

Flying Over Time: The Legacy of Donald A. Hall, Designer of the Spirit of St. Louis

Nova Hall and Pace Ellsworth

Flying Over Time Inc, 501(c)(3), Maricopa, AZ, 85138, USA

The upcoming May 2027 centennial of Charles Lindbergh's 1927 transatlantic flight in the Spirit of St. Louis offers a unique opportunity to honor Donald A. Hall, the aircraft's chief designer [1]. This paper explores Hall's contributions and presents the "Flying Over Time" initiative, which aims to inspire future aviation innovators through immersive education and storytelling. By unveiling previously unseen artifacts from the Donald Albert Hall Collection, in partnership with the Missouri Historical Society, we seek to address the aviation industry's pressing need for skilled professionals, including 50,000 drone pilots, 50,000 commercial pilots, and 500,000 engineers and STEAM innovators.

Purpose

This work aims to restore Donald A. Hall's legacy in aviation history and inspire a new generation of engineers, pilots, and innovators. Through immersive storytelling and education, we intend to create an educational framework that draws parallels between Hall's work and the ongoing evolution of commercial air and space travel.

Intellectual Foundation

Donald A. Hall's design of the Spirit of St. Louis in 1927 was a pivotal moment in aviation history, marking the beginning of transatlantic commercial flight. Despite his groundbreaking achievements, Hall remains overshadowed by more prominent figures in aviation history. This oversight represents a gap in public and scholarly understanding of aviation heritage.

The "Flying Over Time" initiative builds upon experiential education principles, integrating storytelling, artifact curation, and technological innovation. Partnering with the Missouri Historical Society, we will unveil previously unseen artifacts from the Donald Albert Hall Collection, providing the intellectual foundation for the initiative.

Addressing the Pilot Shortage

The aviation industry is currently grappling with a significant pilot shortage, a challenge that threatens the stability and growth of air travel globally. According to a 2022 analysis by Oliver Wyman, the demand for pilots is projected to outstrip supply in most regions between 2022 and 2024, with the shortfall worsening over the next decade. The study forecasts a global shortage of nearly 80,000 pilots by 2032, absent a downturn in future demand or substantial efforts by the industry to bolster pilot supply.

In North America, the situation is particularly acute. The region is already experiencing a pilot shortage equivalent to 11% of pilot supply, approximately 8,000 pilots, a gap expected to widen throughout the decade. Factors contributing to this shortage include a wave of early retirements during the COVID-19 pandemic, a mandatory retirement age of 65 for pilots, a shrinking pool of potential pilots from the military, and the high cost and time commitment required for pilot training. Additionally, a significant training bottleneck is

hampering recovery efforts, as the number of pilots that airlines must train currently exceeds historical norms.

The "Flying Over Time" initiative seeks to address this pressing issue by inspiring a new generation to pursue careers in aviation. By leveraging the legacy of Donald A. Hall and the centennial of the Spirit of St. Louis flight, we aim to create educational programs and storytelling initiatives that highlight the importance of aviation careers. Through partnerships with educational institutions and industry stakeholders, we plan to develop immersive experiences that showcase the challenges and rewards of being a pilot, thereby encouraging young individuals to consider this vital profession.

Preserving Records Everywhere

As part of the "Flying Over Time" initiative, we plan to employ cutting-edge artificial intelligence technologies to create an interactive digital avatar of Donald A. Hall. This avatar will be designed to engage audiences of all ages, providing a dynamic and immersive way to explore Hall's contributions to aviation and his pivotal role in designing the Spirit of St. Louis. Drawing on Hall's personal writings, blueprints, and correspondence archived in the Donald Albert Hall Collection, the avatar will be trained to respond to questions, narrate stories, and explain his design philosophies and engineering processes in his own words.

Using advanced natural language processing (NLP) models and generative AI, we will reconstruct Hall's voice, demeanor, and knowledge base, allowing users to interact with him as if speaking to the man himself. This approach not only brings history to life but also creates a platform for personalized education, enabling students, historians, and aviation enthusiasts to engage deeply with Hall's legacy. The avatar will be accessible via online platforms, museum exhibits, and educational apps, ensuring broad reach and inclusivity.

The potential of this AI-driven approach extends far beyond Donald A. Hall. By applying the same methodology to personal and organizational archives of other unsung heroes in aviation and engineering, we can uncover and celebrate countless contributions that have been overlooked by history. Thousands of engineers, designers, and innovators played crucial roles in shaping modern aviation, yet their stories remain untold. By digitizing and analyzing their archives, we can create a global repository of interactive avatars, preserving their legacies and inspiring future generations.

This initiative also offers a scalable model for other industries and disciplines. Schools, museums, and research institutions can use AI to rediscover and honor the achievements of individuals whose work has faded from public memory. By fostering a deeper appreciation for the collaborative nature of innovation, this project encourages students and professionals alike to see themselves as part of a continuum of progress, motivated by the legacies of those who came before them.

The creation of these avatars, starting with Hall, positions the "Flying Over Time" initiative at the intersection of history, technology, and education, ensuring that the stories of aviation's pioneers continue to inspire and educate for generations to come.

International Historical Preservation

In addition to our work with Donald A. Hall's legacy, the "Flying Over Time" initiative has made significant international strides in historical preservation through our partnership with the Association of Librarians, Archivists, and Documentalists of Burundi (ABADBU). Together, we have embarked on a groundbreaking project to digitize and prepare for publication over 2 million archival records from the National Archives of Burundi. These

records encompass critical historical, cultural, and technical insights that have remained largely inaccessible until now.

This partnership represents a pioneering effort to bring advanced digitization techniques and data management tools to a region where archival preservation faces significant resource challenges. The upcoming publication of these records on a digital platform will make this wealth of information globally accessible, fostering international research, education, and cultural understanding. By applying the same principles of digital preservation and storytelling that guide our work with Hall's archives, we are ensuring that the voices of Burundi's past—engineers, innovators, and unsung heroes—are rediscovered and shared with the world.

This collaboration demonstrates how historical preservation efforts can have a ripple effect, bridging continents and disciplines. It exemplifies the potential for partnerships between technology-driven initiatives and local organizations to uncover and amplify hidden histories, inspiring global audiences to appreciate the interconnectedness of innovation and heritage.

Preliminary Results

Preliminary results demonstrate significant public interest in Hall's story and its educational applications. Pilot programs with educators and students have shown measurable engagement with aviation history and STEM topics. Key activities included:

1. **Art & Artifact Display:** The initial exhibitions of Hall-related artifacts have attracted over hundreds of visitors in over 10 locations since 2011.
2. **Educational Modules:** Prototype STEM curricula developed in partnership with educators demonstrated increased student interest in engineering and aviation careers.
3. **Community Outreach:** Public forums and storytelling events received enthusiastic responses, sparking local initiatives to preserve aviation heritage.

Expected Results

The manuscript below details a scalable framework for leveraging historical narratives to address workforce challenges in aviation and STEM. Anticipated outcomes include:

1. **Expanded Workforce Pipeline:** Meeting industry needs for 50,000 drone pilots, 50,000 commercial pilots, and 500,000 engineers.
2. **Public Awareness:** Elevating Donald A. Hall's contributions through national and international campaigns.
3. **Sustainable Models:** Proposing sustainable educational initiatives that link historical preservation with STEM innovation.

Abstract Conclusion

The "Flying Over Time" initiative offers a visionary approach to linking the historical legacy of aviation pioneers with the urgent needs of the modern aerospace industry. Donald A. Hall's story, when effectively told and integrated into STEM education, has the potential to inspire transformative innovation and preserve a critical chapter in aviation history. This paper provides a robust foundation for advancing this mission and rallying public support in the centennial year of Hall & Lindbergh's historic achievement, the transatlantic flight of the Spirit of St. Louis.

