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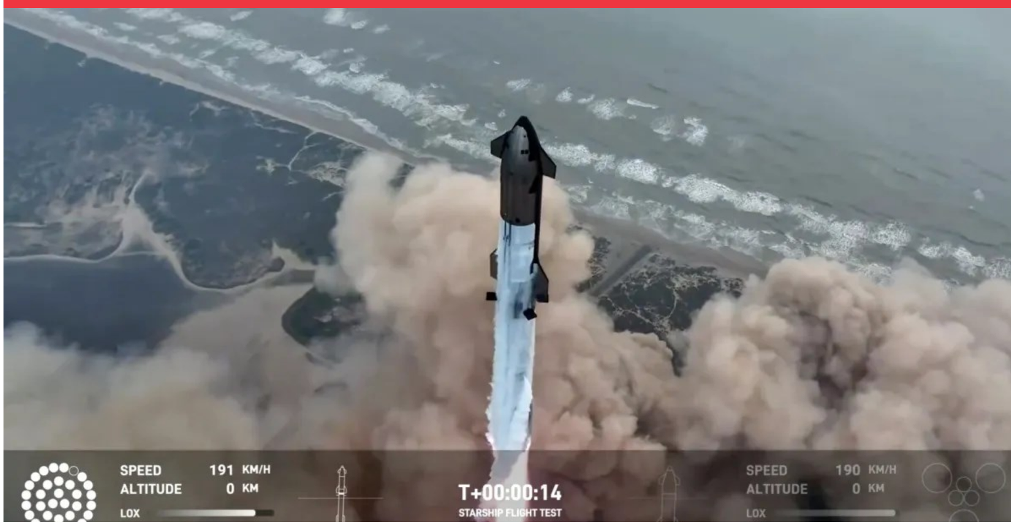
JULY 2024

THE UPM MARKET INFORMER



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Starship Survives Reentry During Fourth Test Flight

SpaceX conducted the fourth test flight of its Starship launch system June 6, with both the Super Heavy booster and Starship upper stage making it back to the surface intact. The vehicle lifted off at 8:50 a.m. Eastern from the company's Starbase test site at Boca Chica, Texas. The ascent appeared to go as planned other than the failure of one of 33 Raptor engines in the Super Heavy booster to ignite. After "hot staging" stage separation, where the Starship upper stage ignites its engines before separating from Super Heavy, the Super Heavy booster performed a boostback burn without any Raptor engine failures, as was the case on two previous flights. It then jettisoned the hot staging interstage section, a new step for this launch that SpaceX says is a temporary measure to reduce the mass of the booster for its landing.

During the booster's final phase of descent, it reignited three Raptor engines for a landing burn. This allowed the booster to make a "landing" in the Gulf of Mexico, reducing its velocity to zero at the ocean surface before toppling over. Achieving that landing was a major priority for the mission. Starship flew its planned suborbital trajectory, not exhibiting the rolling seen on the previous launch in March. Starship provided live video during reentry through SpaceX's Starlink satellites, offering dramatic views of the plasma field enveloping the spacecraft. Starship made it through the maximum phase of heating, unlike the March flight, although video showed damage to one flap. The vehicle continued a controlled descent and performed a landing burn before splashing down about 65 minutes after liftoff.
"The payload for this test was the data," the company said in a post-launch statement summarizing the flight. "Starship delivered." "Despite loss of many tiles and a damaged flap, Starship made it all the way to a soft landing in the ocean!" said Elon Musk, chief executive of SpaceX, on social media.

