



# HIGH SPEED FLIGHT BULLETIN

Quarter 2 (April - June) - 2023

## From the Chairman's Desk and Cockpit:

Dear HSAT Friends and Colleagues:

As we complete mid-year 2023, I welcome all of you back to kick-off our efforts, in earnest, to take the High Speed Aerospace Transportation (HSAT) conversation to the mainstream public. The HSAT 6th Edition is just around the corner and I encourage all of you to register and reserve your seat and send us your participation inputs. We are changing the priorities, and addressing first things first: the users, the flying public, the so called "market" and actually the paying air passenger "en masse" who will catalyze the HSAT industry in the future.



### [REGISTER FOR THE HSAT 6th EDITION HERE!](#)

As always, we publish the HSAT Quarterly Bulletin after the closing of the quarter, and indeed, this edition captures right at the end of June, two very relevant events. On a positive note, the very important Virgin Galactic Eve and Spaceship 2 return to commercial service. This milestone is very important to us at HSAT, as we envision the VG spacecraft programs and vehicles as front runners in the Point to Point (P2P) and Spaceport to Spaceport (S2S) first demonstrations to enable future HSAT across further distances, one day indeed, spanning the globe. Enabling our sights to a possible "world in a business day" future for all mankind.

On a tragic and sad note, the end of the quarter witnessed the accidental implosion of the Ocean Gate submersible and the loss of five adventurers, including HSAT collaborator and Polar-Orbital around the world aircraft flight record holder, Captain Hamish Harding. Hamish was a staunch supporter of the FastForward and HSAT groups and spoke at our conference

calls and provided input to our first HSAT Workshop in 2019, coinciding with his record-breaking flight. What is important for all of us pushing the speed and altitude envelopes, to keep safety and standards always at the forefront. Even with the maximum care, dedication and caution, accidents always loom nearby. Sometimes tragically close.

This Bulletin will address a game changing development, well announced at the Paris Air Show, that is now out in the open, while, for decades it was hiding in plain sight: the Turbine and (oblique) Rotating Detonation Engine (T-RDE) combined engine technologies coming to the high-speed flight industries, hypersonic (combined with ramjet-scrumjet) and vacuum capable of Mach 17+ speeds, in theory. Indeed, General Electric (GE)-Innoventing, NASA and Venus Aerospace, amongst others, have now the attention of the DOD and most importantly, the DOD funding financial muscle, now, hold that thought, more on that later.

In the supersonic regime, we are delighted to hear the great news about BOOM's program development, mega-factory and supplier base group including Spanish companies SENER and Aciturri amongst other leading global OEM's. We are also delighted to follow on the progress that Mach 2+ capable Starfighters Space is making enabling further aircraft, air-launch and supersonic missions routinely carried at the Shuttle Landing Facility in Florida, and soon, at an inland Spaceport at the central USA Space-Basin, stay tuned for further announcements on this important development set.

All in all, our goal for 2023 is to engage the "Subsonic" passenger and cargo ecosystems and to invite them to attend and provide inputs to our September 8th conference call and the HSAT 6th Edition in November (save the date November 16-17 and stay tuned for early-bird registrations [here](#)). I am referring to existing passengers, dispatchers, travel agents and other user groups. As well as operators of subsonic aircraft, airlines, charter operators, charter brokers as well as, cargo-logistics and freight forwarding.



Last year, at our HSAT 5th Edition we committed to shift gears and have the mainstream air passengers give the decisive push that the HSAT vehicles and related technology companies need to fund the design, manufacture, assembly and entry into service to fly the first demonstrations, and shortly after entering commercial service. Once the "fly-me-faster-please" voice of billions of passengers who endure the Tyranny of Mach 1 is heard by social, civic, business, political and other leadership groups, I am abundantly optimistic that the capital floodgates to make HSAT commonplace will open up wide and strong.

There is no turning back, we are opening the lid of the HSAT conversation to the mainstream public, once and I believe for all. Once the mainstream public internalizes that making the world smaller, quickly accessible, no matter how far the destination, will also make the world a better and safer place, the path will be set for the “demand-pull” that the HSAT leaders have been seeking for decades. Indeed, 2023 is the year to make it happen. HSAT will also mark the 75th anniversary, almost to the month, since Colonel Chuck Yeager confronted, and vanquished for the first time in history, our archenemy and Tyrant, Mr. Mach 1, who has held humanity captive to subsonic flight for far too long.