I. Introduction

A. Background and Motivation

1. Donald A. Hall's Pivotal but Under-Recognized Role in the Spirit of St. Louis Design

My motivation for this work springs directly from my lifelong immersion in the Donald A. Hall Collection [1], which I have curated over the past three decades. Although Charles Lindbergh's celebrity secured front-page headlines in 1927, it was Hall's uncompromising engineering vision—his innovative fuselage layout, custom fuel-tank integration into the nose structure, and weight-optimization strategies—that transformed the Orteig Prize dream into an airborne reality. Yet Hall's contributions have remained largely invisible in public memory, overshadowed by Lindbergh's fame and the broader narrative of transatlantic flight. By unveiling previously unseen artifacts—Hall's original blueprints, correspondence, and prototype parts—in museum exhibits and digital repositories, we aim to reframe the foundational story behind the Spirit of St. Louis [2] and acknowledge Hall's role as co-author of aviation history. This reframing is not merely corrective; it offers a new pedagogical paradigm in which historical artifacts become active pedagogues, inspiring contemporary learners to see engineering not as abstract equations but as human stories of risk, creativity, and perseverance. Integrating these archival treasures into a broader platform, we establish a scalable blueprint for preserving and interpreting aero-engineering heritage in the 21st century.

2. Centennial of Lindbergh's Flight as a Catalyst for Workforce and STEM Challenges

The upcoming 100th anniversary of Lindbergh's solo Atlantic crossing in May 2027 represents a singular commemorative milestone that must be leveraged to the fullest: it is a strategic inflection point for addressing acute workforce shortages in aviation and STEM. A 2022 Oliver Wyman report projects a global pilot deficit approaching 80,000 by 2032—and North America alone faces an 11 percent shortfall of roughly 8,000 pilots [3]. Beyond pilots, the industry anticipates demand for half a million new aerospace engineers and technologists over the next decade. Leveraging the Centennial, the Spirit100 coalition will orchestrate 100 events—air shows, public lectures, and hands-on workshops—in key aviation hubs (San Diego, St. Louis, New York, Paris, Washington DC), using the “Spirit100th Commemorative Quilt” narratives and the GrowSpirit volunteer clubs to convert public fascination into permanent recruitment channels. By synchronizing these physical events with digital engagement via Spirit100.org—and drawing on AI-driven archiving infrastructure—this campaign seeks to ignite a new generation's passion for flight, demonstrating how lessons from Hall's design ethos remain profoundly relevant to today's technological and workforce challenges.

B. Objectives

1. Restore Hall's Legacy

The first objective of this initiative is historiographical restoration—resituating Donald A. Hall at the epicenter of transatlantic aviation history. Through a multifaceted exhibit campaign in partnership with the Missouri Historical Society and coalition museums, we will surface Hall's original designs, letters, and design diaries, integrating them into an interactive digital avatar capable of narrating Hall's design decisions in his own voice. Complemented by the Spirit100.org platform's “History” section, which houses the 100 stories of the quilt and provides both hand-sewn and screen-printed replicas, we ensure Hall's narrative is woven into public consciousness. Additionally, collaborations with ABADBU and other public archival projects will publish Hall's archival materials on open-access repositories, demonstrating how digital preservation techniques can amplify overlooked engineers' legacies. This objective not only corrects the historical record but also provides a replicable framework for honoring other marginalized contributors in aerospace, ensuring that future scholars and practitioners encounter a more complete, inclusive lineage of innovation.

2. Inspire Next-Generation Aviators, Engineers, and Innovators through Historical Narrative

The second objective is to harness Hall's story and the Spirit of St. Louis centennial as catalysts for youth engagement in aviation and STEM. The GrowSpirit movement—launched in twenty cities coinciding with Spirit100 air-show tent events—will recruit volunteers, deploy flight-simulator workshops, and host engineering hackathons inspired by Hall's design challenges. By linking these in-person experiences to Spirit100.org's “Clubs” and “Media” channels, which feature documentary screenings and Save My History podcasts, we create a continuous learning ecosystem. Students will trace Hall's problem-solving pathways—from blueprint to prototype to record-setting flight—then apply those methods to contemporary drone-pilot training programs and commercial-pilot fellowships.

Through mentorship programs with the Lindbergh and XPRIZE Foundations, participants gain visibility into real career paths, while the Spirit100 quilt's 100 relatable stories personalize aerospace innovation, connecting each young attendee's own centennial aspirations—be it first solo flight or inaugural drone mission—to the broader legacy we preserve as we enter a new century where the spirit of wonder and innovation takes flight.

II. Historical Context and Intellectual Foundation

A. Donald A. Hall & the Spirit of St. Louis

1. Engineering Innovations and Design Philosophy

Donald A. Hall's design philosophy for the Spirit of St. Louis exemplifies an early, deeply human-centered approach to aerospace engineering. Rather than treating each subsystem in isolation, Hall fused aerodynamic, structural, and operational requirements into a single, weight-optimized architecture. His decision to relocate fuel tanks into the nose—eliminating external fuel bladders—reduced drag and simplified refueling, while his use of laminated spruce longerons and a monocoque fuselage delivered an optimal strength-to-weight ratio. These innovations were not merely technical feats; they embodied Hall's conviction that engineering should be a seamless extension of human capability and risk management. By documenting his iterative sketch revisions, scaled mock-ups, and flight-test findings, Hall effectively created a living archive of design reasoning. This archive serves as the pedagogical bedrock for our framework: by studying Hall's notebooks and blueprints, modern learners encounter engineering as a narrative of hypothesis, experimentation, and adaptation. Embedding these artifacts into Spirit100.org's interactive modules allows participants to emulate Hall's problem-solving process—transposing centennial reverence into actionable insights for today's drone-pilot and aerospace-engineer training programs.

2. Hall vs. Lindbergh in Historical Memory

The celebration of Charles Lindbergh's transatlantic feat has, until now, eclipsed Donald A. Hall's engineering authorship in public memory. Lindbergh's charisma and singular pilot narrative created a simplified hero's journey, positioning Hall as a backstage figure rather than a co-architect of aviation history. This collective oversight reflects broader historiographical patterns that privilege visible actors over the collaborative network of designers, fabricators, and test engineers. Correcting this imbalance is central to our mission: by recontextualizing Hall's contributions, we challenge attendees and online visitors to reconsider how history is told—and who is granted canonical status. The Spirit100 quilt's 100 stories, for example, interweave Hall's narrative alongside those of Lindbergh, the funders, and hidden-figure fabricators, prompting a more inclusive understanding of innovation. Through guided exhibit tours and oral-history workshops, we invite individuals to share their own centennial stories, drawing parallels between their lived experiences and Hall's creative perseverance. In doing so, we transform historical memory from a static monument into a living dialogue—one that empowers participants to claim their own roles in aerospace's unfolding legacy.

B. The Flying Over Time Initiative

1. Partnership with the Missouri Historical Society

Our collaboration with the Missouri Historical Society (MHS) anchors the Flying Over Time initiative in rigorous archival practice and community engagement. MHS's curators and conservators are in discussions towards facilitating high-resolution digitization of Hall's original blueprints, correspondence, and prototype components, ensuring both preservation and accessibility. This partnership extends beyond passive digitization: together, we will co-design exhibit narratives that place artifacts in their broader social and technological contexts, from 1920s manufacturing techniques to contemporary additive-fabrication parallels. MHS's educational outreach network also provides access to K–12 and university audiences, where our Spirit100 workshops integrate Hall's materials into STEM curricula. By leveraging MHS's deep local roots, we anchor the centennial commemoration in St. Louis's living heritage, transforming downtown galleries and satellite venues into immersive laboratories of historical inquiry. This model—where a leading museum institution and an academic-industry coalition co-curate technology heritage—serves as a blueprint for other regions seeking to mobilize their own archives in workforce-development campaigns.

