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Def min defers ₹10,000cr deal for 12 Jap aircraft

THE Defence Ministry has deferred a proposal worth over ₹10,000 crore for acquiring 12 amphibious aircraft from Japan for the Navy as the government feels that there is a need for further clarity in the project. "There is a view in the Ministry that there is still need for further discussion on the requirement of these planes for the Navy and what roles would they play in the maritime force," sources told MAIL TODAY.

The Navy is now planning to give a detailed presentation to the Government on how the planes would be useful for the force and

bring in more clarity on the issue, the sources said. The deal was also taken up for discussion during the recent meeting of the Defence Acquisition Council (DAC) headed by Defence Minister Manohar Parrikar.

The Navy has been pushing for the acquisition of these amphibious planes which can land on both sea and runways but the Defence Ministry's acquisition wing has not been very keen for procuring it.

Joint Secretary-rank officers in the Ministry in the past have questioned the proposal to buy the planes.

Mail Today

THE  HINDU

Navy vessel with all-woman crew flagged off from Panaji

It will participate in Cape Town to Rio de Janeiro race which will start on December 26

Navy vessel Mhadei, with an all-woman crew, was flagged off from here to Cape Town, South Africa, by Rear Admiral Monty Khanna, Commandant, Naval War College, on Wednesday.

The vessel is scheduled to reach Cape Town on December 15. The boat will participate in the "Cape to Rio Race" (Cape Town to Rio de Janeiro), which will start on December 26.

Long distance sailing

"Sea faring is our profession and there is nothing better than long distance ocean sailing to learn the fine nuances of seamanship and understanding the oceans. The women officers have already sailed to Mauritius in the peak of monsoons and we are confident that the experience gained will hold them in good stead during the long voyage," Rear Admiral Monty Khanna said.

The present voyage of INSV Mhadei consists of four legs, which include Goa to Cape Town, Cape Town to Rio de Janeiro (the actual race), and back to Goa.

Four sets of crew

The Navy has identified four sets of crew to participate in various legs of the voyage with the purpose of preparing a larger base of adventure loving seafarers.

While the present leg up to Cape Town is being undertaken by an all-woman crew skippered by Lt. Cdr. Vartika Joshi, the Rio race would be undertaken by a mixed crew of men and women, which would be helmed by Capt. Atool Sinha, the officer-in-charge of the recently established Ocean Sailing Node of the Navy. Capt. Sinha is an Asian Games silver medallist. Similarly, the return legs would have separate sets of crew.



Thu, 10 Nov, 2016

Lieutenant General Devraj Anbu new chief of Northern Command

He has participated in Indian Peace Keeping Operations (IPKF) in Sri Lanka, United Nations Peace Keeping in Namibia, Counter Insurgency and Counter Terrorist operations in Manipur and Jammu and Kashmir.

Lt Gen Devraj Anbu on Wednesday was appointed as the new chief of strategically important Northern Command in place of Lt Gen D S Hooda, who retires at the end of this month. The Appointments Committee of Cabinet headed by Prime Minister Narendra Modi cleared the name of Anbu for the post of General Officer-in-Commanding-in-Chief (GOC-in-C) with effect from December 1. Udhampur-based Northern Command is a strategically important army formation that overlooks the functioning of Srinagar-based 15 Corps, Jammu-based 16-corps and Leh-based 14-Corps. Anbu was posted as the Corps Commander of Tezpur-based 4 Corps. His last posting in Jammu and Kashmir was as a Brigadier in 2008-09.

He takes over at a time when exchange of fire along the Line of Control has been happening quite frequently especially after the Indian army carried out surgical strikes on September 29 this year, killing at least 19 Lashker-e-Taiba militants inside the territory in Pakistan-occupied-Kashmir. Lt Gen Anbu Commissioned in the Sikh Light Infantry Regiment in June 1980 has had a distinguished military career in which he has executed important Command and Staff appointments in India and abroad. He has participated in Indian Peace Keeping Operations (IPKF) in Sri Lanka, United Nations Peace Keeping in Namibia, Counter Insurgency and Counter Terrorist operations in Manipur and Jammu and Kashmir.