NASA Administrator Bill Nelson also praised the flight as a step towards development of a lunar lander version of Starship that the agency plans to use for its Artemis lunar exploration campaign. "Congratulations SpaceX on Starship's successful test flight this morning!" he posted. "We are another step closer to returning humanity to the Moon through Artemis—then looking onward to Mars." Musk said in an April presentation that if the Super Heavy booster's landing at a "virtual tower" in the Gulf of Mexico was a success on the fourth flight, the company could attempt to bring the booster back to the launch site on the next flight to attempt to land it back on the pad with the assistance of "Mechazilla" arms on the launch tower. Musk appeared to be pressing ahead with that plan in a comment on social media shortly after this flight. "I think we should try to catch the booster with the mechazilla arms next flight!" Click here to read the full article.

Nickel/Cobalt & Stainless-Steel Flat Rolled Surcharges

--	Apr '24	May '24	Jun '24	Jul '24	Aug '24	Sept '24
15-5	0.8714	0.8962	0.9543	0.9410	*	*
17-4	0.8836	0.9092	0.9675	0.9540	*	*
17-7	0.9023	0.9191	0.9831	0.9570	*	*
201	0.6347	0.6521	0.6867	0.6762	*	*
301 7.0%	0.8815	0.8978	0.9586	0.9319	*	*
302/304/304L	0.9647	0.9847	1.0543	1.0253	*	*
304-8.5%	1.0044	1.0218	1.0956	1.0656	*	*
305	1.2696	1.2874	1.3916	1.3537	*	*
309	1.3112	1.3324	1.4366	1.3992	*	*
310	1.8533	1.8765	2.0416	1.9885	*	*
316/316L	1.5034	1.5068	1.6310	1.6406	*	*
321	1.0292	1.0456	1.1238	1.0926	*	*
347	1.3388	1.3552	1.4334	1.4022	*	*
409/409 Mod	0.2885	0.2988	0.2988	0.2872	*	*
410/410S	0.2977	0.3088	0.3088	0.2972	*	*
430	0.3513	0.3666	0.3668	0.3556	*	*
439	0.3628	0.3791	0.3791	0.3683	*	*
263	7.4378	7.1872	7.2037	7.5222	7.7369	8.1174
276	8.2185	8.3632	8.4690	8.8325	9.0886	9.9294
A286	2.2714	2.2421	2.2549	2.3887	2.4877	2.7088
600	5.2968	5.1756	5.2453	5.7004	6.0009	6.5626
601	4.4546	4.3571	4.4003	4.7578	4.9957	5.4508
617	7.5183	7.4124	7.4565	7.8179	8.0628	8.6323
625	8.2410	8.2697	8.3298	8.7005	8.9518	9.6282
718	7.2377	7.1970	7.2408	7.5559	7.7691	8.2477
X-750	5.7573	5.6430	5.7073	6.1339	6.4162	6.9448
800	2.4995	2.4442	2.4550	2.6283	2.7505	2.9928
825	3.8727	3.8560	3.8810	4.1142	4.2785	4.6712
Alloy X	5.5787	5.6251	5.6762	5.9659	6.1674	6.7538
188	8.8891	8.2433	8.2733	8.4554	8.5847	8.3965
L-605	9.2428	8.4775	8.4870	8.6063	8.6954	8.3402

*Surcharge currently not available

Thin Gauge Stainless Steel and Nickel Alloy Surcharges

--	Apr '24	May '24	June '24	Jul '24	Aug '24	Sept '24
301 7%	1.0578	1.0773	1.1503	1.1182	*	*
302/304/304L	1.1609	1.1816	1.2651	1.2303	*	*
304 8.5%	1.2053	1.2261	1.3147	1.2787	*	*
305	1.5235	1.5449	1.6699	1.6244	*	*
316L	1.8042	1.8082	1.9572	1.9687	*	*
321	1.2351	1.2547	1.3488	1.3110	*	*
347	1.6066	1.6262	1.7201	1.6825	*	*
201	7.8586	7.6654	7.8060	8.5373	9.0187	9.8935
600	6.3562	6.2108	6.2943	6.8405	7.2011	7.8751
625	9.8893	9.9237	9.9958	10.4406	10.7422	11.5539
625LCF	9.8893	9.9237	9.9958	10.4406	10.7422	11.5539
718	8.6852	8.6365	8.6889	9.0671	9.3229	9.8972
Alloy X	6.6944	6.7502	6.8115	7.1591	7.4009	9.7410
X750	6.9087	6.7716	6.8487	7.3607	7.6994	8.3337

