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Chandrayaan-3: India Becomes Fourth Country to Land on the Moon

India's Chandrayaan-3 lander successfully touched down on the moon Wednesday, making the country only the fourth to achieve the feat. The Chandrayaan-3 mission lander touched in the vicinity of the lunar South Pole region at 8:32 a.m. Eastern (1232 UTC) Aug. 23 after a 19-minute powered descent from lunar orbit. India joins the United States, the former Soviet Union and China in successfully soft landing on the moon. Footage from the Indian Space Research Organization's (ISRO) Mission Operations Complex showed jubilant scenes following the successful landing. Indian Prime Minister Narendra Modi declared moments after the landing that, "India is on the moon."

The Vikram lander touched down near a prime landing site at 69.37 degrees south latitude and 32.35 degrees east longitude, close to the crater Manzinus U. The descent was supported by ESA's ESTRACK deep space tracking station in New Norcia, Australia. The landing was made at the highest latitude of any spacecraft to soft land on the moon. The success follows a failed attempt in 2019 with the Chandrayaan-2 mission lander. The landing also comes days after Russia's Luna 25 spacecraft suffered an issue during an orbital maneuver and smashed into the moon. The lander also carries Pragyan, a six-wheeled, 26-kilogram solar-powered rover which will seek to demonstrate roving operation on the lunar surface. Its rollout is expected within the next few hours. ISRO's live coverage of the event began at 7:50 a.m. Eastern. The mission lander module began an automatic landing sequence at 8:14 a.m. having reached a designated point in its orbit. The spacecraft activated its throttleable engines and began its powered descent from an altitude of around 30 kilometers.

The mission is chiefly a landing technology demonstrator, the lander and rover carry a number of payloads for in-situ science experiments. Vikram carries the Radio Anatomy of Moon Bound Hypersensitive ionosphere and Atmosphere and Langmuir Probe (RAMBHA-LP), a deployable Langmuir Probe to measure plasma density near the lunar surface, a probe to measure thermal properties of lunar surface down to a depth of 10 centimeters, an instrument for detecting lunar seismic Activity, and the passive Laser Retroreflector Array provided by NASA. Pragyan carries an Alpha Particle X-ray Spectrometer (APXS) and a Laser Induced Breakdown Spectroscope (LIBS) for assessing the chemical and mineralogical composition of the lunar surface. Both spacecraft will spend the remaining roughly 12 days of lunar sunlight carrying out activities and experiments. Neither are expected to survive the lunar nighttime, during which temperatures will drop to around minus 130 Celsius. Chandrayaan-3 launched July 14 on a LVM-3 heavy-lift rocket from Satish Dhawan Space Centre into an initial highly-elliptical Earth orbit, beginning a circuitous journey to the moon. It arrived in an elliptical lunar orbit Aug. 5, from which it began to trim its orbit to a roughly circular low lunar orbit in preparation for the landing attempt. ISRO chose the prime landing site using high-resolution photographs and data from Chandrayaan-2 orbiter and NASA's Lunar Reconnaissance Orbiter. The Chandrayaan-2 landing attempt which suffered a hard landing in 2019 due to an accumulation of software errors. Read the full article here.

