NASA
FABRICATION ALLIANCE

PARTNERSHIP
FOR EXCELLENCE

- History
- Vision, Mission
- Success Story
- Cost Savings/Avoidance
- Collaborations
- Ongoing Activities
- Future Plans/Issues

Fabrication Alliance

HISTORY

- Formed strategic alliance (co-op) among Fabrication Divisions at Code R Centers (LaRC, GRC, DFRC, ARC) to leverage manufacturing capabilities (1995). Began with 1994 ZBR
  - Four independent manufacturing divisions to operate as one
  - Need to explore interdependencies vs. independencies
- Received "NASA Team Excellence Award" at the 12TH NASA Continual Improvement and Reinvention Conference, April 18, 1997
- Original alliance membership expanded to include: GSFC (1999), MSFC (2000), JPL (2001), and JSC (2001), KSC (2003), and Stennis (2003)
  - Ten NASA Centers manufacturing capability represented (KSC and SSC contacted)
  - Committed to weekly telecons quarterly face-to-face meetings

Fabrication Alliance

CO-OPERATIVE APPROACH

VISION

To foster a manufacturing organization that effectively integrates the resources of member NASA Centers to operate as one

MISSION

To continue the alliance among the member NASA Centers in order to optimize NASA manufacturing capability through innovation, teamwork, and cost-effective methods that focus on customer satisfaction

Fabrication Alliance Membership

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Fabrication Alliance

CO-OPERATIVE APPROACH

- **Successful Because:**
  - Management support (Code R Advocate, Steering Team)
  - Adoption of workforce strategy
    - Develop unique processes/products, integrate adaptive, and outsource routine
    - Share unique, adaptive, routine strategy with Alliance members
  - Nurtured “research team” concept
    - Development and integration of new products/processes through partnerships with researchers, engineers, technologists, academia, and business
    - Share product/process achievements with Alliance
  - Value is obtained through cooperation, not competition
  - There is mutual respect through personal relationships among members
  - Open and honest communications occur between Centers

Fabrication Alliance

COLLABORATIONS

The synergy of Alliance members provides a means to cooperatively and collaboratively approach decisions facing the members. Implementation of the original Co-Op goals led to increased knowledge and understanding of the joint and individual value of the members. From the interaction of the members a number of activities developed:

- **Utilization of manufacturing capability**
  - –GRC Parametric Inlet test article (LaRC, ARC, MSFC, DFRC, GSFC)
  - –ARC Subsonic Transport Aeroacoustic Research (STAR) test article (LaRC)
  - –GRC Ultra Efficient Engine Technology (UEET) baseline exhaust mixer (LaRC)
  - –LaRC Aft Flight Deck (AFD) glare shield (GRC)
  - –DFRC DC-8 Lear Experiment rack, DC-8 LIDAR chiller intake flapper valve (ARC)
  - –JSC Return to Flight Hardware

WORLD NEWS & ANALYSIS

Improved Inlet

100% external compression means less complexity, lighter weight

STANLEY W. KANDEBO/NEW YORK

NASA Glenn Research Center engineers have concluded Phase 2 testing of an innovative, external compression inlet that could be used on manned and unmanned supersonic aircraft.

Called the Parametric Inlet, the unit was originally developed by TechLand Research in conjunction with Boeing. NASA Glenn's role has been to conduct extensive amounts of computational fluid dynamics work. Wind tunnel tests of the inlet in 2003 were aimed at verifying its basic performance. The latest trials, totaling some 25 hr., were focused on optimizing inlet design.

The evaluations were conducted in NASA Glenn's 10 X 10-ft. supersonic wind tunnel in Cleveland. The inlet is designed for Mach 2.35 conditions, but is being run off its design point to determine how well it will function. Investigators have examined inlet performance over a Mach 2.26-2.4 speed range; and late last week before wrapping up tests, they expected to extend this down to Mach 2 conditions.

The inlet, which is about one-quarter scale, has a simple movable ramp and four bleed regions that are varied individually. The main advantage of the inlet is that it utilizes 100% external compression, which prevents "unstart" conditions. Typically, a mixed compression inlet of the type normally used on supersonic aircraft employs oblique shock waves internal and external to the inlet to decelerate air. When the waves move outside the inlet, unstart occurs. This dramatically increases drag and decreases inlet efficiency.