He was awarded the Sena Medal Gallantry for operation in Siachen Glacier. The General has also been awarded Ati Vishisht Seva Medal and Yudh Seva Medal for his distinguished service.



Thu, 10 Nov, 2016

Army chief reviews facilities on China border

Army chief Gen. Dalbir Singh on Wednesday reviewed the operational preparedness and the infrastructure development along the northern borders with China. He visited the forward areas of Uttarakhand and was received by the formation commanders and later given a detailed brief on the operational and administrative preparedness of the forces.

Meets troops -He also interacted with the troops at various locations and enquired about their well-being, a statement by the Army said. Gen. Suhag expressed satisfaction with the efforts being made to ensure capability enhancement and operational effectiveness to meet all contemporary and emerging challenges in the forward

areas along the LAC, the statement said. The Army chief appreciated the efforts of the formations deployed in the remote and difficult areas and exhorted the troops to continue their selfless service to the nation.



Thu, 10 Nov, 2016

PM Modi visits Japan today, nuclear-deal on agenda

Modi will be holding the annual Summit meeting with Japanese Prime Minister Shinzo Abe and have an audience with the Emperor of Japan in Tokyo.

Prime Minister Narendra Modi will embark on a three-day visit to Japan from tomorrow during which the two countries are expected to sign a civil nuclear deal, besides discussing ways to step up cooperation in the areas like trade, investment and security.

Modi will be holding the annual Summit meeting with Japanese Prime Minister Shinzo Abe and have an audience with the Emperor of Japan in Tokyo.

From Tokyo, Modi, accompanied by Abe, will travel to Kobe by the famed Shinkansen bullet train, the technology that will be deployed for the Mumbai-Ahmedabad High Speed Railway, Modi said ahead of his visit. He will visit the Kawasaki Heavy Industries facility in Kobe, where high speed railway is manufactured.

“I will visit Japan on 10-12 November 2016 for the Annual Summit. This will be my second visit to Japan as Prime Minister,” Modi said in a statement here today. “I will have a detailed interaction with top business leaders from India and Japan, to look for ways to further strengthen our trade and investment ties,” he said.

Modi said he looks forward to reviewing the entire spectrum of bilateral cooperation when he meets Abe in Tokyo on November 11. “Our partnership with Japan is characterised as a Special Strategic and Global Partnership. India and Japan see each other through a prism of shared Buddhist heritage, democratic values, and commitment to an open, inclusive and rules-based global order,” he added. During the visit, the two countries are expected to sign civil nuclear cooperation agreement which will facilitate leading US-based atomic companies to set up plants in India. The two countries had sealed a broad agreement during Abe’s visit here last December but the final deal was yet to be signed as certain technical and legal issues were to be thrashed out. Both the countries have completed the internal procedures including legal and technical aspects of the text of the pact, External Affairs Ministry spokesperson Vikas Swarup said last week.

When specifically asked whether the pact will be signed during Modi’s visit, he only said, “I cannot pre-judge the outcome of the talks.” Negotiations for the nuclear deal between the two countries have been going on for a number of years but the progress on these was halted because of political resistance in Japan after the 2011 disaster at the Fukushima Nuclear Power Plant.



Thu, 10 Nov, 2016

We are supporting India’s bid to NSG, says Japan’s Envoy Kenji Hiramatsu

PM Modi will visit Japan from November 10 to 12.

Ahead of Prime Minister Narendra Modi’s visit to Japan from November 10 to 12, Japan’s ambassador to India, Kenji Hiramatsu, spoke with The Indian Express on a wide range of issues — from nuclear cooperation to terrorism, and Shinkansen to the ease of business rankings. Edited excerpts:

What is the state of play on the Indo-US civilian nuclear deal?

On the civilian nuclear agreement, we are working on it. Discussions are taking place on technical details right now. During Prime Minister Narendra Modi's visit, we hope to have good progress.

Have all the issues arising out of India's non-NPT signatory status been resolved?

We have agreed on the important issues...on lot of issues, we have to be careful about screening and scrubbing. On major issues, I don't see any major differences.

What is Japan's position on India's membership of the Nuclear Suppliers' Group (NSG)?

We are working together with India to make sure that India becomes a member of NSG. So we are communicating and discussing with India to facilitate this process in order for it to become a member of NSG. We are supporting India's bid to become a member of NSG. We are an important member. Japan continues to communicate with India to support this process.