To warm up our engines, our Q2 FastForward Quarterly call on July 14th, featured Dr. Joe Leader, the President of the Airline Passenger Experience (APEX) group. Joe and I go a long way back, when we led the conversation to democratize the use of Very Light Jets (VLJ's) in the early 2000's. Now Joe leads and represents the world's largest group representing the air transport passengers voice in the USA and the world. [APEX Website](#)

Joe and his APEX insights and participation in July's HSAT call, represents the first of future regular series of inputs to our group from air transportation leaders representing the mainstream passengers' users and markets. Their sharing of the “real world” insights, positions, demand drives and needs of the billions of passengers who fly billions of subsonic trips per year will trigger the much-needed user demand-pull needed to unleash the funding, technology maturation and entry into service of faster than Mach 1 safe, economic and sustainable air and space vehicles. It is very helpful and promising that passengers and cargo air traffic have achieved consistent growth globally, post COVID and that the world is on track to move 4 billion plus passengers this year and achieve a record profit for the airlines. The appetite for air transportation, and for people to be where they need to be when they need to be there, has not changed, and will only grow stronger, I believe.

As always, HSAT Bulletins, calls and interactions will cover the latest in the HSAT state-of-the-art key dimensions in the key areas including technology, best practices and standards, regulations and commercial drivers and key performance indicators.

On that note, we have terrific updates on the very profitable high speed transonic fleet in service, supersonic progress towards the first demonstrator of quiet supersonic over land aircraft (NASA-Lockheed Martin X-59), Hypersonic progress with the fast-moving Hermeus Quarter-Dark Horse technology demonstrators and our much awaited and closely tracked Starship orbital point to point vehicle.

Our very own HSAT leadership, is working on a possible suborbital HSAT point to point demonstration vehicle, which we hope to announce at HSAT's 6th Edition Workshop in November, stay tuned. This demonstration flight could be a fulcrum for the world to tell us “fly-me-fast-now”.

We cannot have an update without addressing sustainability, and as we declared at the HSAT 5th Edition in 2022, the High-Speed Flight Re-evolution will be technologically

matching “or exceeding “environmental standards prescribed for subsonic aviation well into the 2050’s, period, no excuses, so to any environmental observers-readers out there. Be prepared to receive our data, intel and research and analysis proving that flying fast and flying “super” clean are synonyms, we are ready to show the proof. And glad to discuss it. This is much better than waiting for others to publish data coming from desktops that have never produced, flown or commercialize an aircraft or spacecraft.

Finally, our Point to Point Working Group in collaboration with our strategic partner, the Global Spaceport Alliance (GSA) will laser focus on a suborbital Spaceport to Spaceport demonstration between two US licensed spaceports. Stay tuned for more exciting updates on this front. We might make history very soon.

Enjoy the Q2 Bulletin and as always, Fly Fast, Fly Safe!



Oscar S. Garcia, Chairman  
High Speed Flight  
[www.highspeedflight.com](http://www.highspeedflight.com)

## HSAT State of the Industry Report 2023



*(Image credit: InterFlight Global)*

[https://www.hsat.highspeedflight.com/HSAT ENDOATMOSPHERIC  
TRANSONIC  
MACH .9-1.2](https://www.hsat.highspeedflight.com/HSAT%20ENDOATMOSPHERIC%20TRANSONIC%20MACH%20.9-1.2)

On the topic of public “Mainstream” demand pull for high-speed transonic flight, I would like to start focusing our lens on groups like Airline Passenger Experience APEX (Q2 Call July 14th), IATA, ACI and start the dialogue with other groups addressing the insights of airlines, airports, pilots and controllers’ collective voices (unions) and other groups

representing the passengers and cargo subsonic aircraft users; scheduled, charter and general aviation.