External compression inlets have been a means of eliminating unstart, but they come with a performance penalty—they usually have large cowls that greatly increase drag. The Parametric Inlet, according to investigators, does not. "It has a very small cowl," said Tom Biesiadny, chief of the inlet branch at NASA Glenn. The inlet also is less complex than comparable inlets, which means it's much lighter in weight and easier to build, he observed.

Wind tunnel test funding was provided under NASA's Ultra-Efficient Engine Technology project and by the U.S. Air Force. TechLand and Boeing are seeking a patent for the inlet. If additional funding can be secured, investigators would like to use the Parametric Inlet as a testbed for various flow control devices aimed at improving inlet performance.

Quarter-scale Parametric Inlet, being developed by TechLand Research and Boeing, has undergone two wind tunnel campaigns at NASA Glenn.

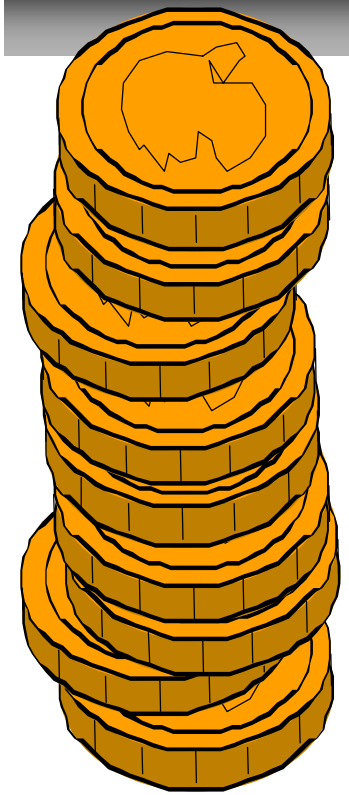
Fabrication Alliance

COLLABORATIONS (Con't)

- **Joint purchasing strategy**
  - –LaRC Stereolithography for proof of concept
  - –GRC Selective Laser Sintering and Laser Engineered Net Shaping for proof of concept
- **Sharing and exchange of equipment**
  - –GRC Coordinate Measuring Machine to LaRC
  - –JPL SLS 2500 to ARC
  - –ARC Autoclave to JPL
  - –MSFC surface finisher to GRC
  - –GRC material/ tooling to Alliance (surplus utilization)
- **Sharing of management software**
- **Development of Alliance ISO Team**
- **RECOM**

Fabrication Alliance

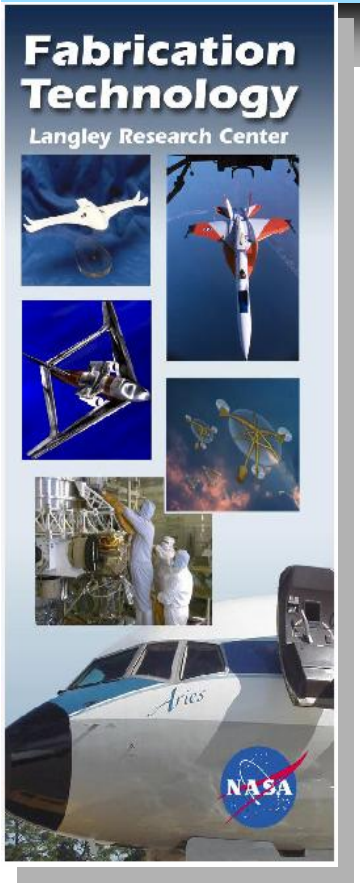
COST SAVINGS/AVOIDANCE



($9 MILLION SINCE 2006)

- **Consolidations ($3.4 M)**
  - –Building Consolidation
  - –RECOM (SEB)
- **Technology Sharing ($5.6 M)**
  - –CAD/CAM Standardization
  - –Surplus Utilization
  - –Tech Cross-training
  - –Equipment Leasing
- **“Best Business Practice” Sharing ($.04 M)**
  - –Position descriptions, ISO 9000, Full cost strategies, management information systems, awards

Fabrication Alliance



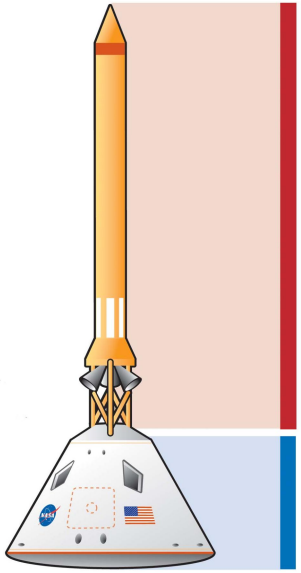
ONGOING ACTIVITIES

- Resource sharing
- Coordinated capital equipment procurements
- Surplus resource utilization
- CAD/CAM user's group
- Continuous Improvement Team
- Telecons and face-to-face meetings