But China has been blocking the consensus, along with some other countries. How do you propose the way forward?

How to get a majority support on this..in each international negotiation, important thing is to have a critical mass to get through a certain resolution. India is working very hard with almost all member-countries... that is a way forward. We are having regular contact and discussion with the main players in the NSG in trying to find a way to make sure that India becomes a member of NSG.

India has witnessed series of terrorist attacks this year, from Pathankot to Uri. How does Japan view this development?

Japan condemns very strongly terrorism in all forms and manifestations, and Japan is working internationally to tackle this menace. This year, Japan has the presidency of G-7 countries. It has taken the lead on fight against terrorism. Japan has also been a victim of terrorism...last July, in Dhaka, seven aid workers (were) killed, and in February Japanese journalists (were) killed by ISIS in Syria.... A few years ago, some Japanese engineers were killed in Algeria. Japan is not immune to terror attacks. We are working with countries like India; Japan is communicating with India for information-sharing...

How does Japan view India's diplomatic initiative to isolate Pakistan at the global level?

I cannot make any judgment about the effect of India's diplomacy but what India is doing is raising awareness about terrorist threats and to the importance of working together on terrorism issues. Japan has expressed solidarity to India for efforts in countering terrorism.

How did you see the Pakistan defence minister's comments threatening use of nuclear weapons, in the wake of the Uri attack, especially since Japan has suffered a nuclear attack?

I don't know in which circumstance those statements were made. But, Japan, in principle, is against any threat of nuclear weapons. It is the only country to have suffered nuclear disaster...we have very strong views that nuclear weapons should not be used, and any threat in use of nuclear weapons are not justified.

What are your comments about the surgical strikes conducted by India?

These so-called surgical strike was made in response to an incident like Uri. India informed (us after the strikes) that it had information like that..at the same time, India government doesn't have the intention to escalate unnecessarily, so this is what I understood at that time. We fully understand the background behind these surgical strikes. Indian government has made very considerable efforts to explain the event, I appreciate and understand.

Since Japan is one of the members of the 1267 sanctions committee at the UN, how do you see the listing of Jaish-e-Mohammad chief Masood Azhar as a global terrorist?

We are not opposing this person's inclusion in the list. We are member of the committee, (and) we have no objection.

How do you see the ease of business rankings by global agencies keeping India quite low, in the 130s?

The ranking is unfair. (The Narendra) Modi government has brought in GST and the bankruptcy law, these are two major achievements. I hope they will implement successfully...the Indian government is making efforts. Many Japanese companies have India as their favourite destination. It is an emerging big market, but some do have trouble, regarding tax issues and others. There is still room for improvement.

One of the showpiece projects between India and Japan has been the Shinkansen, the high-speed train project. What is the state of play?

On Shinkansen, some road map will be agreed. We are comfortable with the pace of the project, I am happy with the progress (made).

Another project, which has been highlight of the defence cooperation has been the US-2 planes. What is the progress on that?

On US-2, there is commitment by the two leaders. The Indian side understands the importance of search and rescue. We are hopeful of some progress. We have every intention to provide the best possible plane to India.

How has been Japan's experience with the Japan-plus cell?

Japan plus is a very useful mechanism for future investors, it is accumulating experience and knowledge for future investors. It is very nice...it's a collective effort. It is playing an important role, matching up future investors with relevant authorities.



Thu, 10 Nov, 2016

India-Russia Ties Revisited

At the Brics summit, India and Russia reiterated their commitment in defence cooperation with announcements on several big ticket procurements. Both countries re-affirmed their commitment to the ongoing programmes, writes DILIP KUMAR MEKALA

India and Russia have reiterated their commitment in defence cooperation with announcements on several big ticket procurements such as S-400 air defence missile system, Kamov 226T helicopters, Grigorovich class frigates (Project 1135.6) and also an agreement with Russia's United Shipbuilding Corporation to set up shipbuilding capabilities in Andhra Pradesh.