*Surcharge currently not available

Nickel/Cobalt & Stainless-Steel Bar Surcharges

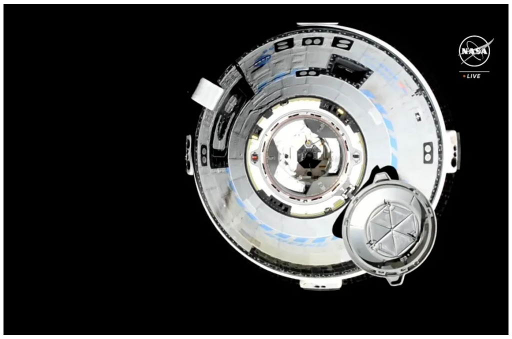
	Feb '24	Mar '24	Apr '24	May '24	Jun '24	Jul '24
316LS/316LVM	2.26	2.27	2.36	2.43	2.62	2.49
Custom 455	1.29	1.30	1.34	1.41	1.48	1.35
Custom 465	1.83	1.84	1.91	2.00	2.11	1.97
Custom 630	0.98	0.99	1.01	1.05	1.11	1.03
CCM	12.30	12.30	11.93	11.81	11.04	10.96
625	8.84	8.86	9.31	9.67	10.39	9.79
718	6.70	6.69	7.06	7.37	7.89	7.29
718CR	6.70	6.69	7.06	7.37	7.89	7.29
A286	3.25	3.27	3.44	3.62	3.86	3.55
A2861	3.25	3.27	3.44	3.62	3.86	3.55
A2862	3.25	3.27	3.44	3.62	3.86	3.55
A2867	3.25	3.27	3.44	3.62	3.86	3.55
A286R1	3.25	3.27	3.44	3.62	3.86	3.55
A286SH	3.25	3.27	3.44	3.62	3.86	3.55
Alloy X	7.32	7.37	7.70	7.99	8.56	8.14
Wasp6	8.58	8.64	8.98	9.28	9.66	8.99
L605	12.46	12.54	12.40	12.35	11.84	11.87
321	1.43	1.44	1.50	1.56	1.66	1.51
347	1.43	1.45	1.50	1.56	1.66	1.51
Greek Ascoloy	1.32	1.33	1.34	1.35	1.39	1.41

*Surcharge currently not available

Titanium Surcharges

Form	Grade	Q1 2024 Surcharge	Q2 2024 Surcharge	Q3 2024 Surcharge
TI - SHEET	6AL4V	8.23	7.82	6.36
TI - PLATE	6AL4V	8.08	6.52	5.30
TI - PLATE	6AL4VE	7.28	4.18	3.62
TI - COIL	GR 2	8.70	8.92	8.92
TI - COIL	GR 3	8.70	8.92	8.92
TI - COIL	GR 4	8.70	8.92	8.92
TI - SHEET	GR 2	8.70	8.92	8.92
TI - SHEET	GR 3	8.70	8.92	8.92
TI - SHEET	GR 4	8.70	8.92	8.92
TI - BAR	6AL4V	5.45	6.02	4.90
TI - BAR	6AL4VE	5.45	6.02	4.90

Starliner Docks with International Space Station on Crewed Test Flight



Boeing's CST-100 Starliner spacecraft docked with the International Space Station on its first crewed flight June 6 after working through problems with the spacecraft's thrusters. The spacecraft docked with the forward port on the station's Harmony module at 1:34 p.m. Eastern, nearly 27 hours after its launch from Florida on the Crew Flight Test (CFT) mission. On board Starliner are NASA astronauts Butch Wilmore and Suni Williams, who entered the station about two hours after docking.