Fabrication Alliance

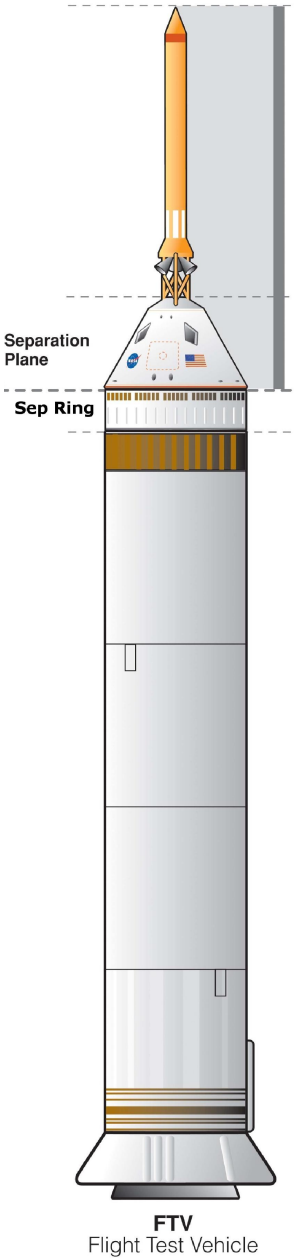
FUTURE PLANS/ISSUES

- Establish Headquarters advocate for manufacturing
- Effective use of internal resources (unique capabilities, new technology development and integration, concurrent design and fabrication)
- Effective coordination and distribution of Center capabilities
- Agency strategy for sourcing
- Center to Center transfer of funds