During the meeting between Prime Minister Narendra Modi and Russian President Vladimir Putin at the 17th India-Russia annual summit, days ahead of Brics (Brazil, Russia, India, China and South Africa) meeting in Goa, the two countries signed several memorandum of understanding (MoUs) to re-affirm this commitment to the ongoing programmes. "The agreements on manufacturing of Kamov 226T helicopters; construction of frigates; and acquisition and building of other defence platforms are in synergy with India's technology and security priorities. They also help us achieve the objectives of Make in India", said Modi while addressing the media after the summit in Goa in the presence of Putin. "These projects are new chapters in a long history of strong and diverse defence partnership that both sides can take much pride in," added Modi.

Rostec State Corporation has signed the complex agreement for production of Ka-226T helicopters in India. This agreement is the next big step in cooperation between Russia and India in the area of helicopter production and service. The preliminary contract was signed by the CEO of Rostec Sergei Chemezov and Modi in December 2015. In addition, the heads of the State Corporation conducted a series of negotiations on development in the area of Russian helicopter export and after-sales servicing.

"The contract for export and joint production of 200 Ka-226T helicopters is one of the key projects within the trade and industrial relations between Russia and India. We plan to expand them in both military-technical and civil areas. Currently, we are in negotiations with India's Ministry of Defence (MoD) for a long-term contract for after-sales servicing of Russian-made helicopters, which are widely used in India. We are expecting to

setup an after-sales service in a profoundly new format. There is an array of other projects, where we see perspectives for mutually beneficial cooperation,” said Chemezov.

Out of the 200 helicopters, 40 will be supplied in the fly-away condition and the remaining helicopters will be assembled in India. The agreement also includes maintenance operation and repair of helicopters and providing them with technical support. India’s Ka-226T is to be equipped with modern navigation equipment. It can easily manoeuvre in both urban as well as non-urban environments such as mountains. The absence of a tail rotor and compact dimensions allows the use of small airfields.

In total, India and Russia have signed 19 MoUs that take bilateral cooperation forward in various areas including defence trade. India and Russia have reiterated their commitment to purchase S-400 Air Defence Missile System (ADMS) through an MoU. India had cleared the purchase of five units of S-400 ADMS which are planned for induction into the Indian Air Force (IAF) between 2017 and 2022 (13th five year plan). It was in December 2015, the Defence Acquisition Committee (DAC), chaired by Defence Minister Manohar Parrikar, approved the purchase of the Russian S-400 Triumpf Air Defence Missile System manufactured by Almaz-Antey. S-400 mobile (wheeled) multi-channel ADMS is designed for advanced air threat interceptions to include aircraft on varied missions, hypersonic cruise missiles, tactical and theatre medium-range ballistic missiles and other air threats at dense counter-measures scenario.

Russian industry is keen on Indian Navy’s P-75 (I) programme where Rubin Design Bureau is confident about the Amur 1650 submarine. The Indian Government is close to finalising the strategic partner from the Indian industry that will carry forward the project with the support from the foreign Original Equipment Manufacturer (OEM).

The Indian Government is planning to establish indigenous submarine building industry with the P-75(I) programme. The added advantage for Amur in this programme is its existing partnership with the Indian industry and the Navy with respect to the Kilo class submarines that are currently in service. For the Kilo class refit, Amur has partnered with Larsen & Toubro and will undertake the work at shipyard in Kattupalli near Chennai. India and Russia already have an established partnership in nuclear sub-marines with *INS Chakra* that is currently on lease with the Indian Navy. The nuclear attack submarine that had joined the Navy in 2012 will be in service till 2022. While there were plans earlier to lease a second nuclear submarine, the reports now suggest that the second submarine will join the Navy only around 2021, when *INS Chakra* is about to finish its service with the Indian Navy. The experience from *INS Chakra* and the future leased submarine will help India achieve its strategic goal of developing indigenous nuclear submarines.

Days before the summit in Goa, Russian Minister for Industry and Trade visited Visakhapatnam in Andhra Pradesh to sign a MoU that would pave way for Russia set up shipbuilding capabilities in the State. An agreement was signed between Russia’s United Ship-building Corporation and Andhra Pradesh Economic Development Board. “This is a first step towards a cooperation with Russian Federation that will have a long-term advance in job creation, technology absorption and skilling for the State of Andhra Pradesh,” said Chief Minister N Chandrababu Naidu. Seventy per cent of the naval ships in India, including submarines, have been supplied by the USC and its subsidiaries and partners.