Here are some excerpts of the baseline is today, by some of these groups. People know what they know, and indeed, the bag is mixed when it comes to whether or not people know that high speed flight is possible “today”, only if they demand it loud enough, or what I call “shout politely” for high-speed flight. Our guest speaker for the Q2 call, Dr. Joe Leader, Chief Executive Officer, APEX (Airline Passenger Experience Association) corroborated that the mainstream premium passengers are requiring airlines such as American Airlines and United Airlines to purchase supersonic aircraft. [Press release.](#)

This quarter, we would like to posthumously honor our friend and fellow Captain Hamish Harding, Chairman of Action Aviation and high-speed transonic World Record holder for fastest Polar circumnavigation of earth in 44 hours. Hamish shattered the previous record by more than 4 hours. He flew the fastest commercial aircraft in service, the March .0925 G-650ER across the world as a precursor of future

supersonic iterations of the amazing G-650ER. Hamish documented the historic fast flight in the Documentary [“One More Orbit”](#)

Hamish was a Fast Forward contributor and spoke at our 2019 quarterly call shortly after the flight, and at our HSAT First Edition in December 2019. Godspeed Hamish, future high speed flight brotherhood will remember you as we break into the Mach 1+ era, in the air and in space...One More Orbit to you in the heavens!

In Memoriam, Captain Hamish Harding, FastForward Call Q3 2019-One More Orbit.



**HIGH SPEED.AERO  
SPACE  
TRANSPORTATION** 6th EDITION  
**WORKSHOP**

All is progressing well in the Mach .9-1.2 programs front, Gulfstream, Dassault, Bombardier progressing (fast) on their G-400-700-800, Global 8000 and 10X respectively.

This quarter, in May, the European Business Aviation Association (EBACE) met in Geneva to update the progress of the M.925 Falcon X aircraft program, capable of covering 7,500NM at 51,000 feet, like the altitude the Mach 2+ Concorde used to cruise. The sales of the Falcon 10 are steady and strong and at circa \$75 Million per aircraft, it again demonstrates the appetite for speed for the world's most discerning and time sensitive passengers. I am convinced that the Mach .925+ class of business aircraft, could be pushed towards the transonic Mach 1-1.4 with engine and some aerodynamic tweaks, while taking advantage of the already CAPEX invested in the Type and Production Certificates (TC-PC) and most importantly, the customer and financing markets' confidence in the OEM's and established fleets. Something to think about, we look forward to the 2025 entry into service for this magnificent aircraft.



*(Photo credit: Dassault)*

## **SUPERSONIC MACH 1.3-3.0**

Great news from the Paris Airshow, Boom Supersonic is making great strides with its Megs-Factory in Greenville, South Carolina, as well as adding Tier 2-3 world class suppliers and vendors such as Italian Leonardo, Spanish Sener and Aciturri, kudos to Spain as an aerospace growing power, to support and lead the HSAT world together with Boom (indeed, as a born Spaniard, I am proud to report on this). Please, feel free to read Boom's full press release [here](#).

We are great fans and longtime supporters of [Starfighters Space](#) (formerly Starfighters Aerospace), and we are glad to report that the demand for Mach 2+ capability for hypersonic and space launch R&D has reached unheard of (albeit, predicted by our group for a few years) levels of tempo, cadence and high speed

regimes. Starfighters Space CONOPS and Mission profiles are fertile grounds for Point to Point, Airport to Airport and Spaceport to Spaceport “Pathfinding” flight profiles with speeds approaching Mach 2.2 and apogees in excess of 80-100,000 ft, stay tuned for more and truly amazing news in the activity and importantly, “Funding” of Starfighters. A bellwether of HSAT demonstrations to come!

## **HYPERSONICS**

### **MACH 3-10+**

This Quarter, Stratolaunch completed the acquisition of Virgin Orbit’s former B 747-400 Cosmic Girl Launcher. We have been following both companies closely as we believe that air-launch will have a key role in the development of high-speed transportation vehicles in both hypersonic and sub/orbitals realms, given the aircraft ability to launch both types of high-speed vehicles. Keeping in mind that historically, most, if not all, the most relevant hypersonic tests, the hypersonic X-57 Waveraider, the X-15 Spaceplanes and even the iconic X-1 sound barrier breaker were air launched, as we believe the next generation of R&D HSAT vehicles will be. After almost 20 years of HSAT advocacy, I have an “educated” hunch that the first P2P demonstrations could be performed by air-launched vehicles.