LAS
Launch
Abort
System

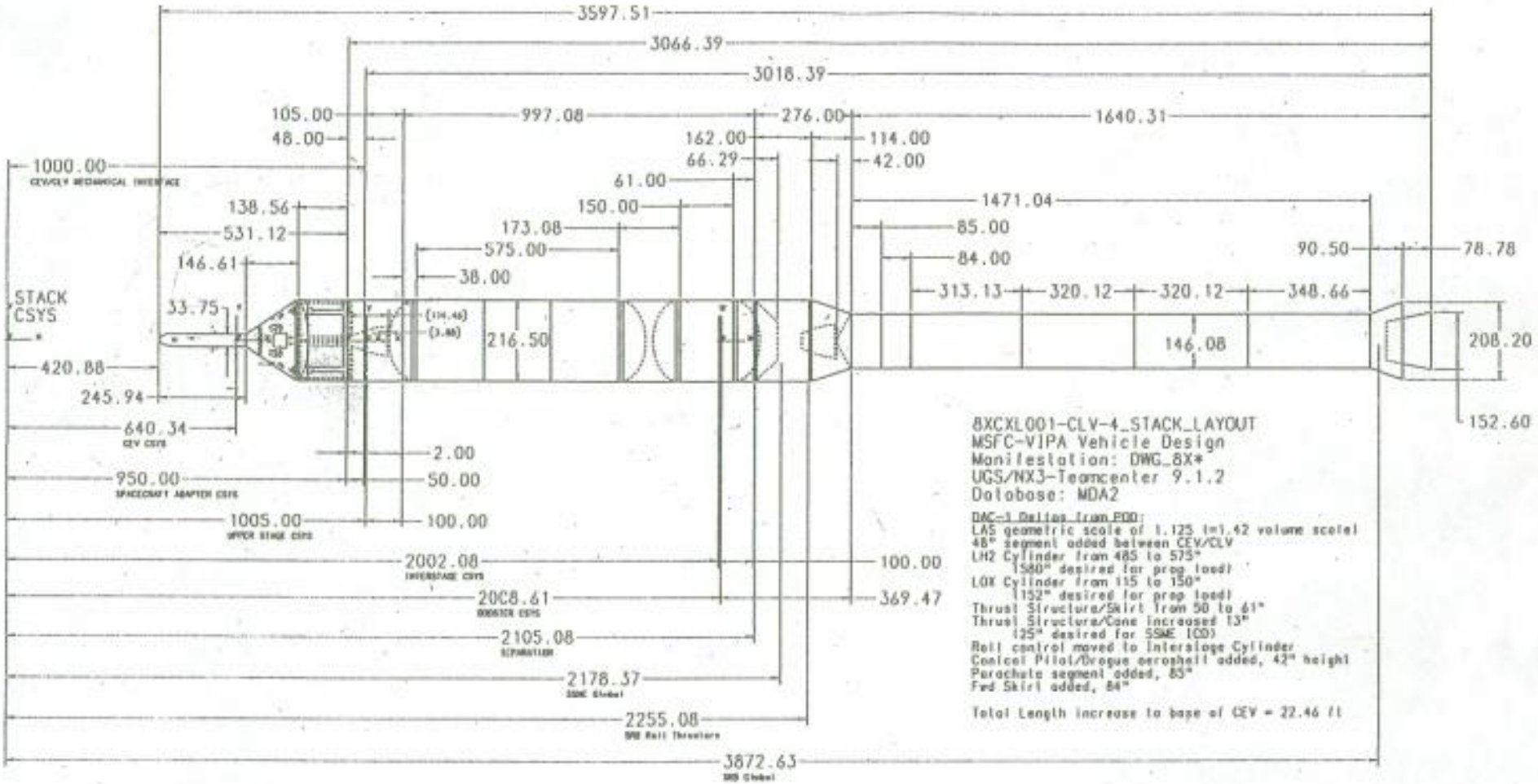
CM
Command
Module



FTV
Flight Test Vehicle

FTA
LAS, CM, SM & Adapter

2nd Stage
+ 1st to 2nd stage "interstage"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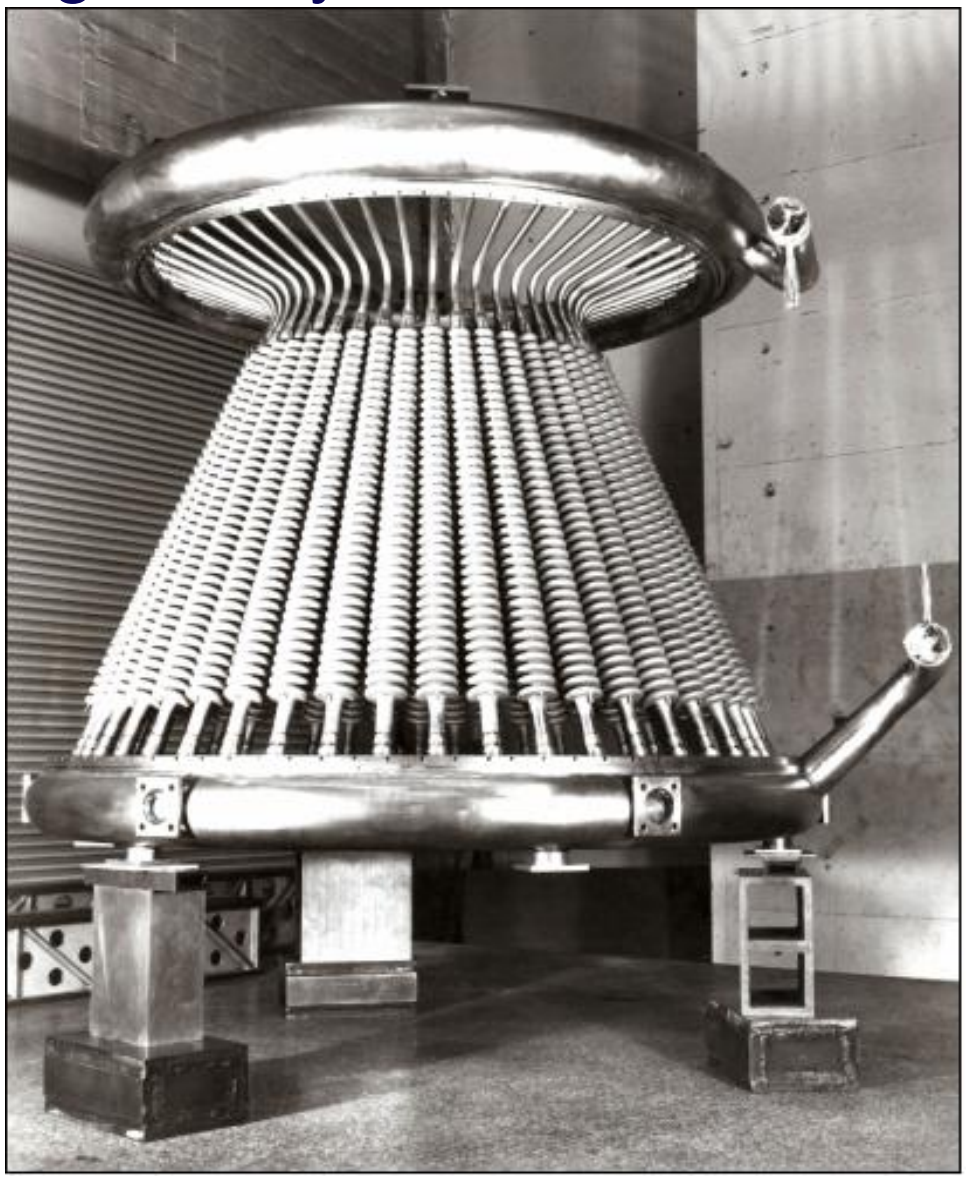
8XCXL001-CLV-4_STACK_LAYOUT
MSFC-VIPA Vehicle Design
Manifestation: DWG_8X*
UGS/NX3-Teamcenter 9.1.2
Database: MDA2
DAC-1 Deltas from PDD:
LAS geometric scale of 1.125 (=1.42 volume scale)
48" segment added between CEV/CLV
LH2 Cylinder from 485 to 575"
(580" desired for prop load)
LOX Cylinder from 115 to 150"
(152" desired for prop load)
Thrust Structure/Skirt from 50 to 61"
Thrust Structure/Cone increased 13"
(125" desired for SSME ICD)
Roll control moved to Interstage Cylinder
Conical Pilot/Drogue aeroshell added, 42" height
Parachute segment added, 85"
Fwd Skirt added, 84"
Total Length increase to base of CEV = 22.46 ft