The CEO of Economic Development Board, Krishna Kishore said, “With the signing of this MoU, ship-building in Andhra Pradesh will get a major fillip and the State will emerge as one of the biggest ship-building hubs in Asia in the years to come”. Furthermore, one of the subsidiaries of USC, Sudoexport is studying the inland waterway project and has made exploratory visits to the State. Another project that will give a major boost to ‘Make in India’ effort is the construction of Grigorovich class frigates (Project 1135.6 ships).

According to the agreement signed at the summit, the project involves the purchase of four Grigorovich class frigates to be built for the Indian Navy, two of which will be constructed in India. Project 1135.6 ships are the improved version of the Talwar-class frigates built by Russia. The Indian Navy currently operates six of the Talwar class frigates. Earlier, the Russian Government had selected Reliance’s Pipavav Shipyard to built four frigates. It is estimated that this ‘Make in India’ project would certainly exceed three billion dollars, and will provide opportunities for the Russian and Indian ship-building industry. India had also sought Russia’s support in cornering Pakistan after the recent attack in Uri. “Russia’s clear stand on the need to combat terrorism

mirrors our own. We deeply appreciate Russia's understanding and support of our actions to fight cross-border terrorism that threatens our entire region", said Modi. "President Putin and I noted the similarity of our views on the situation in Afghanistan and turmoil in West Asia," he added. In order to ensure there is an opportunity in future for joint development, transfer and sharing of cutting edge technologies in different fields, the countries are planning to set up a Science and Technology Commission.



Thu, 10 Nov, 2016

India-China defence officials discuss peace along border

New Delhi, DHNS: Top defence officials from India and China had a quiet meeting to discuss how the two sides would maintain peace while guarding the 4,056 km long disputed boundary. At the eighth meeting of China-India Defence and Security Consultation held on Tuesday, the visiting delegation was led by deputy chief of the Joint Staff Department of China's Central Military Commission Sun Jianguo while the Indian team was headed by Defence Secretary G Mohan Kumar.

Jianguo said the Chinese military was willing to join hands with the Indian Army to strengthen the border management so as to safeguard peace and stability in the border areas. The two neighbours are in constant dialogue on how to reduce flare ups, often seen in Jammu and Kashmir, Sikkim and Arunachal Pradesh.

In the absence of a demarcated boundary, friction between the border guarding troops from both sides and entry into each other's territory happen regularly, though officials from both nations deny any motivated intrusion. Last year, Defence Minister Manohar Parrikar informed Parliament that Chinese troops transgressed 1,278 times between 2010 and 2013. In 2013, there was a three-week long face-off between the troops of either side near Daulat Beg Oldie in the Ladakh region. In October 2013, the two countries signed border defence cooperation agreement to ensure that patrolling issues didn't lead to an armed conflict. However, the transgression along the border and in the general area of Pangong Tso lake as well as the stand-off between the guards continued. The latest stand-off took place last week in Demchok, located 250 km east of Leh, where India was carrying out construction of an irrigation canal.

Around 60 People Liberation Army personnel arrived at the locality and sought to halt the work.

THE ASIAN AGE

Thu, 10 Nov, 2016

Don't side with Japan on SCS: China media to India

India may suffer "great losses" in bilateral trade if it joins Japan during Prime Minister Narendra Modi's visit to ask China to abide by an international tribunal's ruling quashing Beijing's claims over disputed South China Sea (SCS), Chinese media warned on Wednesday. "India should beware of the possibility that by becoming embroiled in the disputes, it might end up being a pawn of the US and suffer great losses, especially in terms of business and trade, from China," an oped article in state-run Global Times said.

Citing media reports that India is seeking support from Tokyo during Mr Modi's visit to Japan this week to issue a joint statement asking China to abide by July ruling of the tribunal on the South China Sea, it said, "India and China should put more efforts into resolving problems like the imbalance of their trade ties". "India won't benefit much by balancing China through Japan. It will only lead to more mistrust between New Delhi and Beijing," it said.

