20000	\$28.50	\$0.86	1700



Figure 18. Aircraft Cost Comparison for a 300 km Flight

The cost effectiveness of proposed cargo airship operations were contrasted with the ever increasing cost of existing ground and air transport options.

Dr. Prentice also pointed out the terrible human impact associated with the remoteness of villages and the high cost and low availability of healthy foods and fresh vegetables to counter the growing epidemic of diabetes among native populations (Fig. 19).



Figure 19. Housing Shortages and High Rates of Diabetes

The luncheon speech was delivered by Gordon Taylor, Marketing Director for Hybrid Air Vehicles Ltd. (HAV), on the topic of “Industry Developments Demonstrating the Advancement of Commercial Airship Operations”. Mr. Taylor touched on the current activities at HAV and their efforts to

develop a line of commercial SkyCat hybrid airships. The initial customer is expected to be the Discovery Air Innovations (DAI) company based in Canada.

Following lunch the speakers and all workshop attendees were invited to participate in four Breakout Sessions. The moderator of the breakout sessions was Dr. Barry Prentice who chose an individual leader to facilitate each of the four breakout groups that then dispersed to nearby rooms to discuss the following cargo airship topic areas:

Group 1 – Business Approaches and Strategies (financing; incentives; public/private partnerships; etc) for Airship Development and Operation

Group 2 – Design, Development, Production Challenges, and Possible Solutions

Group 3 – Regulatory, Certification, Legal, and Insurance Issues

Group 4 – Operational Issues, Customer Requirements, and Airship Requirements

Following the afternoon break the leaders of each of the four groups presented their breakout briefs to the workshop participants.

Breakout Session Highlights

It was suggested that governments need to even the playing field with respect to the public sector transportation infrastructure investments required for airship transport systems. Technology gaps in airship design and development could be bridged by exploiting advanced technologies available from Federal labs and by encouraging the State of Alaska to engage in conversations with airship development programs to ensure that new airship designs will support the needs of Alaskan citizens (Fig 20). More support is needed from those commercial and governmental communities that will benefit most from the development and deployment of cargo airship operations. Political support at both the highest and lowest level of Federal, State, and local governments is needed to provide the [9th International Airship Convention, Ashford, 2012](#)

motivation for these government offices to divert scarce public resources to supporting development of cargo airship solutions. Linkages with Inuit people groups could provide a strong voice for the airships to be used in addressing their many needs. Governments can also provide indirect support for airship developments through tax credits by including airship transportation in transportation carbon credit programs currently being introduced. It was recognized that only a successful public demonstration of a viable cargo airship vehicle (of any scale) will provide the final assurance to public and private industry decision makers that the airship industry is able to build and operate transport airships safely and cost effectively.

Recommendations for future development were made for research in three broad areas of airship design, development, and production:

- Design of new materials, buoyancy compensation systems, and systems requiring reduced manpower for ground support operations. Development of dedicated airship support facilities and infrastructure, more extensive material and component testing, and airship focused personnel education and training.
- Production assembly methods for large structures, streamlining airship assembly, and simplified designs to facilitate payload system integration, improved manufacturing quality, and establishment of a robust production supply chain.

- Develop materials properties forecasts/trends
- Perform systematic evaluation and demonstration of buoyancy control options
- Perform integrated testing and simulation of ground operations based on CONOPS
- Develop statement to inform educators and others of future personnel required (training, jobs, certification)
- Dialog with natural gas producers on economic potential for helium recovery, understand helium economics and forecast demand due to airships
- Incentivize specialty providers to improve production rates and product availability

Figure 20. Recommended Action Items

Discussions on regulatory issues highlighted the dearth of relevant operating regulations governing operation of cargo airships predicted to begin working in Alaska and Canada in the near future. Most of the proposed operations in Alaska would logically be conducted under an FAA approved Part 135 program for the airship operation. But this is not possible in the absence of any FAA pathway for creating a Part 135 cargo airship operation. The FAA Alaska Capstone program established the systems and methodologies needed for self separation of aircraft flying in the National Airspace. This highly successful program is a possible template for Alaska and the FAA to “experiment” with airship operational “guidelines” prior to a major commitment of resources to develop a full slate of appropriate cargo airship regulations. It was suggested that the FAA may more readily address issues associated with airship operations in Alaska if an existing airship were to commence flight operations there.

The long term solution however calls for a joint program between the FAA in Alaska and Transport Canada to devise a common set of cargo airship operating regulations. This idea precipitated an action to investigate possible teaming opportunities between the FAA in Alaska and Transport Canada to at least begin discussing a common set of cargo airship operational “guidelines”.