Cryogenically Cooled Rocket Nozzle



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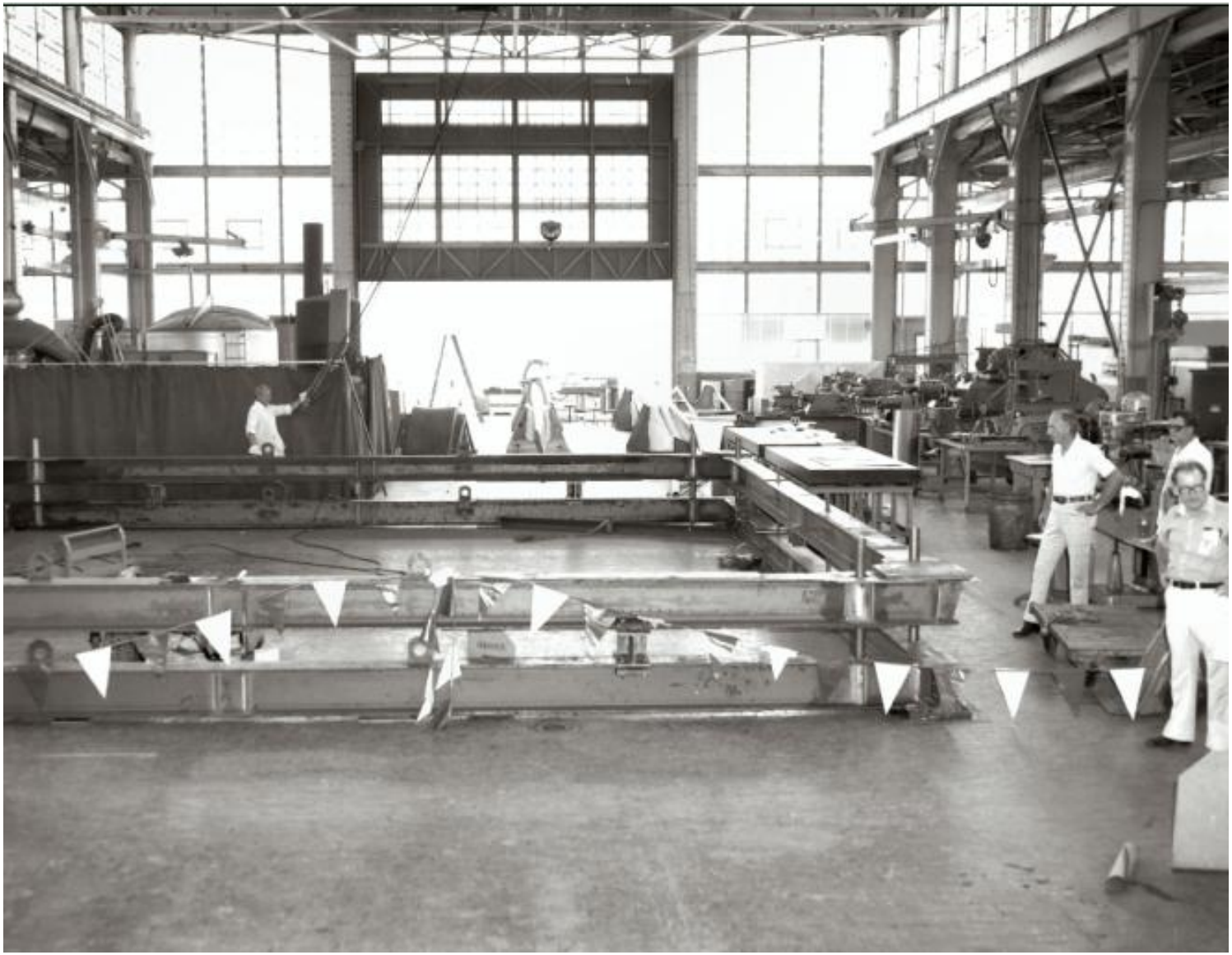