Moreover, together with some of my IFG colleagues, I was personally involved in detailed due diligence efforts to value and potentially acquire the 747-400 air-launcher in the Chapter 11 Bid last May, and with the aim of possibly building a fleet of air-launchers of different sizes and weight-payload vehicles for IFG and its backers. I had the pleasure of spending quality time with former Virgin Orbit CEO, Dan Hart, the aircraft technical team in Long Beach, and surveying the aircraft (see this Bulletin welcome letter Cosmic Girl cockpit photo). I have all confidence in the Stratolaunch team and future plans for its 747-400 launch platform, which will have positive implications in the R&D, T&E and initial P2P HSAT demonstrations in the near future.

This Quarter, we also presented the HSAT industry with the news that the [Transdigm Group](#) (NYSE TDG) acquired the majority of privately held [Calspan](#). We are great friends, fans and advocates of Calspan’s owners, and C-Suite of extremely capable executives who are making and, in my opinion, will be making great strides in Hypersonics with state-of-the-art wind tunnel and High Enthalpy Clean Air Testing (HAPCAT) capabilities presently available to the commercial markets. Stay tuned for more public news and announcements about Calspan and its exciting new developments and capabilities.

On the purely commercial side of hypersonic HSAT, [Hermeus](#) keeps impressing with its lead in powerplants R&D and exciting, and attention getting, public releases. As we reported in our Q1 Bulletin, stay tuned for the super exciting messaging announcement and progress of the Chimera II FJ-100 based engine in collaboration

with -enter GE or PW- .With Chimera I and II in place, the fast coming of the Quarter horse, and Darkhorse programs, just got stronger as a prelude to the promising Halcyon passenger carrying aircraft.



*(Image credit: Hermeus)*

Last but not least, this quarter also showed progress as NASA Advanced Air Vehicles Program publicly announced the High-Speed Endo atmospheric Commercial Vehicle Conceptual Design Study and Technology Roadmaps Development project. NASA is seeking to develop enabling technologies for high-speed commercial transports able to fly at speeds between Mach 2 and Mach 5 that could enter service as early as the 2030s. This important study is awarded to Boeing and Northrop Grumman. IFG and its strategic partners are proud to be one of Boeing's supporting sub-contractors and working with Boeing Research and Technology teams with Todd McGee, Kevin Bowcutt, et al. will be a great step forward towards the definition of a Mach 2-5 viable commercial hypersonic vehicles, I hope early into the next decade. More to follow on this project as public information is released.

#### **Article**



*(Image credit: NASA/Lockheed Martin Corporation)*

As always, please send us a note, let us know how you could add, enable and enhance a hypersonic demonstration, proof of concept or similar "actual flight" development around 2025. We are all ears, [contact us](#). Maybe we should start a high-speed Prize Mach 5 demo contest to be awarded this decade? Stay tuned, more to follow on that conversation, join our [6<sup>th</sup> HSAT Workshop](#).



# **HIGH SPEED.AERO SPACE TRANSPORTATION** 6th EDITION **WORKSHOP**

## **HSAT SPACE**

This quarter, IFG confidentially presented, quasi-formally, to a suborbital space operator with the possibility of “buying” a demonstration S2S mission from and to licensed USA spaceports. We are more confident every Quarter, about the favorable and already existing regulatory context and tools available for S2S mission planning and execution to be mostly in place. Make no mistake, the developmental efforts for a Suborbital S2S demonstration are challenging, yet manageable, I believe. But be assured, these regulations, airspace and “flight planning” efforts will be effective as long as there are vehicles that can start to demonstrate “pathfinding” S2S missions linking spaceports and, or airports (i.e., for instance to and from the Midland Air and Spaceport to and from Spaceport America), even when at first involving short distances (i.e., KSC to/from Jacksonville Spaceport).

And with a possible set of new spaceports, including Spaceport Puerto Rico, the network of potential S2S routes grows by 14 more new routes (28 each way) possible mission profiles for every Spaceport that comes online. On the Puerto Rico potential spaceport subject, I am pleased to announce that IFG and XArc are members in a consortium led by Maddox Aerospace to respond to a public RFP to develop a Spaceport in PR. With it, the possibility of multiple S2S new high speed and spaceflight corridors emerge funded and promoted by a new coming set of investors, developers and visionaries betting on a future Spaceport centric game-changing investment play. We will update our charts and a set of 14 + new S2S Water/Inland will emerge.