2. Artifact Curation and Immersive Storytelling Methods

Artifact curation under Flying Over Time employs immersive storytelling techniques designed to bridge past and present. Utilizing augmented-reality headsets at key events, visitors can superimpose Hall's hand-sketch annotations onto life-size Spirit fuselage replicas, visualizing weight-balance calculations in real time. Interactive kiosks allow attendees to "flip through" digitized lab notebooks, annotating and exporting their own design variants for drone-prototype challenges. The centennial quilt itself—present at each major air show—is curated as a living artifact: volunteers guide guests in placing personal story cards alongside Hall's narrative panels, co-creating a tapestry of collective memory. This hands-on approach transforms passive spectators into active co-historians, fostering deeper emotional resonance and cementing the link between archival artifacts and modern-day aerospace challenges. By weaving these methods into Spirit100.org's virtual gallery and additional digital-archive interfaces, we ensure that immersive storytelling scales effectively across in-person and online audiences alike.

C. AI-Driven "Preserving Records Everywhere"

1. Interactive Digital Avatar of Hall (NLP, Generative Models)

Building on proprietary AI infrastructure, we are developing an interactive digital avatar of Donald A. Hall, powered by fine-tuned natural-language models trained on his letters, notebooks, and oral-history transcripts. This avatar allows users—whether at a museum kiosk, in a classroom, or on Spirit100.org—to engage Hall in first-person dialogue about his design rationale, problem-solving strategies, and reflections on the human dimensions of risk and creativity. By merging Hall's archival voice with generative modalities, the avatar will answer bespoke questions ("Why did you choose laminated spruce?"), propose hypothetical design tweaks, or narrate the emotional stakes of his 1927 flights. This personalized interaction deepens participants' connection to Hall's legacy and exemplifies how AI can animate archival materials, transcending static exhibits to foster active learning. Moreover, the same approach informs GrowSpirit's remote mentorship platform, where aspiring aviators and engineers receive guidance "from Hall" alongside real-time coaching from industry experts.

2. Scalable Model for Other Archival Heroes

The AI-driven Hall avatar, which we might dub the "Hallogram", is a proof-of-concept for a scalable, extensible framework—Preserving Records Everywhere—for honoring other under-recognized contributors across cultural history. Drawing on ABADBU's digital-archive best practices we have supported in East Africa, we have created modular pipelines that ingest scanned documents, apply semantic OCR, and fine-tune domain-specific language models. This workflow can be adapted to figures such as Bessie Coleman, Robert Esnault-Pelterie, or indigenous aerospace innovators, empowering local museums to co-create interactive avatars that tell diverse histories. The Spirit100 coalition will publish this open-source toolkit, enabling global communities to digitize, preserve, and reanimate their own engineering heritage. By demonstrating replicability through pilot projects in partnership with regional archives, we establish a sustainable ecosystem in which historical narratives become dynamic engines for education, workforce development, and intergenerational connection.

III. Expanded Workforce Pipeline

A. Workforce Shortage: Scope & Drivers

The aerospace industry today confronts a confluence of demographic and institutional pressures that threaten its capacity to meet burgeoning demand. Globally, Oliver Wyman projects a pilot shortfall approaching 80,000 by 2032, absent concerted training efforts and policy interventions ([oliverwyman.com](https://www.oliverwyman.com)). In North America specifically, the gap between supply and demand is forecast to peak at roughly 17,300 pilots—equivalent to nearly 11 percent of current requirements—by the same year ([oliverwyman.com](https://www.oliverwyman.com)). Parallel shortages afflict the engineering workforce: the U.S. Bureau of Labor Statistics estimates annual openings for aerospace engineers at approximately 4,200 per year over the next decade—totaling over 42,000 positions driven by retirements and industry growth ([bls.gov](https://www.bls.gov))—while broader architecture and engineering occupations project nearly 195,000 average annual openings ([bls.gov](https://www.bls.gov)). Contributing factors include an aging pilot cadre nearing mandatory retirement, pandemic-era furloughs that precipitated early departures, and slow throughput in flight schools and university programs constrained by limited faculty, simulators, and accreditation bottlenecks. These structural shortfalls underscore the urgency of scalable interventions—like those proposed by GrowSpirit—to expand capacity across drone, commercial-pilot, and engineering pipelines.

B. The GrowSpirit Movement

GrowSpirit mobilizes a coalition of museums, aviation firms, nonprofits, and local education partners to convert the Spirit of St. Louis centennial into a catalytic workforce initiative. Governed by a steering committee that we will form, inviting the Lindbergh Foundation, the XPRIZE Foundation, and our digital-archives consortium, GrowSpirit unites legacy programs with modern outreach channels. Its core strategy leverages three historical conduits: partnership with entities like the U.S. Navy Blue Angels for public “STEM in Action” airshow workshops; collaboration with the Red Tail Cadets to honor Tuskegee Airmen heritage while training entry-level aviators; and integration of Spirit100th narratives—especially the 100-story Commemorative Quilt—to forge personal connections between participants and aerospace milestones. Across 20 host cities, volunteer “Clubs” will operate within tented airshow events, delivering standardized curricula in basic aerodynamics, drone flight simulators, and maker-space prototyping. Mentored by retired pilots and engineers, club members progress through certification modules—culminating in FAA Ground School prep and university-affiliated or job-placement engineering internships—thus transforming centennial commemoration into a distributed training network.

C. Educational & Career Pathways

GrowSpirit’s educational architecture weaves museum and university resources into modular learning pathways that mirror Donald A. Hall’s inventive trajectory. Concurrently, drone-pilot academies run intensive FAA Part 107 preparatory courses, leveraging remote-pilot-certification data (1,065,197 certificated operators as of April 1, 2025) ([faa.gov](https://www.faa.gov)) and embedding historical vignettes to contextualize flight-rules evolution. Our goal is to develop complementary commercial-flight fellowships that place cohorts of aspiring pilots in partnering flight schools while engineering internships embed students within advanced-manufacturing firms working on electric and hybrid-propulsion prototypes. Together, these integrated pathways must offer clear achievement ladders: from introductory exhibit tours in partnered museums, through hands-on simulator challenges, to credentialed certifications and industry placements—thereby aligning individual ambition with proven career trajectories.

D. Projected Impact & KPIs

Based on initial cohort scaling and partner capacity, GrowSpirit projects pipeline contributions of 5,000 additional drone-pilot certificates, 4,500 commercial-pilot licenses, and 35,000 engineering-track internships by 2028, moving the needle toward industry targets of 50,000 drone pilots, 50,000 commercial pilots, and 500,000 engineers by 2037 (the 110th anniversary of the *Spirit* flight). Key performance indicators include: cumulative certifications attained vs. target pipelines; percent retention through multi-stage pathways; geographic distribution of participants across underserved communities; time-to-certification metrics; and longitudinal career-placement rates measured through AI-driven alumni tracking. Quarterly dashboards—integrated into [Spirit100.org](https://spirit100.org)—will provide real-time visibility for stakeholders, while annual “impact sprints” reassess curriculum efficacy through participant feedback, artifact-driven engagement scores, and job-market placements. This rigorous KPI framework ensures accountability, continuous improvement, and the ability to replicate success across new regions, embedding historical inspiration at the core of tomorrow’s aerospace workforce.