That docking took place more than an hour behind schedule as engineers worked on as many as five reaction control system (RCS) thrusters that went offline during various phases of the spacecraft's approach. Space station controllers kept Starliner outside the 200-meter "keep out sphere" of the station while working to bring those thrusters back into operation.

It was not immediately clear what caused the thrusters to malfunction. At a post-docking briefing, NASA and Boeing officials said that they were able to get four of the five thrusters working again, allowing the docking to proceed. The problem, they said, is similar to what they saw on the Orbital Flight Test 2 (OFT-2) uncrewed test flight in May 2022, with thrusters in the same location of the service module being turned off both times. "We don't understand quite why they're happening," said Steve Stich, NASA commercial crew program manager.

The problem is less with the thrusters themselves with the software that controls them and the data that software receives from the them. Stich explained that when the software seems some parameter out of limits, like lower thrust than expected or taking longer to ramp up, the software will disable it. Controllers then fired individual thrusters to confirm they were working to re-enable them.

"The thrusters worked great, and by refiring them we proved that," said Mark Nappi, Boeing vice president and commercial crew program manager. "It's the conditions that we've put into the software that is somehow telling the thruster to be de-selected." Late June 5, NASA and Boeing said that spacecraft controllers had detected two more helium leaks in Starliner's propulsion system. These were separate from the helium leak detected after a scrubbed May 6 launch attempt, and took some thrusters offline. Mission managers approved plans to allow the docking to proceed early June 6, deciding to use extra helium to repressurize the system and re-enable the thrusters. Stich said that, after docking, controllers found a fourth helium leak in the spacecraft, smaller than the other three.

What is causing the helium leaks is not clear, but Nappi did not rule out a common root cause. "They're very similar in the way that they're behaving, so there's a good reason to believe that they may be similar," he said. Before the launch, officials said the believed the one helium leak then known on Starliner was an isolated issue related to a defect in a seal. "It certainly is something that we're going to reevaluate," Nappi said of that earlier conclusion. With Starliner now docked with the station, propulsion system manifolds are now closed, stopping the leaks. Stich and Nappi said that they have more than enough helium at current leak rates to allow Starliner to undock and return home, and will use the time docked at station to investigate what could be causing the leaks. Read the full article here.

Blue Origin Works Towards New Glenn Debut, Ramps BE-4 Deliveries

Over the past few months, Blue Origin has been busy progressing on many of its projects as target dates move closer. New Glenn continues to inch closer to launch, facilities are being expanded, BE-4 engines have been delivered to ULA, and New Shepard has returned to crewed flights.

With the September launch window of NASA's EscaPADE Mars mission closing in, teams are working through the tail-end of tests at Launch Complex 36 (LC-36) to prepare the site for its first static fire and launch. On March 12, Blue rolled back the New Glenn Pathfinder first stage after completing cryogenic and ground system testing on the launch pad. The 7-meter-wide and 45-meter-long stage made the trek back to the company's campus at Exploration Park, just outside the gates of Kennedy Space Center.

While back inside the first stage integration facility, it is likely that the stage is being closely inspected following its round of testing. From there, the stage will be integrated with an engine section and BE-4 engines that could support a static fire alongside a flight-ready interstage and possible aero surfaces. It is still unclear if this booster will fly with the same hardware it performs the static fire with, or if there will be further upgrades before the vehicle is flight-ready. In late March, Blue Origin rolled the second-stage transporter erector to the launch pad for more testing and checks. A New Glenn second stage hasn't been transported to the pad on this structure yet, though Blue may still have that test planned before New Glenn's first flight. The second stage transporter erector features two cutouts at its base which suggests the possibility of testing the twin BE-3U engines on the launch pad.

At Blue's Space Coast rocket production campus, work continues to support not only New Glenn production and operations but also the company's other programs, such as Blue Moon. Read the full article here.