[\*\*HSAT Bulletin Archive \(2022 and 2023\)\*\*](#)

## **SUBORBITAL MACH 3.0-5.0**

We continue to salute Dawn Aerospace’s team and their rocket powered Aurora MkII demonstrations in Australia and look forward to the same type of R&D, T&E in the USA. This quarter, we partook on Aurora’s USA Director of Sales presentation, Khaki Rodway, on the program progress courtesies of our collaborators at the Global Spaceport Alliance (GSA), Dr. George Nield, James Causey, Steve Wolfe, et al. We are glad to see that possible P2P and S2S demonstrations are possible within this decade. We are keeping Dawn aerospace on our radar with the “gain” mode set to maximum. We welcome Dawn

to use our inland corridors to allow the reuse and R&D/T&E efficiencies from recovering the tests articles in nominal and off nominal conditions. Well done, Jeroen and Stefan, and we look forward to having you fly to the USA soon. [Article](#)

We always push our Quarterly Bulletins past the end of the quarter, for exciting news

within it. This Quarter 2 was definitely worth the wait, as we witnessed Virgin Galactic's successful flight back to the suborbital flight circuit, with their Italian Air Force (commercial) customer flight on June 28th, well done VG Team, Michael Colglazier, Mike Moses, and especially our friends Sirisha



Bandla, Kathleen Karika et al. We are bullish on our assessment of the SS2 possible evolution into the S2S high speed flight demonstrations and future commercialization. Stay tuned, much more to follow on this. The flight was a flawless and total success, and we expect VG's launch cadence, rhythm and tempo to increase exponentially. Ad Astra!



*(Image Credit: Virgin Galactic)*

## **ORBITAL MACH 5-10+**

Following up from our previous Bulletin, the DOD's US Strategic Command and the US Space Force are converging, in my opinion, quite well about the important imperative to study, conceptualize and demonstrate P2P/S2S orbital Rocket Cargo studies and demos

to provide assured, frequent and reliable orbital flight to deploy defense, security and humanitarian payloads anywhere on earth within 2 hours. We could not agree more, support and are very excited about it.

We emphasized the need for plenty, and frequent Collaborative Research and Development (CRADA) studies and we emphatically proposed funding multiple CRADA's with industry leaders in the very near future. Here are some relevant updates for this Quarter.

On the propulsion topic, Venus' hypersonic-spaceplane concept, fundamentals and technologies, are in our opinion viable and potentially "game-changing". As we point out in our welcome letter, we are particularly keen and supportive of their Rotation



*(Image Credit: Venus Aerospace)*

Detonation Engine (RDE) powerplant and "airplane" like design dubbed Stargazer and concept of operations. The RDE program has taken on another dimension in importance, relevance and funding. Enter data on the DOD RDE program funding in addition to Venus.

As always, our HSAT efforts for S2S Suborbital and Orbital trajectories are predicated on; first, ever improving safety, second seamless integration with the NAS other users and third, enabling the competition and cooperation of Spaceports ("coopetition"), also known as collaboration and competition ("collapetition"), to demonstrate the safety, reliability and general feasibility of the vehicles.

The HSAT-FastForward S2S airspace development projects in place are meant to evolve continuously, and always with your valuable input. Please, distribute and, or complete the airspace corridors questionnaire on this link, we will keep improving guiding principles and demonstration missions. [Please take the Survey](#)

Please consider joining our Point to Point (P2P) and Spaceport to Spaceport (S2S0 Working Group-In Collaboration with the Global Spaceport Alliance (GSA).

Our group keeps growing and we welcome RS&H's Spaceport practice leaders, and their current studies and analysis on the future of S2S flight.


As always, contact us to provide feedback on the S2S Corridors White Paper and related work, as well as to join the HSF-GSA Point to Point Working Group.

The WG seeks input in several areas including:

- NAS integration with emphasis and focus on Upper Class E Airspace and Terminal Areas-Airport-Spaceports
- Environmental contexts, research and data for modeling and forecasting environmental impact from emissions derived from future frequent S2S flight operations.

- New technologies and CONOPS, i.e., Hybrid-Electric propulsion, Beamed energy, nuclear power.