IV. Public Awareness

A. Strategic Framework

In developing our public-awareness strategy, I established three interlocking objectives: to elevate Donald A. Hall from an archival sidebar to a central figure in aerospace history; to translate centennial enthusiasm into meaningful public engagement; and to sustain this engagement through multi-channel storytelling. To meet these objectives, I conducted a stakeholder-mapping exercise that identified six primary constituencies: leading museums (e.g., the Missouri Historical Society and the Smithsonian National Air and Space Museum) as custodians of Hall’s artifacts; city cultural offices in St. Louis, San Diego, New York, Paris, and Washington, D.C. as hosts of centennial events; aerospace firms (including Boeing, Lockheed Martin, and museum-affiliated restoration workshops) as technical and financial partners; nonprofit organizations such as the Lindbergh Foundation, XPRIZE Foundation, and the Tuskegee Airmen Legacy Foundation as outreach and advocacy conduits; digital-archive consortia like ABADBU as technological collaborators; and community institutions—most notably senior assisted living communities—as intergenerational storytelling venues. By aligning these stakeholders around shared goals of visibility, legacy recognition, and public engagement, the framework creates a robust network in which each partner amplifies the others’ efforts. Strategic governance will be maintained through a Spirit100 steering committee, which

will meet quarterly to synchronize calendars, co-develop content guidelines, and ensure that Hall’s narrative remains front and center across all activities.

B. Spirit100.org Platform (Key Features)

At the heart of our public-awareness campaign lies Spirit100.org, a coalition portal that synthesizes the centennial’s Partners, History, Events, Clubs, Media, and Merch into a single user journey. The **Partners** section profiles each organization’s role—from the Lindbergh Foundation’s archival stewardship to the XPRIZE Foundation’s “Innovation for All” educational grants—while linking to their institutional resources. **History** hosts the 100-story Commemorative Quilt narratives alongside high-resolution artifact scans; visitors can pre-order hand-sewn replicas for \$300 or screen-printed blankets for \$100, with proceeds underwriting educational outreach. The **Events** calendar catalogs 100 flagship and satellite gatherings—20 air-show clusters, 40 one-off community celebrations, and 40 digital symposiums—all geo-tagged for cities along both Lindbergh’s original route and secondary tour stops. In **Clubs**, prospective volunteers register for GrowSpirit tent events in 20 host cities, accessing curriculum modules, mentorship sign-ups, and downloadable activity kits. The **Media** hub aggregates three original documentaries (including the Missouri Historical Society’s “Hall & Lindbergh: Co-Authors of Flight”), forthcoming re-releases of the 1957 Hollywood feature starring Jimmy Stewart, and episodes of the Save My History podcast. Finally, **Merch** showcases limited-edition Spirit100th quilts, scale-model Spirit aircraft, and STEM-themed memorabilia, with integrated e-commerce that routes profits back into the campaign’s educational initiatives.

C. Commemorative Quilt Campaign

The quilt campaign exemplifies participatory heritage at scale. Our story-collection process begins with an online submission portal—hosted on Spirit100.org—where stakeholders, senior-living residents, and the broader public can upload personal anecdotes or “centennial remembrances” tied to flight, engineering, or family legacies. These submissions will be curated by a volunteer editorial board, which selects 100 narratives that intersect Hall’s own storylines—such as themes of ingenuity, risk, and intergenerational connection. Quilt design will be led by affiliated artists to translate each narrative into a dedicated patch—incorporating archival motifs like Hall’s monocoque cross-section or Lindbergh’s navigational charts. Manufacturing employs two parallel streams: a U.S. artisan collective hand-sewn 100+ museum-grade heirloom versions, while a screen-printing partner produces 10,000+ blanket-style reproductions for broader distribution. Distribution will leverage Spirit100.org’s e-commerce engine, partner museums’ gift shops, and targeted mailings to pre-registered centennial-club members. By embedding each quilt patch with QR codes linked to its story’s digital transcript and audio narration, we merge tactile heritage with interactive technology, ensuring that every quilt becomes both artifact and educational gateway.

D. Centennial Events Plan

Our centennial-events architecture balances marquee air shows with grassroots community gatherings. The five primary hubs—San Diego, St. Louis, New York, Paris, and Washington, D.C.—each host a three-day air-show festival featuring restored Spirit replicas, Hall-annotated blueprint exhibits, and expert-panel discussions. These flagship events are complemented by 40 one-off “History in Flight” local activations—ranging from drone-racing exhibitions at community colleges to aerospace-career job fairs co-organized with municipal workforce boards. Venue partnerships have been secured through memoranda of understanding with key stakeholders: municipal airports (e.g., LAX, STL Lambert), city cultural centers, university engineering labs, and senior-living campuses (Shepherd Premier) that will host intergenerational centennial salons. Logistically, a central Spirit100 Events Task Force coordinates permit acquisition, FAA-liaison services for flight demonstrations, and equipment shipping logistics, leveraging pre-negotiated freight agreements to ensure on-time transport of exhibit crates and simulators. All site designs adhere to ADA and universal-access standards, with modular tent systems that can be rapidly deployed and reconfigured across urban plazas, airfields, and museum annexes. This hybrid model maximizes both scale—through prominent air shows—and inclusivity—through localized celebrations that bring Hall’s legacy into everyday community spaces.

E. Communications & Media Strategy

Our communications approach integrates social, earned, and paid media to ensure omnichannel resonance. **Social media** campaigns deploy platform-specific storytelling: Instagram carousels visualize Hall’s sketch-to-flight timeline; TikTok challenges inviting users to share their “personal centennial” by discovering family history; LinkedIn articles spotlight professional heritage, and Twitter threads thread archival quotes into modern design debates. **Earned media** may include op-eds in Aviation Week & Space Technology and feature segments with NPR’s “All Things Considered” and BBC World Service, coordinated through a centralized press office. **Paid**

channels—targeted geofenced ads around aviation schools and STEM festivals—will remind industry professionals and students to register for GrowSpirit events. Parallel to these, an **international press tour** unfolds with pop-up exhibits at Paris Air Show and Farnborough, where Nova Hall’s keynote speeches travel in a mobile “Donald A. Hall” exhibit, as I have hosted in the past. Pre-event “teaser” videos and post-event highlight reels populate YouTube and Vimeo, while strategic partnerships with streaming platforms (e.g., CuriosityStream) secure on-demand distribution for our three original documentaries. By orchestrating this layered media mix, we will maintain continuous public momentum from the 99th through the 101st anniversaries (2026-2028).

F. Metrics & Feedback Loops

To ensure accountability and iterative refinement, we have implemented a comprehensive metrics dashboard that aggregates quantitative and qualitative indicators. **Web analytics** will track Spirit100.org’s unique visitors, page-dwell times on the History and Quilt sections, and conversion rates for quilt pre-orders and club sign-ups. **Social engagement** metrics monitor hashtag reach (#Spirit100th, #HallUnveiled) and sentiment analysis through AI-driven text-mining tools. **Event attendance** is captured via RFID-enabled badges, providing real-time foot-traffic heatmaps across exhibit zones. Complementing these behavioral data, **legacy recognition surveys**—administered on-site and online—assess shifts in public awareness of Hall’s role, with pre-survey/post-survey cohorts enabling longitudinal impact studies. Quarterly “impact sprints” convene the Spirit100 steering committee and partner representatives to review dashboard insights, identify underperforming elements, and adjust campaign tactics—whether that means reallocating ad spend, revising exhibit narratives, or introducing new interactive features. This closed-loop evaluation framework ensures that our public-awareness efforts remain data-informed, responsive to audience feedback, and aligned with the overarching goal of restoring and sustaining Donald A. Hall’s legacy in the public imagination.

