

The Aerospace & Defense Forum

**Santa Clarita Valley Chapter Meeting  
May 16, 2023**

**“The X-59  
Pioneering Quiet Supersonic Flight”**

David C. Richardson  
X-59 Program Director  
Lockheed Martin Aeronautics Company

7:15 – 9:00 AM

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The Aerospace & Defense Forum

**Who We Are...**

- An 11-year-old global aerospace and defense leadership community of over 2,400 professionals that facilitates communication, collaboration, and commerce relative to the business of A&D
- Nine chapters – Los Angeles, San Fernando Valley, Santa Clarita Valley, South Bay, Orange County, San Diego, Arizona, Dallas-Ft. Worth, and Ventura County.
- Conduct monthly meetings with presentations, panels and tours with industry leaders focused on some aspect of the business of A&D
- Our practice is to make copies of the business cards and provide them to the attendees. If you wish to do so, please place your cards in the basket



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<p>Holly Schroeder President &amp; CEO SCVEDC <a href="http://scvedc.org">scvedc.org</a></p>		<p>Santa Clarita Valley Economic Development Corporation Santa Clarita Valley Chapter Host and Sponsor</p>
<p>Calvin Hedman President Hedman Partners <a href="http://Hedmanpartners.com">Hedmanpartners.com</a></p>		<p>Hedman Partners LLP Santa Clarita Valley Chapter Breakfast Sponsor</p>

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**“The X-59 Pioneering Quiet Supersonic Flight”**



**David C. Richardson  
X-59 Program Director  
Lockheed Martin Aeronautics Company**

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**The X-59  
Pioneering Quiet Supersonic Flight**

The Aerospace & Defense Forum - Santa Clarita Valley Chapter

16 May 2023  
David C. Richardson



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**Introduction**



Develop a Relevant, Manned,  
Low-Boom Supersonic Aircraft  
for Community Response Testing  
to Repeal Overland Supersonic  
Regulations

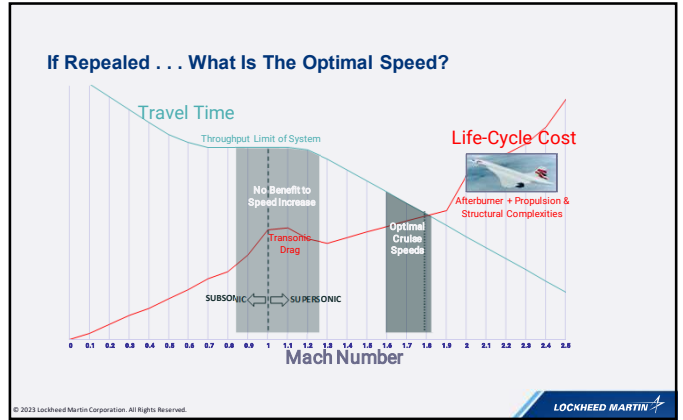


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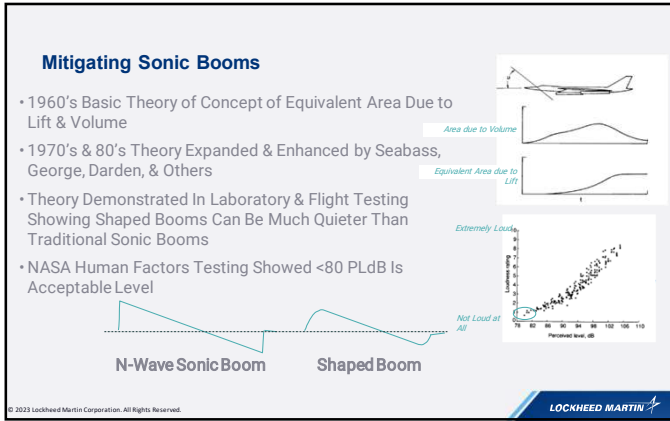
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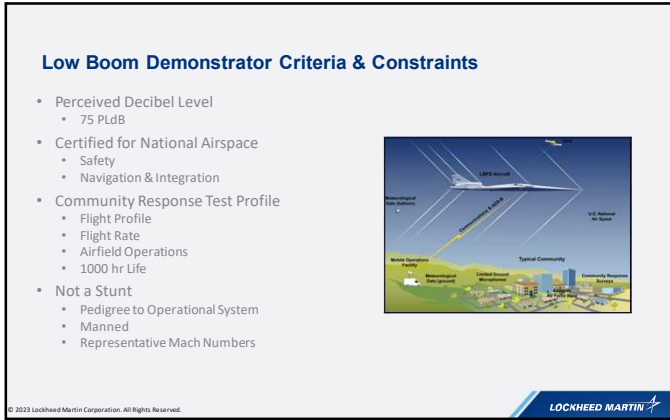
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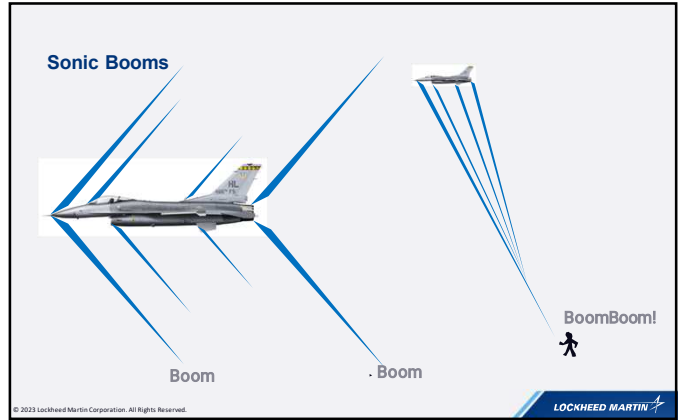
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### Quiet Sonic Booms – Cannonballs vs Olympic Diver