Nickel/Cobalt & Stainless-Steel Flat Rolled Surcharges

	June	July	Aug	Sept	Oct	Nov
15-5	1.1052	1.0380	0.9852	0.9940	*	*
17-4	1.1212	1.0536	0.9986	1.0078	*	*
17-7	1.2207	1.1300	1.0578	1.0640	*	*
201	0.8428	0.7891	0.7335	0.7302	*	*
301 7.0%	1.1929	1.1045	1.0324	1.0392	*	*
302/304/304L	1.3123	1.2146	1.1360	1.1438	*	*
304-8.5%	1.3647	1.2621	1.1814	1.1897	*	*
305	1.7384	1.6026	1.5061	1.5177	*	*
309	1.7901	1.6553	1.5499	1.5615	*	*
310	2.5525	2.3514	2.2118	2.2303	*	*
316/316L	1.9254	1.8298	1.7535	1.8112	*	*
321	1.4076	1.2984	1.2169	1.2227	*	*
347	1.7111	1.6038	1.5234	1.5322	*	*
409/409 Mod	0.3722	0.3474	0.3194	0.3169	*	*
410/410S	0.3789	0.3557	0.3267	0.3267	*	*
430	0.4453	0.4233	0.3830	0.3830	*	*
439	0.4673	0.4433	0.3989	0.3949	*	*
263	11.6182	10.2646	9.6772	8.9444	8.4765	8.9779
276	14.9952	12.6782	10.9707	10.7136	10.5559	10.5271
A286	3.8984	3.4292	3.3624	3.1591	2.9677	2.9181
600	9.4687	8.1466	8.3296	7.7083	7.2431	7.1216
601	7.7529	6.7394	6.8854	6.3922	5.9930	5.8958
617	12.5807	10.8897	10.0656	9.4894	9.1029	9.3428
625	13.444	11.7114	10.8917	10.4959	10.1864	10.1222
718	10.8266	9.6864	9.4656	9.0635	8.7390	8.6605
X-750	9.706	8.4810	8.6586	8.0609	7.6070	7.4798
800	4.2056	3.7000	3.7774	3.5221	3.2999	3.2300
825	6.7479	5.8487	5.5654	5.2746	5.0231	4.9678
HX	10.1612	8.6280	7.7294	7.4375	7.2075	7.1806
188	10.4308	10.1272	10.0419	9.0778	8.6075	9.9286
L-605	10.2033	10.0991	9.9560	8.8933	8.4040	10.0520

*Surcharge currently not available

Nickel/Cobalt & Stainless-Steel Bar Surcharges

	Apr	May	June	July	Aug	Sep
316LS/316LVM	3.35	3.01	2.94	2.85	2.82	2.88
Custom 455	1.80	1.87	1.80	1.68	1.57	1.57
Custom 465	2.63	2.59	2.52	2.37	2.17	2.19
Custom 630	1.33	1.36	1.30	1.23	1.21	1.20
CCM	12.61	11.18	9.06	10.23	12.56	12.20
625	12.67	11.62	11.21	10.96	10.57	10.78
718	9.48	9.24	8.80	8.58	8.15	8.19
718CR	9.48	9.24	8.80	8.58	8.15	8.19
A286	4.73	4.71	4.50	4.25	3.98	3.99
A2861	4.73	4.71	4.50	4.25	3.98	3.99
A2862	4.73	4.71	4.50	4.25	3.98	3.99
A2867	4.73	4.71	4.50	4.25	3.98	3.99
A286R1	4.73	4.71	4.50	4.25	3.98	3.99
A286SH	4.73	4.71	4.50	4.25	3.98	3.99
Alloy X	10.58	9.49	9.16	9.01	8.65	8.86
Wasp6	11.53	11.04	10.15	10.06	10.20	10.16
L605	12.41	11.87	10.22	11.01	12.84	12.46
321	2.06	2.11	2.00	1.88	1.85	1.83
347	2.05	2.10	1.99	1.88	1.85	1.84
Greek Ascoloy	1.49	1.50	1.51	1.45	1.46	1.46

*Surcharge currently not available

Titanium Surcharges

Form	Grade	Q1 Surcharge	Q2 Surcharge
TISH	6AL4V	5.56	8.80
TIPL	6AL4V	3.71	5.87
TIPL	6AL4VE	4.08	6.45
TIBR	6AL4V	7.50	6.88
TIBR	6AL4VE	4.45	4.45
TICO	GR 2	8.33	8.69
TICO	GR 3	8.33	8.69
TICO	GR 4	8.33	8.69
TISH	GR 2	8.33	8.69
TISH	GR 3	8.33	8.69
TISH	GR 4	8.33	8.69

Minnesota Manufacturer Finds Gold in Green Hydrogen, Electrolyzers

A large factory north of Minneapolis in Fridley, Minn., has bustled for years turning out a variety of fossil-fueled electric generators. They range from small units designed for recreational vehicles to massive installments for much larger-scale power needs, including those of the military. Now, alongside that conventional production, is an assembly line turning out the first U.S.-made, large-scale machines called electrolyzers that will produce hydrogen without using fossil fuels. “Think of it as a black box,” said Alex Savelli who is overseeing Cummins’ U.S. electrolyzer production. “It allows you to separate water using electricity.” Savelli says inside the black box are numerous plates made out of precious metals.