V. Sustainable Educational Models

A. Donald A. Hall Exhibit & Curriculum Integration

Central to our sustainable-education strategy is the Donald A. Hall Exhibit, a traveling, modular installation that seamlessly integrates archival artifacts into classroom and museum contexts. Each exhibit module pairs a prominent Hall original—such as his nose-tank schematic or laminated-spruce longeron sample—with a structured lesson plan aligned to Next Generation Science Standards and ABET engineering outcomes. Students will begin by examining high-resolution scans of Hall’s hand-sketch annotations via Pre’s digital-archive interface, then transition to hands-on activities like prototyping simplified fuselage models using foam-board, wood, or LEGO bricks, with 3D-printed connectors. Educators will receive a companion guide that contextualizes Hall’s problem statements (“Optimize weight under a 450 kg constraint”) and poses open-ended design challenges reflective of his iterative testing. By situating Hall’s original design dilemmas, and their contrast to modern challenges, at the center of active learning, we cultivate systems thinking and historical empathy—students learn not only the mechanics of monocoque construction but also the engineering mindsets that Hall exemplified: risk-calibrated creativity, cross-disciplinary synthesis, and adaptive iteration. Over multiple academic quarters, this integrated approach embeds aerospace heritage into core STEM curricula and generates a replicable template for exhibits honoring other archival innovators.

B. Nova Hall’s “Spirit and Creator” Book as Pedagogical Anchor

“Spirit and Creator,” my own narrative exploration of Donald A. Hall’s life and work, serves as both a scholarly monograph and a pedagogical anchor for secondary and post-secondary programs. Each chapter includes rich primary-source excerpts that educators can assign in class or via Spirit100.org’s virtual reading groups. Instructors can draw on the book’s companion digital toolkit to assign interactive quizzes, curate VR fly-throughs of Hall’s prototypes, and facilitate live Q&A sessions with aviation historians. By weaving “Spirit and Creator” into the GrowSpirit Clubs’ mentor-led workshops, we ensure that Hall’s narrative resonates not as a static biography but as an evolving case study in human-centered innovation. This literary foundation deepens cognitive engagement, helping participants internalize historical lessons and apply them to modern aerospace challenges.

C. Shepherd Premier Senior Living Partnership

Our collaboration with senior living communities pioneers an intergenerational model in which residents co-create personal “centennial quilts” and contribute oral histories that parallel Hall’s archive. Through in-residence

workshops, senior participants share milestone stories—first flights, mechanical trade apprenticeships, STEM career reflections—that are transcribed, digitized via an end-to-end OCR pipeline, and woven into Spirit100.org’s “History” interface. Simultaneously, youth volunteers from growspirit.org facilitate quilt-patch crafting sessions, illustrating how each story segment can be translated into textile designs inspired by Hall’s blueprints. This reciprocal exchange yields two key outcomes: residents experience renewed purpose and intergenerational connection, while young participants gain authentic insights into engineering’s human dimensions. The resulting quilts—each bearing 100 personal narratives—become living exhibits displayed in both senior-living lobbies and public museums. This model demonstrates how heritage preservation and STEM education can coalesce into a sustainable community practice, fostering empathy, technical curiosity, and cross-age mentorship that endure well beyond the centennial year.

D. Linking Preservation with Innovation

To bridge historical preservation and forward-looking innovation, we embed Hall’s archival lessons into contemporary challenge sprints and hackathons. Participants begin with a guided “artifact dive”, where they analyze Hall Exhibit artifacts. They then form interdisciplinary teams—mirroring Hall’s fusion of aerodynamicists, materials scientists, and pilots—to tackle modern briefs such as optimizing UAV endurance under power constraints or designing modular electric propulsion enclosures. Throughout these events, digital threads link each prototype back to Hall’s original design rationale, reinforcing the continuum between past and future. Winning teams may receive GrowSpirit seed grants to further develop their concepts and gain mentorship from industry partners like Boeing’s historical-restoration division or Lockheed Martin’s additive-manufacturing lab. By situating innovation challenges atop archival inquiry, we create a virtuous cycle: preservation efforts generate fresh engineering insights, and those insights, in turn, justify continued investment in archival digitization. This synergy ensures that historical narratives remain active drivers of technological progress.

E. Scalability & Funding Models

Ensuring long-term viability requires diversified funding and a scalable governance structure. Revenue streams include quilt-and-merchandise sales, paid-access virtual workshops, licensing of the Hall avatar toolkit to other archives, and grant support from agencies such as the National Endowment for the Humanities and the FAA’s Aviation Workforce Development Grants. A tiered sponsorship model invites corporate partners—ranging from simulation-software vendors to aerospace OEMs—to underwrite specific educational modules, exhibit expansions, or regional Club hubs. Governance is administered by Flying Over Time, our 501(c)(3) that integrates representatives from partner organizations. Annual financial reports, published on Spirit100.org, detail program expenditures, impact metrics, and reserve allocations, enabling transparent stewardship. This blended-revenue, coalition-driven approach allows rapid replication in new geographies—museums in Asia or Africa can license the exhibit modules and digital-archive pipeline—while maintaining consistent quality controls and shared intellectual property under a Creative Commons framework. Through this sustainable funding and governance model, the educational programs we inaugurate for Hall’s centennial will endure as living laboratories of aerospace heritage and innovation.

VI. Conclusion

A. Synthesis of Historical-to-Future Framework

The integration of Donald A. Hall’s archival legacy with forward-looking workforce and educational initiatives establishes a replicable, human-centered paradigm for aerospace innovation. By excavating Hall’s design notebooks—his nose-tank fuel integration, laminated-spruce monocoque approach, and weight-optimization ethos—and embedding them into both physical exhibits and the Pre digital-archive platform, we generate a continuous learning thread that connects 1927’s pioneering challenges with today’s drone-pilot certifications and engineering internships. The GrowSpirit Clubs and Spirit100th Commemorative Quilt amplify this dynamic by transforming passive historical appreciation into active skills development: participants prototype hall-inspired airframes, engage in FAA-aligned coursework, and co-author quilt narratives that mirror Hall’s own iterative storytelling. The AI-driven Hall avatar further personalizes this continuum, enabling bespoke archival dialogues that scaffold individual career pathways. This synthesis not only restores Hall’s rightful place in aerospace history but also demonstrates how deeply contextualized historical lessons can serve as powerful motivators and design

templates for addressing acute workforce shortages—thereby forging a living bridge between the past and the future of flight.

B. Roadmap for the Centennial Year and Beyond

As we approach the 100th anniversary of the Spirit of St. Louis in May 2027, our phased roadmap ensures both concentrated impact and sustained momentum. In Year –1 (2026), we will finalize the digital archive and AI-avatar deployments, conduct pilot GrowSpirit Club launches in the five primary hubs, and create the Centennial Quilt design. Year 0 (2027) centers on the flagship airshow festivals in San Diego, St. Louis, New York, Paris, and Washington, D.C., synchronized with 40 secondary events and daily digital symposiums on Spirit100.org. Concurrently, we will scale educational modules to 50 partner schools and certify an initial cohort of 10,000 drone and commercial pilots. In Year +1 (2028), analysis of KPI dashboards—tracking certifications, engagement metrics, and legacy-recognition surveys—will guide expansion into new regions, with licensing of our exhibit and AI-toolkit to international archives. Throughout, a quarterly Spirit100 Steering Committee will adapt tactics via impact sprints, ensuring that Hall’s narrative continues to fuel emergent innovations and workforce pipelines well into the next century of flight.

C. Call to Action for AIAA Members, Educators, and Industry

We invite the AIAA community to join us in elevating Donald A. Hall’s legacy and leveraging it as an engine for tomorrow’s aerospace talent and breakthroughs. Educators can adopt our modular exhibit-curriculum kits and “Spirit and Creator” monograph to enrich STEM courses with authentic engineering case studies. Industry partners are encouraged to sponsor GrowSpirit Clubs, provide mentorship for certification pathways, and allocate internship placements that ground archival insights in real-world projects. AIAA members can contribute technical articles, serve on the quilt’s editorial board, or integrate Hall’s AI-driven avatar into professional development workshops. By uniting under the Spirit100 coalition—through Spirit100.org’s stakeholder portal—you will directly support the training of 50,000 drone pilots, 50,000 commercial aviators, and 500,000 engineers, while ensuring Hall’s co-creative genius informs the next wave of aerospace innovation. Together, we can turn a centennial commemoration into a sustained movement, preserving our shared heritage for generations to come.