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### Making A Supersonic “Olympic Diver”

1. High Fineness Ratio
2. Area Ruling
3. Aft Lift

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### Lift & Balance

1. Aft-Lift of Stabilizers
2. Added Canards

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### The X-59

- Single Pilot
- 99’ Long – 30’ Span – 14’ High
- 24,300 lbs at Take-Off
- 8,700 lbs Fuel for 90 min Flight
- Mach 1.4 at 55,000’
- General Electric F414 Engine

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### Other Boom-Reducing Features

- T-Tail Shock Interacts with Trailing Shock to Mitigate Perceived Sound
- Engine Nozzle Deck – Shock Goes Up
- Inlet on Top – Shock Goes Up
- No Windshield – No Shock
- Actuator Fairings on Top – Shock Goes Up
- NOTHING On the Bottom – No Shocks

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### Sonic Booms -- Cannonball vs Olympic Diver

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### Sonic Booms -- Cannonball vs Olympic Diver

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### Aircraft Progress

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### Aircraft Progress

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### California Companies Supporting X-59

ACE CLAWMASTER ENTERPRISES, INC.	ENGINEERED MACHINING SOLUTIONS, LLC	MOOG INC.
ACEPT FASTENERS, INC.	ESCO AEROSPACE MFG, INC.	MORRIS PRECISION PRODUCTS, INC.
AERO PACIFIC CORPORATION	EXPRESS METAL AEROSPACE, INC.	NEILL AIRCRAFT CO.
AEROFAB CORPORATION	FASTENER TECHNOLOGY CORP.	NORMAN INDUSTRIAL MATERIALS, INC.
AEROFF, LLC	FINE QUALITY METAL FINISHING INC.	PACIFIC CRANE & HOIST, INC.
AEROLANT MANUFACTURING, INC.	FLAME ENTERPRISES, INC.	PERFECT SWITCH, LLC
AEROSPACE ENGINEERING, LLC	FLEXCO, INC.	PERVIAN TOOLING COMPANY, INC.
AEROSYSTEMS, INC.	FOREST MACHINING LLC	PRECISION AEROSPACE CORP.
AFM INDUSTRIES, INC.	GAR ENTERPRISES	QUANTUM MACHINING, INC.
AIR ELECTRIC, INC.	GEAVAC, LLC	ROBERSON AIRCRAFT EQUIPMENT GROUP
AIRCRAFT COVERS, INC.	GLENAIR, INC.	ROHLR, INC.
ALLAN AIRCRAFT SUPPLY CO., LLC	GRAVBAR ELECTRIC COMPANY, INC.	SATURNE FASTENERS, INC.
AMERICAN AIRCRAFT PRODUCTS, INC.	H C MERCHANTSERS, INC.	SENIOR OPERATIONS LLC
ANILLO INDUSTRIES, INC.	HEBER AIRCRAFT SERVICE, INC.	SHAYTON INDUSTRIES, INC.
ASAP SEMICONDUCTOR, LLC	HIGHLAND TECHNOLOGY	SMA, INC.
AVIATAR MACHING, LLC	HOWMET GLOBAL FASTENING SYSTEMS	SOLARFLIGHT MOSPHERES, INC.
B & B SPECIALTIES, INC.	HYDRAFLOW	SOFNAREL AEROSPACE, LLC
B & E MANUFACTURING CO., INC.	ITT AEROSPACE CONTROLS, LLC	SPEARMAN AEROSPACE, INC.
BEYOND PRECISION, LLC	J & M PRODUCTS, INC.	SPENCER AEROSPACE MANUFACTURING,
BROOD INDUSTRIES INC.	JOB AIRCRAFT DESIGNING, LLC	SFS TECHNOLOGIES, LLC
BOEING DISTRIBUTION SERVICES, INC.	JVR SHEET METAL & FABRICATION, INC.	STADCO
CAN-AM MANUFACTURING, INC.	KD PRECISION MACHINING, INC.	STRATTECH DIRECT, INC.
CENTURY PRECISION ENGINEERING, INC.	KIMBERLY MACHINE, INC.	STRETCH FORMING CORPORATION
CHIMPASTERS MANUFACTURING, INC.	KLINE INDUSTRIES, INC.	SWP ENGINEERING, INC.
CIRCOR AEROSPACE, INC.	KST DATA, INC.	T & F SHEET METAL FAB AND
COAST COMPOSITES, LLC	LAMICO WEST, INC.	TA AEROSPACE CO.
CONTOUR ENGINEERING, INC.	LASER INDUSTRIES, INC.	TAB HARDWARE, INC.
CRAG KACKERT DESIGN TECHNOLOGY,	LEACH INTERNATIONAL CORPORATION	TJ AEROSPACE, INC.
CRSSAR, INC.	MAVERICK AEROSPACE, LLC	TFS AVIATION, INC.
CUSTOM CONTROL SENSORS, LLC	MD ENGINEERING, INC.	UMPCO, INC.
DESIGNS METAL CONNECTIONS, INC.	MED TECHNOLOGIES, INC.	UNITEX TECHNOLOGY INC.
DUGAN TECHNOLOGIES, INC.	MEDGIT (NORTH HOLLYWOOD), INC.	VALLEY SEAL COMPANY
DYTRAN INSTRUMENTS, INC.	MET AIRCRAFT BBS TRANSPARENTS AND	
EATON CORPORATION	MIRON PMP LLC	
ELMA ELECTRONIC INC.	MOELER MANUFACTURING & SUPPLY, LLC	
EMBE INDUSTRIES, INC.		