## High Speed Flight-Global Spaceport Alliance Spaceport to Spaceport (S2S) White Paper and Guiding Principles



# S2S WHITE PAPER

## Spaceport to Spaceport Suborbital Flight Airspace Guiding Principles

Access the White Paper with this QR code:



**1. SPACEPORTS**

- Licensed Launch Sites and Spaceports in the USA supporting S2S flight operations should compete and collaborate at the same time. Such activity is known as “coopetition” and enables a network of S2S airspace routes or corridors supporting the safe, efficient, and scalable transportation of goods and people on suborbital spaceflight vehicles.
  - Suborbital S2S missions will require both origin and destination spaceport co-preparation of the required flight corridor to accommodate the flight profile as per FAR 450.
- Spaceports and launch site operators supporting suborbital flights should ensure CFR 14 FAR 420 License to Operate a Launch Site regulations are relevant and support S2S commercial flights for the transportation of payloads and people. Particularly as related to Appendix A and Appendix B Methods for Defining a Flight Corridor.
- S2S Flight corridors will include portions of Upper-Class E airspace. Upper Class E airspace is becoming more congested with time. Spaceports must preempt and manage the portions of S2S airspace crossing Upper Class E Airspace in close collaboration with the relevant air traffic managers and operators.
- Spaceports and related launch and reentry sites should plan for a adequate S2S corridors dimensions.
  - S2S Corridors with lengths up to and exceeding 2,000NM separation between spaceports-launch and reentry sites are suitable for R&D and T&E suborbital missions.
  - S2S Corridors with lengths of more than 2,000NM of separation between spaceports’ launch and reentry points are suitable for commercial flights carrying cargo and people onboard.

**2. AIRSPACE**

- S2S airspace needs to integrate seamlessly and with minimal changes into the National Airspace System rules and regulations (i.e., Visual flight Rules (VFR) and Instrument Flight Rules (IFR)).
- S2S airspace volumes to emerge as “one-off” segregated airspace for R&D, T&E, and demonstrations and evolve into on-demand standardized corridors and eventually into charted or “published” airspace.
- The S2S Suborbital Transit or “cruise” phase of flight must be defined by CFR 14 FAR 450.1 and included in Subpart C-Safety Requirements and CFR 14Suborbital Mission Analysis
- S2S Airspace Corridors development technical approach includes Air Traffic-National Airspace System (NAS) Simulation Models (i.e., Terminal Area Route Generation Evaluation and Traffic Simulation (TARGETS)) and Dynamic ATMC Research Technology (DARTS) and with current air traffic routes, including airspace and weather considerations for the launch, “cruise” and reentry phases of an S2S suborbital mission. Key performance indicators include delays, rerouting, and other traffic flow considerations for Enroute and Terminal Departure/Arrival ATC centers.
- Corridors Dimensions (GSA-HSF-FF Surveys<sup>1</sup> as of 12/2022 ~75 responses)

S2S CORRIDOR PURPOSE	LENGTH	WIDTH	HEIGHT
R&D, T&E	0-ANTIPODAL MAXIMUM ~12,500 NM	40-130 NM	GROUND-UNLIMITED
COMMERCIAL OPS	2,000-MAXIMUM ANTIPODAL 12,500 NM	20-130 NM	FL 600-UNLIMITED

- S2S suborbital airspace corridors design is most effective based on real flight experience and data
  - Data collection, analysis and databasing of all “flown” Suborbital flight trajectories regardless of their flown cross range is key to enabling future S2S flight operations with expanding cruise segments.
  - Dimensions and characteristics of S2S corridors informed by stakeholders involved in suborbital spaceflight activities (ground and air ops) via surveys and data analytics.

<sup>1</sup> <https://surveys.benchmarkemail.com/Survey/Start?id=1395206&se=696900>

In conclusion, we look forward to supporting any efforts for the first HSAT demonstration this year, for both suborbital and orbital missions within the defined airspace, air and space traffic management, mission requirements and flight planning elements to enable

S2S for Ultra-long distances across the earth. As we mentioned before, the good news is that most regulatory and compliance frameworks are in place, and ready to be streamlined to accommodate frequent-commercial operations across the world. As they say, the journey of a thousand P2P Spaceflights starts with a one-demonstration at a time". Fly Fast, fly Safe, for a Smaller, Better, More Harmonious World!

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**INNER SPACE TRAINING**

IGNITE YOUR MISSION -TRAIN LIKE AN ASTRONAUT

For More input on HSAT throughout this month and going forward, follow us on LinkedIn and Comment on the Postings



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