VII. Acknowledgments

The author gratefully acknowledges the Missouri Historical Society for its archival stewardship and high-resolution digitization of Donald A. Hall’s original blueprints and correspondence. Special thanks to the ABADBU Digital-Archives Consortium for co-developing the semantic OCR pipelines and for generously sharing best practices from the East African archives initiative. The Spirit100 coalition extends its appreciation to the Lindbergh Foundation and the XPRIZE Foundation for their educational grants and mentorship support, and to Shepherd Premier Senior Living for fostering intergenerational quilt-story workshops. Corporate partners—most notably Boeing and Lockheed Martin—provided critical sponsorship for exhibit fabrication and GrowSpirit Club pilot programs. We also thank the National Endowment for the Humanities and the FAA Aviation Workforce Development Grants Program for funding the curriculum-integration and workforce-pipeline studies. Finally, the author acknowledges the Pre (“Preserving Records Everywhere”) AI-development teams for creating the interactive Hall avatar and digital-archive platform that animate this work. Any remaining errors or omissions are the responsibility of the author alone.

VIII. References

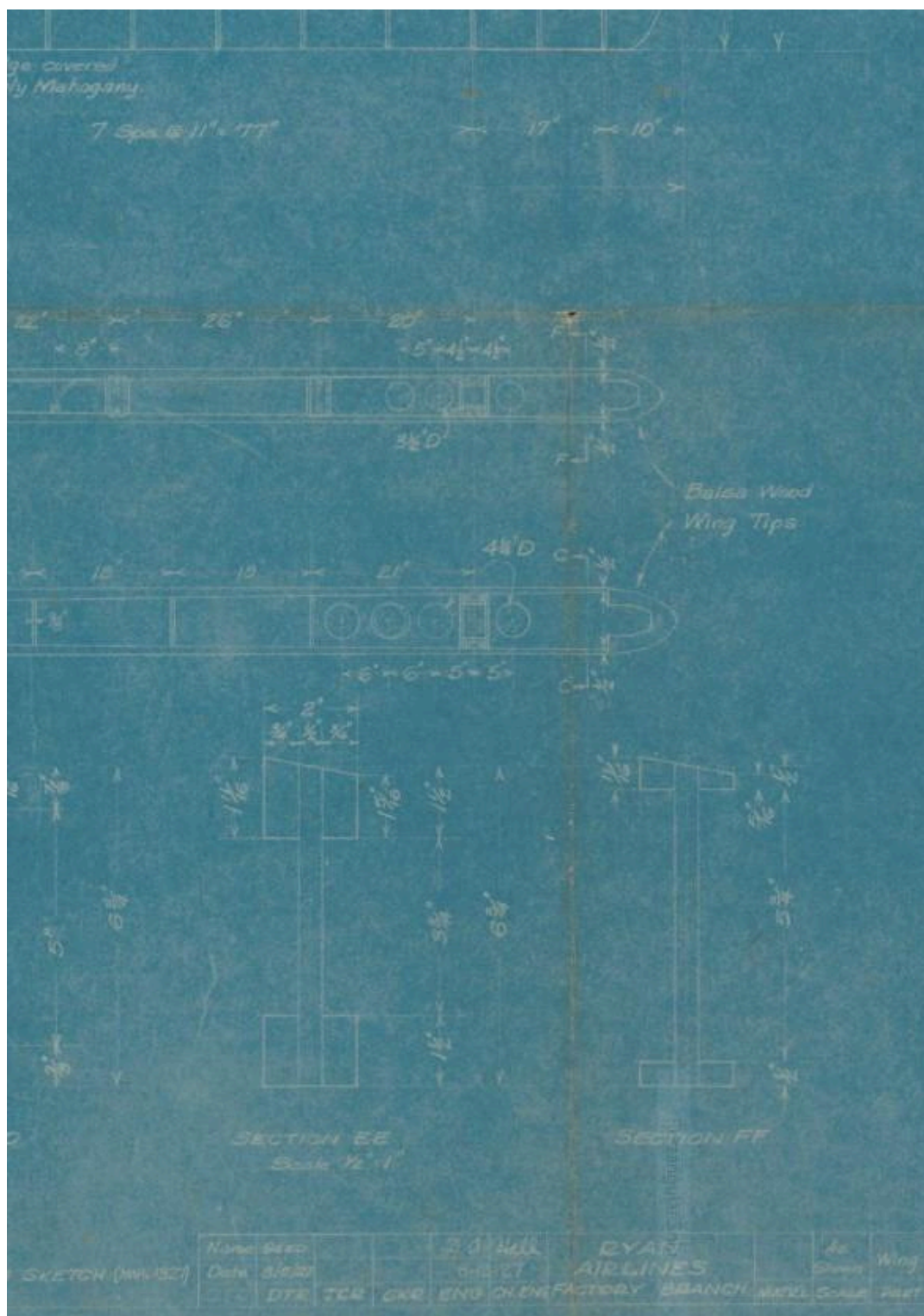
- [1] D. A. Hall Collection, curated by the Missouri Historical Society, St. Louis, MO, 2025.
- [2] C. A. Lindbergh, *The Spirit of St. Louis*. New York: Charles Scribner’s Sons, 1953.
- [3] G. Murray and R. Heilakka, *The Airline Pilot Shortage Will Get Worse*, Oliver Wyman, 2022.
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- [5] ABADBU Digital-Archives Consortium, “Digital National Archives of Burundi,” 2022-2025.
- [6] Federal Aviation Administration, “Remote Pilot Certification Statistics,” FAA, Apr. 2025.