“India’s proposal to make new waves in the SCS first came to Singapore in October, but Singapore, a master of the rebalancing strategy, snubbed it. The rejection shows India lacks legitimacy and leadership in making new waves in the SCS,” the article said.

It also pointed out that with the recent visit to China of Rodrigo Duterte, the new President of Philippines, the country that filed arbitration case against Beijing, the SCS dispute “passed pinnacle of tensions”. “India should realise that the SCS disputes have passed the pinnacle of tensions after the announcement of the arbitration result, and some involved parties have begun to reflect on their old way of addressing the disputes,” it said. The article stated India wants to scale up its stand on the SCS in retaliation to Beijing blocking India’s bid to the Nuclear Suppliers Group (NSG). “India knows that it is not yet qualified for membership in the Nuclear Suppliers Group, according to the organisation’s rules. China’s decision was simply a fulfillment of its international duties,” it said.



Thu, 10 Nov, 2016

Didn't help Pak N-proliferation: China

Questioning a UK think tank report alleging its complicity in Pakistan's nuclear and missile programmes, China said it has a world class “catch all” control system to curb proliferation of proscribed technologies.

“We have seen this report,” Chinese foreign ministry spokesman, Lu Kang said on Wednesday about the report titled ‘Pakistan's strategic nuclear and missile industries’, prepared by Project Alpha at King's College, London, which has alleged that Pakistan has procured supplies from China for its nuclear and missile programmes. “What is mentioned in this report sounds so true but it doesn’t hold water because it evades a fundamental question that is whether all the exports China made to Pakistan violates its legal and international obligations,” Lu said.

The report identified China as the most important supplier of all forms of goods to Pa kistan's nuclear and missile programmes, and most procurements from China are “probably from unwitting private suppliers“. “But, on a smaller scale, Chinese state and private entities continue to knowingly supply Pakistan's strategic programmes with sensitive equipment,” it said.

While Pakistan's reliance on China's sensitive technolo gies is not surprising, “it does raise questions about China's commitment to the principles of the export control regimes which it claims to subscribe,” the report said. Denying any complicity, Lu said: “As for our exports and non-proliferation policies China is always responsible ...We adopt catch all controls and list management. This is a world class management system. With regard to whether any Chinese enterprise violated the law, for us, once they are discovered we will deal with them seriously.



Thu, 10 Nov, 2016

Indian mission websites hacked

Two hackers from Netherlands have claimed to have broken into seven Indian High Commission websites, and published online the login details, passwords and database containing names, passport numbers, email ids and phone numbers of people of Indian origin, media reported on Monday.

According to a report on the hacker news website, security pen-testers by the name of Kapustkiy and Kasimierz have claimed responsibility of the hack and told the reason behind the hack was to compel administrators to consider the cyber security of their websites seriously. The hackers in a Pastebin link shared on their Twitter account have claimed to have hijacked the Indian Embassy websites in Switzerland, Italy,

Romania, Mali, South Africa, Libya, and Malawi and leaked personal details of hundreds of Indians which include students studying abroad as well.

The sites upon inspection revealed that they are vulnerable to SQL Injection vulnerability which allows the hacker to inject malicious SQL commands to the web application and steal database containing sensitive information. "We did it because their security was poor, and several domains related to the Indian Embassy had the same vulnerability. This proves that a lot of people cannot trust the "Embassy." We hope that this problem will be fixed in the future," hackers told The Hacker News via email.

THE ASIAN AGE

Thu, 10 Nov, 2016

NASA set to launch six small gen-next satellites

NASA is launching a suite of six next-generation, small satellite missions - ranging in size from a loaf of bread to a small washing machine — that will debut new approaches to measure the Earth's hurricanes, energy budget and weather. Their small size keeps development and launch costs down as they often hitch a ride to space as a "secondary payload" on another mission's rocket providing an economical avenue for testing new technologies and conducting science.

"NASA is increasingly using small satellites to tackle important science problems across our mission portfolio," said Thomas Zurbuchen, associate administrator of NASA's Science Mission Directorate in Washington. Small-satellite technology has led to innovations in how scientists approach Earth observations from space. These new missions, five of which are scheduled to launch during the next several months, will demonstrate innovative new approaches for studying our changing planet. "NASA is expanding small satellite technologies and using low-cost, small satellites, miniaturised instruments, and robust constellations to advance Earth science and provide societal benefit through applications," said Michael Freilich, director of NASA's Earth Science Division in Washington.