Electricity is applied as water passes through the plates. What comes out of the box are the chemical components of water — pure hydrogen and oxygen. “If you’re using renewable electricity, whether it’s solar, wind, hydro power, then basically you are creating green hydrogen when you do that,” Savelli said. Mike Reese oversees green hydrogen research at the University of Minnesota. He said what Cummins is doing in the suburban Twin Cities is noteworthy as the world seeks to reduce carbon emissions. “I think it’s really exciting,” Resse said. Exciting because hydrogen can be used in many ways. It’s a needed chemical input for many fertilizers and other products. It also can serve as an alternative or supplement to fossil fuel use, from refining iron ore and petroleum to making electricity. And when hydrogen burns, it just turns back into water.

“There are other electrolyzer manufacturers in the U.S., and they’re scaling up as well to meet this demand, but Cummins is the first to start their production line,” Reese said. Electrolyzers have been around for a long time. Reese said what changed is there are now major tax incentives to bolster the technology. “[The] Infrastructure bill and the inflation Reduction Act — those bills have really catalyzed the move toward clean hydrogen,” Reese said. Think about government tax credits for solar power generation. Not long ago solar was something of an oddity. Government subsidies helped make solar commonplace and, as the industry has grown, solar has become much less expensive. A major downside of hydrogen is the difficulty of storing and transporting it. It must be kept at extremely low temperatures. Using it where it’s produced is a way to get around storage and transportation challenges. The Cummins division Accelera says it already has $300 million in signed contracts for its Minnesota-made electrolyzers.

“We are purchasing the hydrogen electrolyzer equipment in order to generate green hydrogen that will be used to produce highly sustainable jet fuel,” said Clay Norrbom, president of Zero6 Energy, one of Accelera’s early customers. Norrbom said carbon-neutral aviation fuel will be made at a soon-to-be-built plant in South Dakota within three years. Wind will power the facility and its electrolyzers. The hydrogen the electrolyzers produce will be used to convert corn ethanol to jet fuel. Norrbom said the market for green hydrogen is vast and growing. Read the full article here.

Pratt & Whitney Engine Issue Adds to Airline Challenges

Commercial airlines have faced a tricky balancing act this summer, ramping up service to meet torrid travel demand in a period of labor shortages and supply chain constraints.

Adding to the challenges: new inspections needed on a class of Airbus planes that may suffer from microscopic "contamination" of metals used to manufacture Pratt & Whitney engines. Pratt & Whitney's parent company, RTX, formerly Raytheon, announced on July 25 that a "significant portion" of the Airbus A320neo fleet will "require accelerated removals and inspections within the next nine to 12 months." Company officials described the issue as one of quality control, stressing that there is no immediate risk to flight safety. They blamed a "rare condition in powder metal used to manufacture certain engine parts." The defect could affect 1,200 Pratt engines made between late 2015 and mid-2021. In total, the company has produced 3,000 of the engines.

"We're aware of the issue," Airbus said, "and we will be working with Pratt & Whitney and our customers to implement all required inspection plans." The Federal Aviation Administration told AFP this week that it "is aware of the issue and is in contact with Pratt & Whitney and the affected US operators," an agency spokesperson said. "The agency will ensure that the appropriate steps are taken." But more than two weeks after the original announcement by RTX, airlines are still grasping for details on the inspections, as they work in an already stressed operating environment. The FAA reiterated in early August that it would continue to permit airlines to reduce flights at New York airports amid shortages of air traffic controllers that have led to fewer flights on bigger planes.

RTX said it will begin inspecting 200 jets by mid-September. It did not say how long the inspections would require. "The duration of the grounding will depend on having enough maintenance people, and there aren't many right now," said Michel Merluzeau of AIR consultancy. To speed the process, Pratt potentially could replace the engines with newer versions, but supply-chain problems have limited the company's output, Merluzeau said.

Discount US carrier Spirit Airlines has been notified that up to 13 of its engines will need to be checked. As a result, the airline will remove seven jets from service after Labor Day, said Chief Executive Ted Christie. Among US carriers, Spirit has the most Airbus planes affected by the inspections and the most built in the period in question. Its fleet includes about 80 Airbus A320neo planes. "We will have the equivalent of at least 10 aircraft out of service during most of 2024," Christie said earlier this month on a conference call with analysts. "This new issue is yet another frustrating and disappointing development," said Christie, noting other technical problems that have affected Spirit's fleet. Read the full article here.