IX. Images & Figures

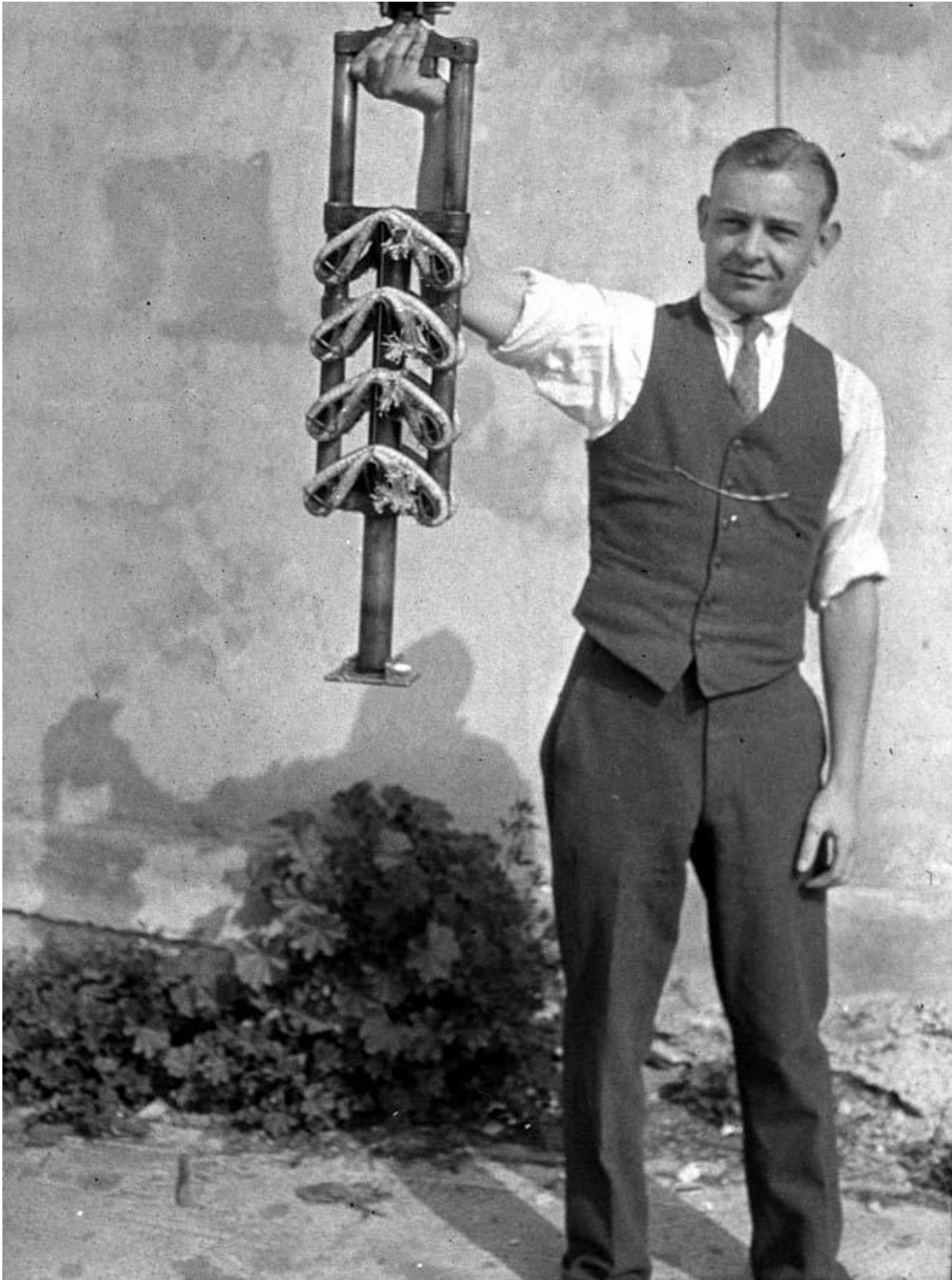
Images



Img. 1 Nova Hall speaking to Lindbergh Foundation board member: Kermit Weeks. Taken @ the Challenger Space Center in Peoria, AZ for Lindbergh Foundation Board event.



Img. 2 Clip from the engineers blueprints, 1 of 3 Spirit of St. Louis blueprints that Donald A. Hall kept.



Img. 3 Portrait taken by Donald Hall of the shocks that he selected for the landing gear of the Spirit of St. Louis.
Workman name: Unknown, 1927



Img. 4 Joe Machbitz, David Fraser and Marlyn Fraser at the Flying Over Time Blue Print Gala Fundraiser @ Challenger Space Center, Peoria AZ. 2014



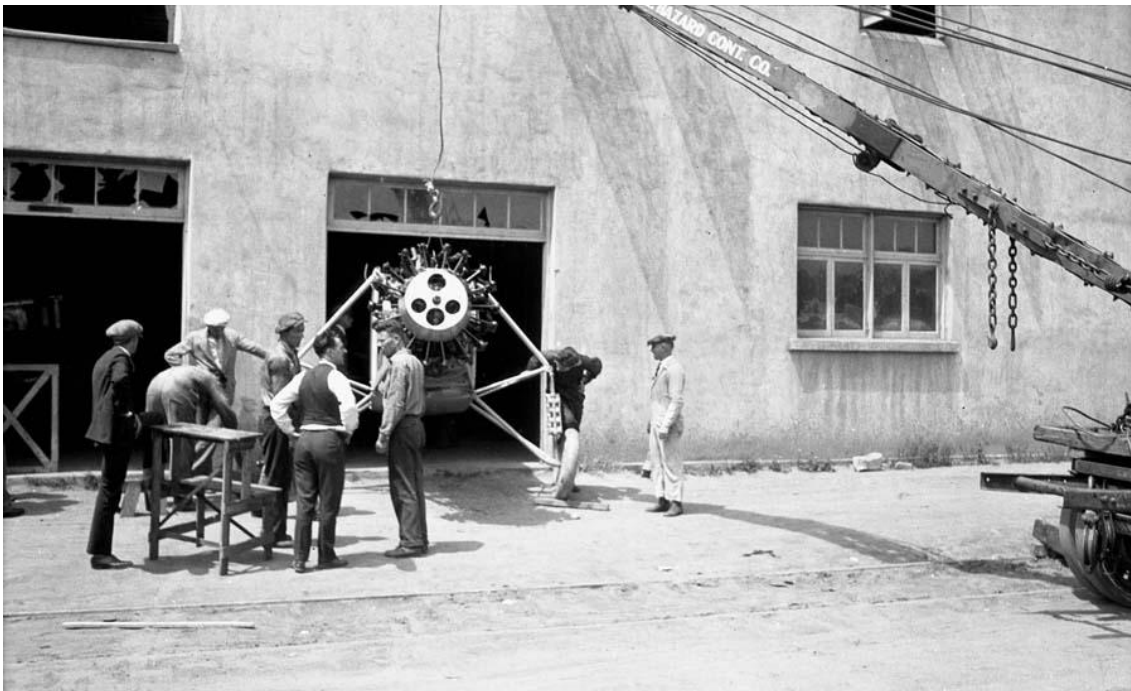
Img. 5 The Buckeye Airfair presentation with the city of Buckeye, AZ



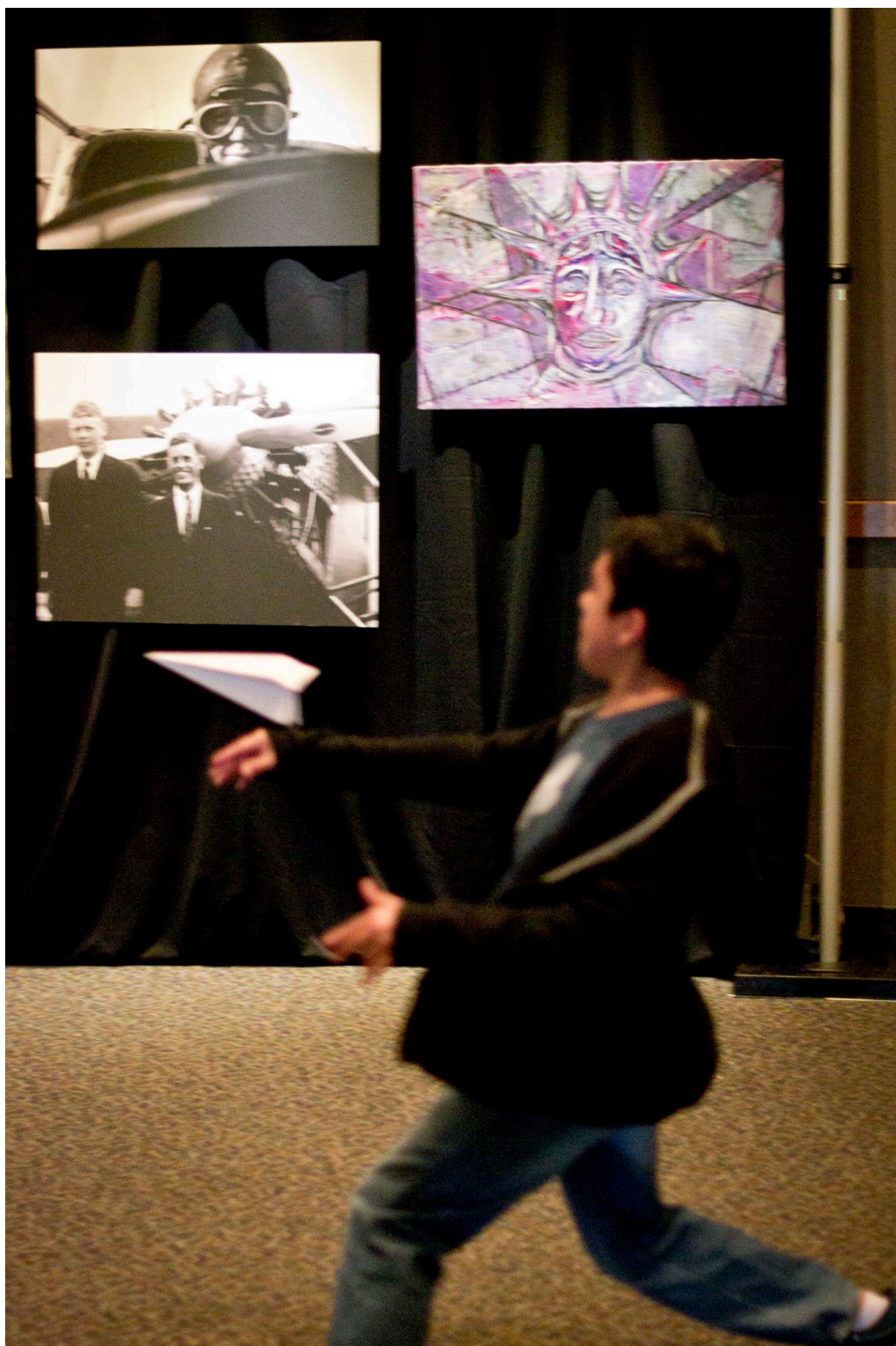
Img. 6 Photograph by Donald Hall of Charles Lindbergh during the 60 days the plane and transatlantic plan was finalized. Donald Hall and Linbergh discussed every point scientifically to plan for every potential issue.