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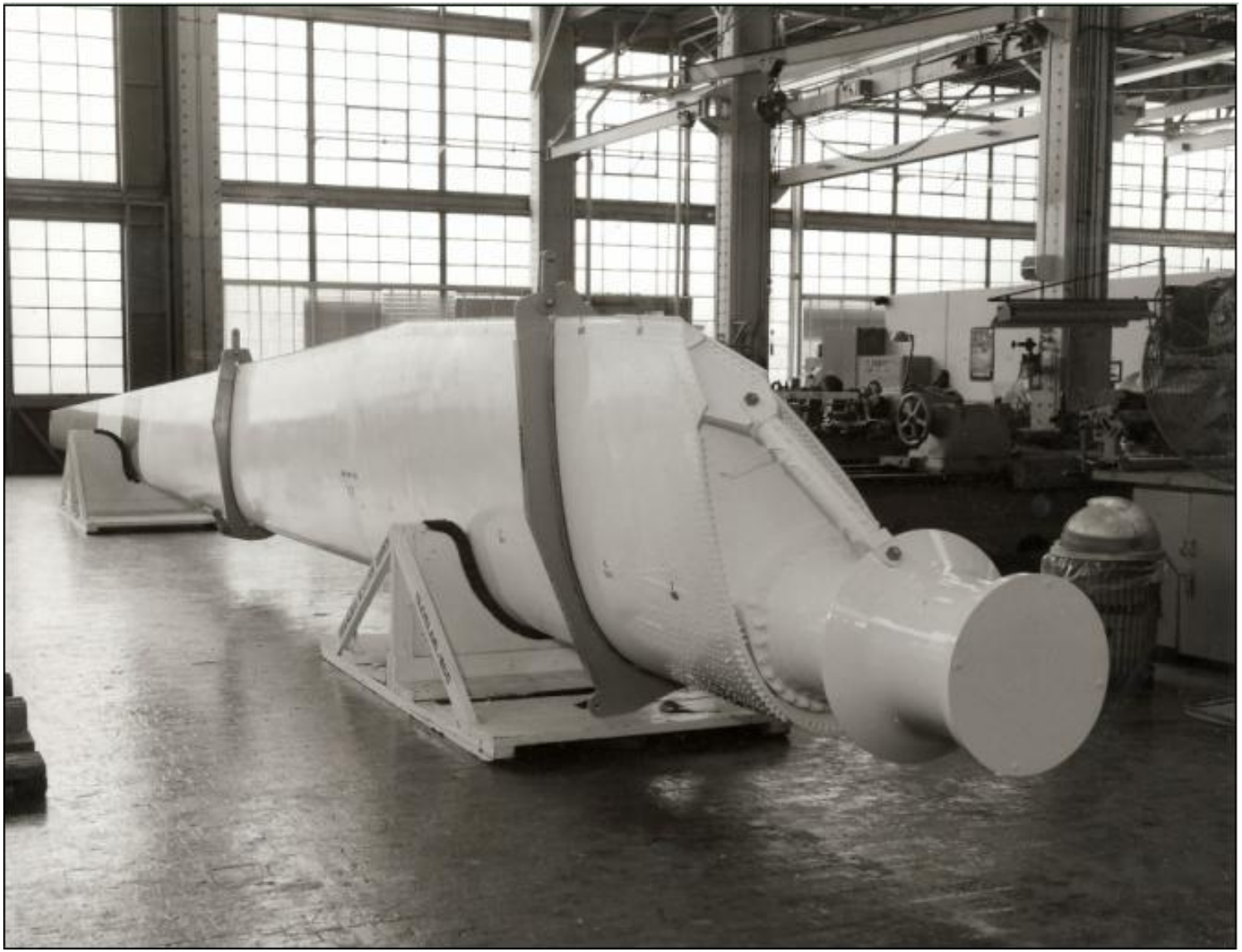