Dr. Prentice provided an excellent summation of the Breakout Sessions reports, and called for more commitment,

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support, and funding from the government leaders in Alaska, the US, and his home country of Canada. He also called on commercial firms to invest in some serious economic analysis of the value that cargo airships could bring to their financial bottom line. Last, he encouraged the attendees to remember the people of the north who must deal with the twin tyrannies of isolation and extreme weather, for whom the cargo airship offers an air bridge to a more pleasant life.

Dr. Pete Worden, Center Director, NASA Ames Research Center, provided closing comments on the workshop and offered an encouragement for all to attend the planned follow on cargo airship workshop the following year.

2012 Workshop Planning

Planning continues apace for the 2012 follow on workshop tentatively scheduled for late August at the University of Alaska campus in Anchorage Alaska. This year’s workshop is expected to be even better than the successful 2011 workshop.

The 2012 workshop will be framed around four crucial elements:

- Addressing state-directed policy considerations
- Bringing the private sector to the table to talk about markets
- Identifying the operational characteristics necessary for Northern application
- Developing a strategic plan for commercial development

The workshop agenda is still being refined, but some of the anticipated presentation highlights are:

Day 1

- Report on 2011 Cargo Airship Workshop
- Risk Factors and Critical Design Elements for Large Airships
 - This presentation (by NASA ARC) will highlight some of the critical design elements and risk factors that large airship designers must address.
- Airship Weather Modelling Study
 - Modelling and simulations of notional Alaska flight operations for cargo airships.
- NASA Airship Modelling and Simulation Tools
 - NASA ARC will present their current capabilities, and the potential for future research and development as required by the airship community.
- Proposed Initial Airship Operation in Anchorage (Summer – 2013)
 - Presentation on preparation (logistics, sponsorship, FAA regulations, weather etc.) required prior to a visit by Airship Ventures to Alaska.
- The First Helium Airship Designed and Constructed in Canada
 - This presentation will detail the building and flying of the airship developed last year in Manitoba.
- A session of presentations will detail the near-term plans for deployment of cargo airships by some of the major developers of cargo airship concepts. Presentations will be given by representatives from the airship development community.

Day2

- The Utilization of Airships to Construct an Alaska Hydroelectric Dam
 - Presented by the Alaska Industrial Development and Export Authority (AIDEA)
- Discussion of Cargo Airships and their Environmental Aspects
 - Presentation on the environmental opportunities and issues that cargo airships present.
- Potential use of Airships for Search and Rescue, and Emergency Response Services
- Airship Market Study
 - Presentation of insights into airship operational issues, opportunities, limitations, cost, and requirements gained from a recent airship market study.
- Financing a Cargo Airship Business
 - Presentation on what is needed for a cargo airship business plan to obtain commercial investment.
- Public/Private/Partnerships for Funding Airship Development and Infrastructures
 - Presentation on options for funding cargo airship development and infrastructure.
- How can Federal and State Government Incentivize Cargo Airship Deployments?
 - Presentation on proposals for US and Canada aiding cargo

airship development or operations in Alaska/Canada.

- Airship “Speed Dating” Sessions

These will be two sets of afternoon breakout sessions where those interested can sign up to meet in private to discuss airship business development opportunities, and meet with investors (including State and Federal representatives) to discuss proposals for funding cargo airship programs. Meetings can be scheduled in advance and will run for six 15 min. periods.

Day 3

The third day will feature a bus visit in the morning to an Anchorage commercial cargo aircraft operations base. The visit will give attendees a tour of the facilities and an introduction to the logistics of air freighting up to 20 metric tons of cargo to remote Alaskan areas. Visitors will see how materials and supplies are packaged, prepared for air shipment, and delivered (Fig. 21).



Figure 21. Commercial Alaskan Hercules Being Loaded

In addition to the daily speakers presentations we will have an exhibitor’s area where most of the major players in the airship community will be displaying their products and plans for cargo airship operations. There will also be several sponsored receptions, coffee breaks, and luncheons for attendees to enjoy and for the sponsors to communicate their themes to the attendees.

Local tourism options are being organized for those attendees who want to take a bit of time during their stay in Alaska to experience the spectacular natural beauty that the state has to offer.

Closing Thoughts

It is hoped that these cargo airship workshops continue and expand to meet the needs of what is potentially a growing market for cargo airships. These workshops bring together the major players in this next chapter of the air transportation saga.