Img. 7 The famous photograph from Lindbergh's book, taken by Donald Hall in April of 1927 at the Mahoney owned Ryan factory in San Diego, CA. The fuselage is being carted out to historic AIAA site, Dutch Flats for the final assembly and first flight.



Img. 8 Factory manager Hawly Bowlus and the crew overseeing the final assembly of the landing gear to the fuselage. Photo taken by Donald A. Hall, April 1927.



Img. 9 Flying Over Time: The Spirit of St. Louis Exhibition @ ASU West campus in the La Sala Ballroom in collaboration with a Rubix Cube competition and other STEM activities and presentations including the art and Photography of Donald A. Hall and Nova Hall. 2014



Img. 9 Nova Hall addressing the crowd of professors and students at Arizona State University, after the Premiere of the one act play about Donald Hall, played by actor James Reid. This showing included a refined version of the prototype traveling museum exhibition (art and photography). 2012

N.A.C.A. Technical Note No. 257 10

General Dimensions and Specifications (Cont.)

Take-Off Distances -

Tests made at Camp Kearney near San Diego, California,
at 600 ft. altitude. Oil = 4 gallons.

Gal. Gas	Gross Wt. lb.	Approx. Head Wind Velocity M.P.H.	Take-Off Distance ft.
36	2600	7	239
71	2800	9	287
111	3050	9	389
151	3300	6	483
201	3600	4	615
251	3900	2	800
301	4200	0	1023

Img. 11 N.A.C.A. Technical Note 257, page 10, written by Donald A. Hall. From: Technical Preparation of the Airplane "Spirit of St. Louis." [5]

N.A.C.A. Technical Note No. 257		11
Weight Characteristics when Ryan NYP Left New York		
Empty complete with tanks and instruments		2150 lb.
<u>Useful load:</u>		
Pilot	170 lb.	
Miscellaneous	40 "	
Gasoline, 450 gal. (California at 6.12 lb./gal.)	2750 "	
Oil, 20 gal. at 7 lb./gal.	<u>140 "</u>	3100 lb.
<u>Gross Weight -</u>		
Fully loaded (25 gal. gasoline over design load) . .		5250 lb.
<u>Net Empty Weight -</u>		
Empty weight of 2150 lb. includes all tanks and special equipment and instruments.		
Assuming a gas capacity of 60 gallons and oil of 5 gallons sufficient for ordinary flying, the weight of excess tanks and special equipment and instruments equals 450 lb.		
Net empty weight = 2150 - 450 = 1700 lb.		
<u>Total Useful Load -</u>		
Total useful load = 5250 - 1700 = 3550 lb.		
<u>Ratio of Weights -</u>		
Ratio of useful load to gross weight = .68		
Gross weight = 3.1 times net empty weight.		
<u>Loading (Fully Loaded) -</u>		
Wing loading = 16.5 lb. per sq.ft.		
Power loading = 23.6 lb. per B.H.P. (223 B.H.P. at 1800 R.P.M.).		
Airplane structure designed to suitable load factors at full design load.		

Img. 12 N.A.C.A. Technical Note 257, page 11, written by Donald A. Hall. From: Technical Preparation of the Airplane "Spirit of St. Louis." [5]

Figures

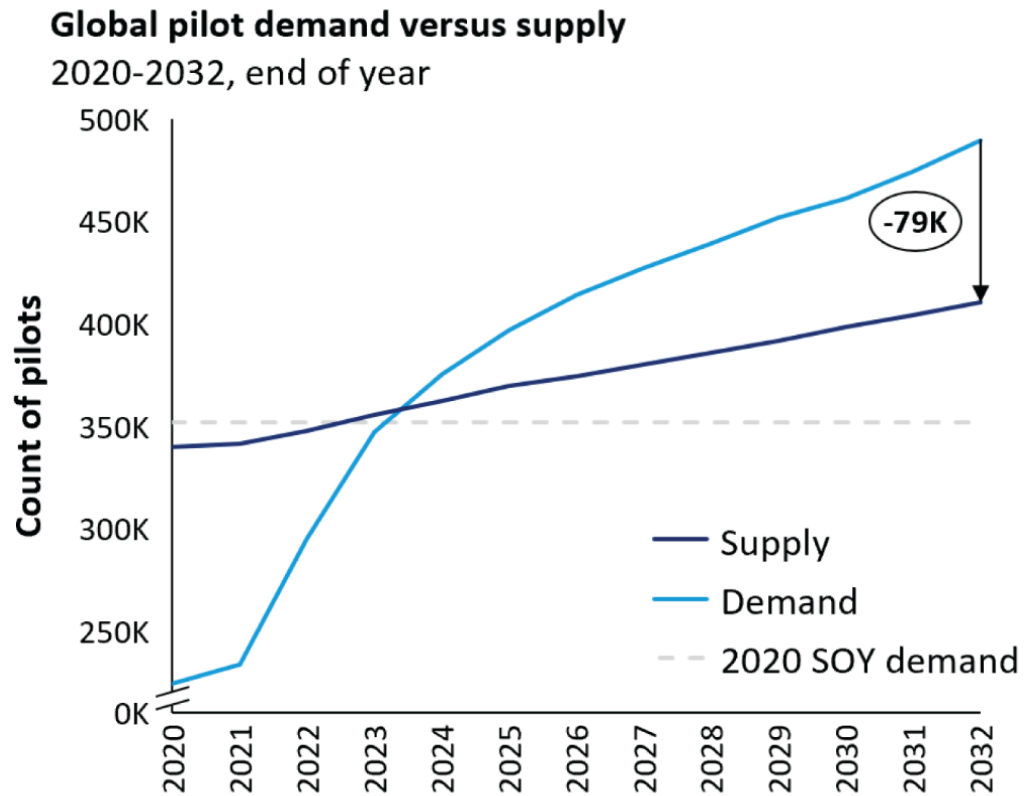


Fig 12 Key statistics on aviation workforce shortages and projected growth. [3].