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### Shared Experiences & Lessons Learned

- Resources & Aerospace Industry Today
- One-Off Prototypes
- Implementing New Technologies & Processes for the First Time
- COVID
- Part/System Re-Use
- Commercial OTS Avionics
- Supplier & Customer Relations

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### Way Ahead

- Aircraft Build Complete
- Move to Flight Line
- Ground Vibration & Structural Coupling Tests
- Paint
- Engine Runs & Integrated Ground Check-out
- Taxi Tests
- First Flight

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**Enablers to Realizing Supersonic Airlines**

Resolved

- Low Boom
- Forward Vision
- Carbon Footprint

Unresolved

- Regulation
- Airport Integration
- Airspace Integration
- Airport Noise
- Engine

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*"The X-59 Promising Quiet Supersonic Flight"*

**David C. Richardson**  
X-59 Program Director  
Lockheed Martin Aeronautics Company

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**Q&A**

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**Upcoming Chapter Webinars/Meetings**

- May 17: **"Second Half Outlook for Aerospace & Defense"**, George Ferguson IV, Senior Aerospace/Defense & Airline Analyst | Research Team Leader, Bloomberg Intelligence | National Online Forum webinar
- May 19: **"Aviation and Defense Markets... What Lies Ahead?"**, Richard Aboulafia, Managing Director, AeroDynamic Advisory | Los Angeles Chapter webinar
- June 1: **Panel on Digital Transformation**, Nathan Kwok (EVP Sales & Marketing, Safran), Jean-Marc Lemaitre (EVP, SkyThread), Jeff Smith (Leader Digital Product Programs, Parker Aerospace), Moderator: Elijah Dobrusin (VP Sales & Marketing, Leach International) | Orange County Chapter meeting


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**The Aerospace & Defense Forum**

**Upcoming Chapter Webinars/Meetings**

- June 20: **Tour of Aircraft Component Repair, Inc.**, Dennis Suedkamp, CEO | Santa Clarita Chapter meeting
- June 14: **"The benefits and risks of AI and ML in A&D products and processes"**, Justin Taylor, Vice President of Artificial Intelligence, Lockheed Martin | National Online Forum webinar
- July 6: Garrett Reim, Aviation Week | Los Angeles Chapter meeting
- July 19: **"Aerospace & Defense M&A Market Trends & Valuations"**, Managing Director, Janes Capital Partners | National Online Forum webinar

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**The Aerospace & Defense Forum**

**Upcoming Chapter Webinars/Meetings**

- August 16: **“Summary of the 2023 Paris Air Show”**, David Conrad, Vice President Business Development, PTI Technologies | National Online Forum webinar
- November 17: Jonna Doolittle Hoppes, Author – **“Calculated Risk: The Extraordinary Life of Jimmy Doolittle | Aviation Pioneer and World War II Hero”** and **“Just Doing My Job: Stories of Service from World War II”** | Los Angeles Chapter meeting

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**The Aerospace & Defense Forum**

- Individual Membership is \$350/year and provides free attendance at all A&D Forum meetings and webinars. Membership is free for those not located near one of the nine operating chapters.
- Recordings of over 250 chapter and webinar presentations are available for download by A&D Forum members.
- You can join the mailing list of any chapter for free, which will also provide you the monthly A&D Forum Newsletter.
- Opportunities to sponsor chapters or webinars are available.
- Our practice is to make copies of the business cards and provide them to the attendees. If you wish to do so, please place your cards in the basket

*For more info: <https://aerospacedefenseforum.org/>*

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**The Aerospace & Defense Forum**

*Thank You*

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