Liebherr to Serially Produce 3D Printed Flex Shaft for Airbus A350

Liebherr-Aerospace, a tier-1 aerospace part supplier, has successfully integrated a 3D printed flex shaft in the Airbus A350 high lift system. The unit has been approved by Airbus as well as by the European Union Aviation Safety Agency (EASA) for serial production, marking the next major step for additive manufacturing of parts with increased complexity for aerospace applications.

After supplying the 3D printed lower cargo door actuator and valve for the Airbus A350 aircraft, Liebherr-Aerospace continues to consistently pursue its path in the 3D printing sector. The company has now celebrated a new milestone. The flex shaft, a component with an increased degree of complexity and produced from titanium powder using AM – or Additive Layer Manufacturing (ALM), as Airbus usually refers to AM processes –, has successfully made its way into aviation.

Based on the new design options that ALM is offering, Liebherr was able to replace the assembly of seven parts, formerly conventionally manufactured, by just one single 3D printed component. The lower number of parts leads to improved reliability and significant weight reduction. Compared to the 3D printed parts previously developed and manufactured by Liebherr, the flex shaft has a higher complexity and represents the next step towards applications in highly integrated systems.

The flex shaft is part of the Airbus A350 high lift system, where it will be integrated in the active differential gearbox of the flap system. The flex shaft transmits the rotary movement to a position sensor and thus compensates for an angle and axis misalignment between the gearbox and the sensor.

As a solution provider Liebherr-Aerospace can already look back at quite a range of its products manufactured by ALM. At the beginning of 2019, for example, Liebherr-Aerospace started the serial production of 3D printed parts with the introduction of a printed proximity sensor bracket for the A350 nose landing gear. This bracket was the first-ever introduced Airbus system part qualified for titanium additive layer manufacturing. Read the full article here.

UPM Focus: Jon Markle: A Career in Metals

At United Performance Metals, we proudly commemorate the remarkable career of Jon Markle, who has devoted 41 years to the metals industry, with 21 of those years spent contributing his expertise to our company. Jon's journey details the importance of professional achievements but also underscores the profound impact of maintaining diligence and integrity.

Jon's start in the metals industry was inspired by his father, whose work instilled in him a deep fascination for craftsmanship and technical know-how. Growing up surrounded by tools and materials, Jon gained early insights into customer service and the multifaceted world of manufacturing, experiences that would prove invaluable in his later career.

In 1983, Jon embarked on his career at Atek Metals Center, starting in the sales division. From the start, he had an innate curiously and drive for understanding the technical aspects of metals. Jon's dedication to learning was remarkable- he immersed himself in extensive research, hands-on exploration, and actively pursued mentorship and networking opportunities. His diligence later led to his election as Cincinnati chairman of ASM International in 1986.

Jon came to UPM via the acquisition of one of his former companies, AIM, in 2003. Throughout his time at UPM, Jon's technical expertise became a cornerstone of his success. His ability to speak the language of the industry and understand the intricacies of different sectors- from aerospace to petrochemicals- set him apart. He wasn't just a salesperson; he was a problem-solver, keen on finding solutions that would benefit both customers and UPM.

Jon has worked in sales throughout his multi-decade tenure at UPM, both on the outside and on the inside, primarily serving as a Senior Account Specialist. In these roles, Jon made countless memories with people he describes as, "people that I truly care about as friends." From making eleven sales calls in one day to attending tradeshows in New Orleans with fellow UPM teammates, Jon can look back on his time at UPM with fondness and have memories he can cherish forever. He can also look back on his time here and reflect on the amount of success he had working in our sales department. Dawn Clark, Inside Sales Manager, stated, "Jon has accomplished a lot here and UPM won't understand the magnitude of his impact until he's been gone for a while. He will be dearly missed." In retirement, Jon looks forward to spending time and traveling with his wife, watching his granddaughter grow, and coming back to mentor at UPM!