6K Additive Partners with Agile Space to Advance Mission to the Moon with 3D Printing

6K's Ni625 powder is being certified for use at Agile's manufacturing facility. The first parts to be produced will be sued in Agile's A2200 bipropellant hypergolic engine. The engines are powered by a pressure-fed hypergolic bipropellant, which does not require ignition as the hydrazine derivative fuel, M20, and MON3 oxidiser combust on contact.

The engine was designed to weigh 5.9 kg and produce 500-lbf of thrust, underscoring the benefits of lightweighting with AM while delivering 'tremendous' power according to 6K.

"By weight, 85% of our engine components are additively manufactured, meaning we rely heavily on AM powders that can withstand the extreme temperatures and forces generated during take-off and flight," said Kyle Metsger, Director of Additive Technology at Agile.

"6K Additive allows us to additively manufacture using high-quality powders that are required for our critical applications, while also helping us meet our environmental goals through their recycling program and sustainably manufactured powders. 6K Additive can deliver extremely consistent powder that allows our production line to run the long build times required for these complex components."

6K Additive says that traditional development cycles for aerospace components can be more than two decades, but with 3D printing, Agile is able to compress development time down to 12 months.

Metsger added: "A year-long development cycle still sounds like a very long time in many industries, but we are showing the primes in the aerospace industry what the future looks like. Moving to the larger TruPrint 5000 machine gave us the ability to qualify the new parameters for the machine and material simultaneously. In this way, AM allows us to be 'Agile' in name and practice."

Agile's A2200 engines will be used on a Lunar lander vehicle. The engine was developed to provide 'maximum performance' on demanding missions, with a specific impulse of more than 318 seconds according to the company. Using a pintle sleeve throttling mechanism, the engine is capable of deep throttling, providing a smooth ride and fine control for a variety of missions says Agile.

The engine can throttle from 50 to 100% thrust in under 650 milliseconds. Making it suitable for heavily demanding maneuvering sequences that lunar missions require according to Agile.

Frank Roberts, President at 6K Additive, said: "We are always excited to partner with customers like Agile who leverage our high-quality powders to produce critical rocket parts to land on the moon. The fact that we can enable space exploration while continuing to lead the way with sustainability at home on Earth is the best of both worlds. Agile has a cradle-to-grave mentality around its products, and having 6K Additive supply the company with high-quality, sustainably produced Ni625 and provide an established waste stream to help with its environmental stewardship speaks to our mission of going beyond expectations for our customers." Read the article here.

UPM Focus: Katie Bland- Flat Roll, Nickel, and Cobalt Products

In last month's Market Informer, we discussed Stainless Steel grades 304 and 316L with our stainless-steel product manager, Ben Randall. To learn more about other products at United Performance Metals, this month we talked with Katie Bland, product manager for all of UPM's nickel and cobalt flat rolled products. Bland started at UPM a little over eleven years ago in the marketing department as an intern. She has ventured into different areas of UPM by taking roles in shipping, sales, and now supply chain.

"Product management is by far the best role I've had whilst at UPM," Bland said. When talking about what she works with every day, Bland stated, "I deal in all sheet, coil, and plate products at UPM that support the aerospace, power generation, and alternative energy industries. Some of the most popular grades we stock include 625, 718, and A286. These are all high-strength grades that can withstand extraordinarily high temperatures, making them great for certain applications like engines. The heat-resistance is probably the most special and unique feature of these grades, and combined with their corrosion-resistance, they are most applicable for high-energy environments, like combustion chambers of engines."

Another popular application for the metals that Katie manages is fasteners of all kinds. Durable, corrosion-resistant, high-temperature withstanding fasteners are essential for aerospace and automotive products. "Fasteners play a crucial role in keeping a plane from disassembling entirely. Even in cars, fasteners are key players and the metal used to make them must be of high enough quality to ensure the car will be assembled and therefore function properly. Aside from aerospace and automotive applications, a lot of these alloys go into alternative energy applications, like hydrogen fuel cells. Hula seals are another example of where our product ends up, specifically our X750 sheet products."

Finally, when asked about what the future holds for metal alloys like 625, 718, and A286, Bland said that they aren't going away any time soon. "We continue to see increases in demand for these products over the years." If you'd like to learn more about any of these metals, please visit this page on our website. If you would like to request a quote, submit a form on www.upmet.com or email sales@upmet.com.