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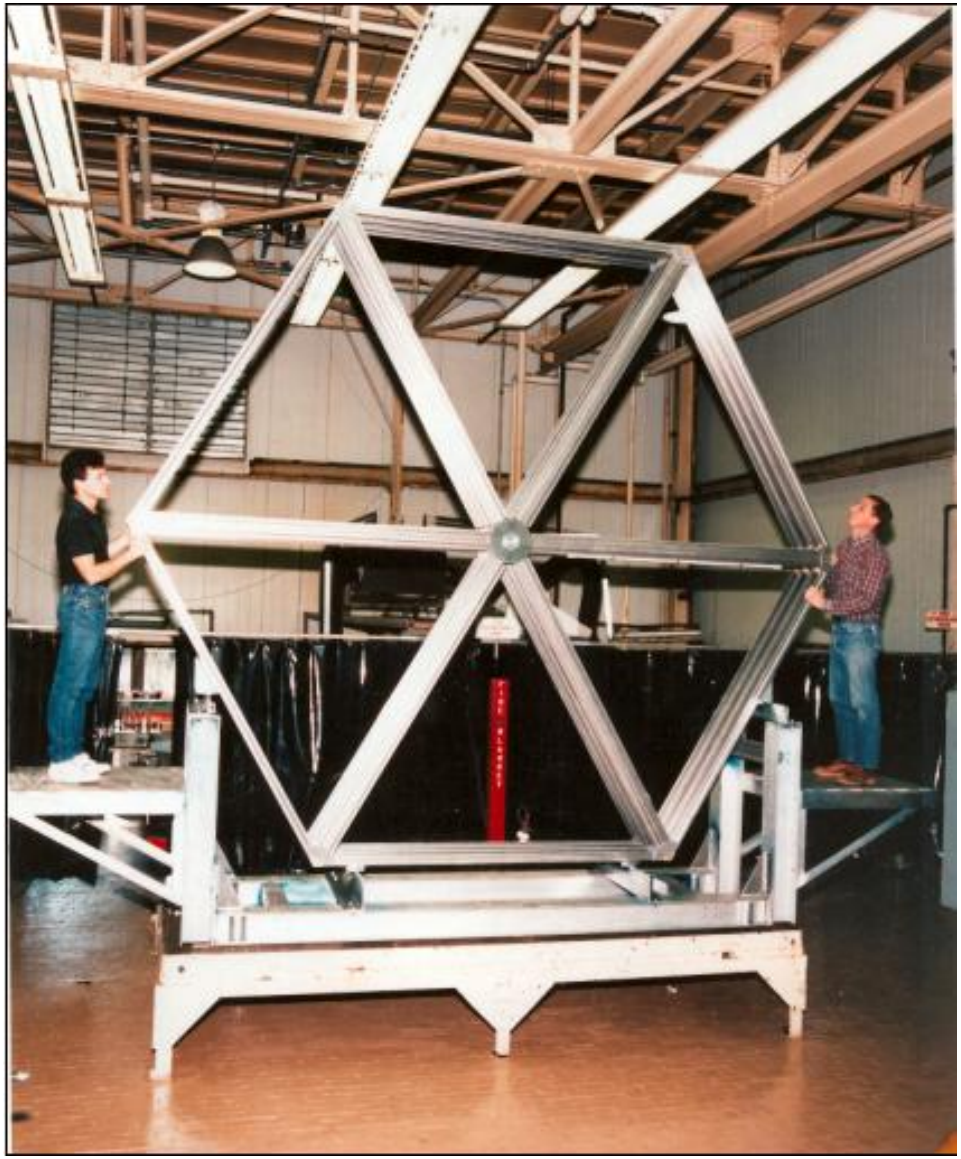