Scheduled to launch this month, RAVAN, the Radiometer Assessment using Vertically Aligned Nanotubes, is a CubeSat that will demonstrate new technology for detecting slight changes in Earth's energy budget at the top of the atmosphere essential measurements for understanding greenhouse gas effects on climate.

In spring 2017, two CubeSats are scheduled to launch to the International Space Station for a detailed look at clouds. Data from the satellites will help improve scientists' ability to study and understand clouds and their role in climate and weather. IceCube, developed by Dong Wu at NASA's Goddard Space Flight Centre in Greenbelt, Maryland, will use a new, miniature, high-frequency microwave radiometer to measure cloud ice.

HARP, the Hyper-Angular Rainbow Polarimeter, developed by Vanderlei Martins at the University of Maryland Baltimore County in Baltimore, will measure airborne particles and the distribution of cloud droplet sizes with a new method that looks at a target from multiple perspectives. MiRaTA — the Microwave Radiometer Technology Acceleration mission — is scheduled to be launched in early 2017 packs many of the capabilities of a large weather satellite into a spacecraft the size of a shoebox. MiRaTA's miniature sensors will collect data on temperature, water vapour and cloud ice that can be used in weather forecasting and storm tracking.

DIAMOND MATERIAL



Diamond nanothreads could be used to manufacture clothes, electronics and construction materials in the future, scientists have claimed

WHAT ARE DIAMOND NANOTHREADS?

First created by Pennsylvania State University last year, one-dimensional diamond nanothreads (DNT) are similar to carbon nanotubes, hollow cylindrical tubes 10,000 times thinner than human hair, stronger than steel — but brittle

WHAT IS IT MADE OF

Researchers said DNT is even thinner than cylindrical tubes, and incorporates hydrogen particles within the hollow structure of carbon particles

This structure reduces DNT's brittleness and adds flexibility

DIAMOND IN THE ROUGH

DNT does not look like a rock diamond

Rather, its name refers to the way the carbon atoms are packed together, similar to diamonds, giving it its phenomenal strength



"Structure makes DNT a great candidate for a range of uses. It's possible DNT may become as ubiquitous a plastic in the future, used in everything from clothing to cars."

HAIFEI ZHAN, from Queensland University of Technology

THE ADVANTAGES

1 Carbon is the most abundant element on the planet. It is also a renewable resource, so the cost of the raw material is extremely low, researchers said

2 Once the manufacturing costs are viable, DNT would likely be used primarily in mechanical applications, combined with other materials to make

ultra-strong, light-weight composites and components

TESTING IT OUT

Zhan plans to test how DNT performs as a two-dimensional networked structure — a sheet or layer — for potential use in flexible electronics and screens

He will also test its viability as a fibre for textiles or rope.

Chinese doctors use 3D printer for skull surgery

Chinese doctors have successfully replaced a section of a woman cancer patient's forehead with a 3D-printed part. The patient who is in her early 20s had recurrent tumours for over 16 years and had kept her hair long at the front to cover the growths.

"I have had bangs for over a decade, finally I can grow my hair out and not be paranoid about my tumors," she was quoted as saying by state-run Xinhua news agency.

When her tumours first began to show, around 16 years ago, Liu had them removed but they returned and grew back larger than before. Despite multiple operations over the years, the tumors returned every time.

The tumours were eventually identified as benign, but due to their location they put pressure against her right eye socket, meaning if they were not removed they would possibly have impaired her vision and limit her motor skills.

Doctors in Chongqing municipality agreed that a complete excision was the only suitable procedure. The location of tumour was such that an operation would have disfigured her face and the damage would have been almost impossible to repair by traditional plastic surgery.

After discussion, a 3D-printed bone replica procedure was agreed as the best operation. The patient underwent a high-precision CT scan so that doctors could create a 3D reconstruction of her skull and print a 1:1 replica of the bone part, with a precision of 20 microns.

The replica piece was then implanted and fixed in place with titanium screws. The operation was conducted earlier this month. Liu was discharged from hospital, the report said.