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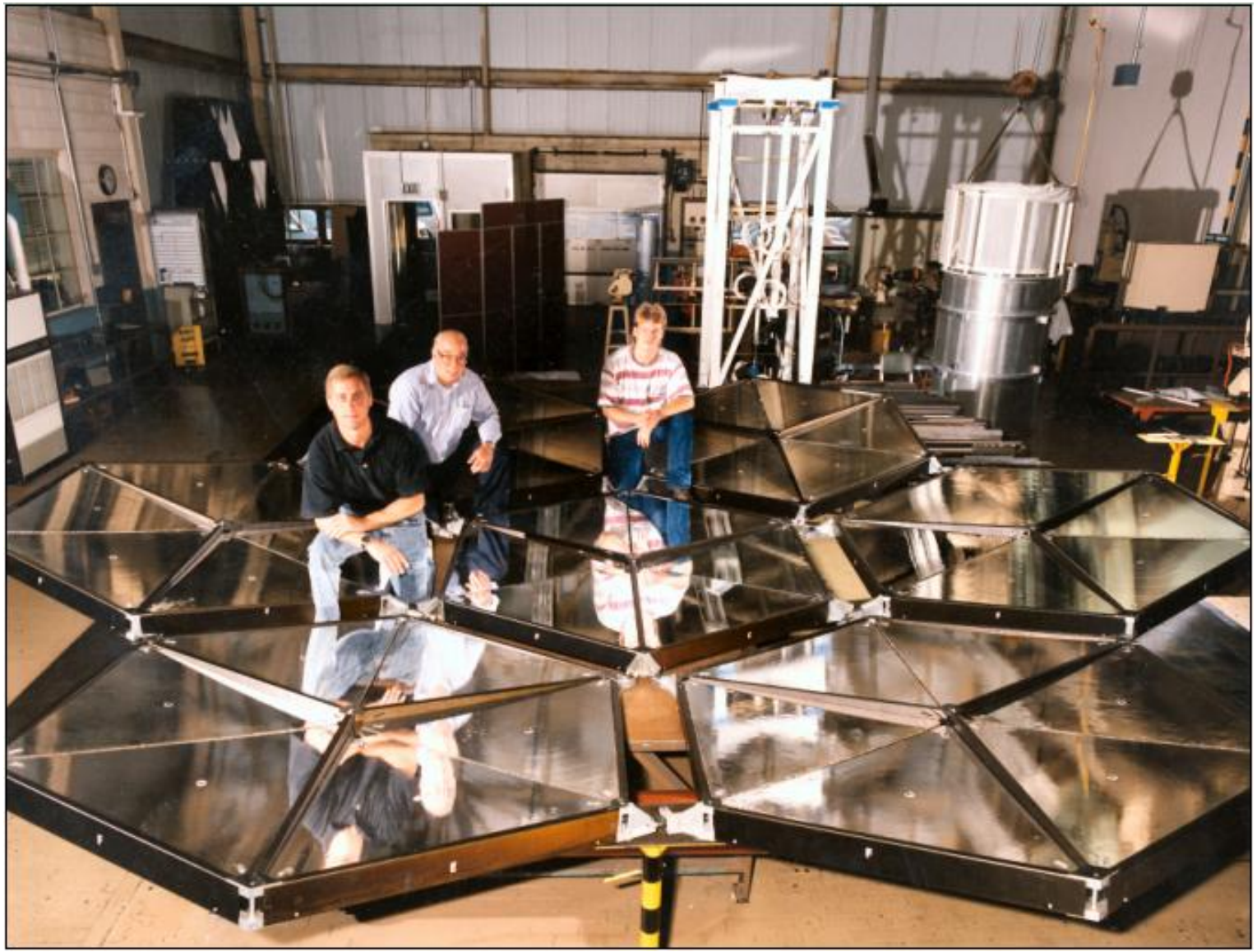


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