

# समाचार पत्रों से चयित अंश Newspapers Clippings

दैनिक सामयिक अभिज्ञता सेवा

**A Daily Current Awareness Service**



रक्षा विज्ञान पुस्तकालय  
Defence Science Library  
रक्षा वैज्ञानिक सूचना एवं प्रलेखन केन्द्र  
Defence Scientific Information & Documentation Centre  
मेटकॉफ हाऊस, दिल्ली 110054  
Metcalf House, Delhi-110054

# तटरक्षक बल में 2020 तक शामिल होंगे 38 और विमान

नई दिल्ली, 8 फरवरी (भाषा)। भारतीय तटरक्षक बल ने अपनी सतर्कता, तलाशी और बचाव क्षमताओं को बढ़ाने के लिए वर्ष 2020 तक अपने बेड़े में हेलीकॉप्टरों सहित 38 और विमान शामिल करने का प्रस्ताव रखा है।

क्षमता बढ़ाने की इस योजना के तहत समुद्री सुरक्षा बल उन्नत हल्के हेलीकॉप्टर (एएलएच), दो इंजन वाले हेलीकॉप्टर और समुद्री बहु-अभियान सतर्कता विमानों (एमएमएसए) को शामिल करेगा। तटरक्षक बल के पास इस समय बेड़े में 62 विमान एवं हेलीकॉप्टर हैं। आधिकारिक सूत्रों ने बताया कि तटरक्षक बल 16 एएलएच की खरीदारी के लिए आगामी तीन से चार महीनों में हिंदुस्तान एयरोनॉटिक्स लिमिटेड (एचएल) के साथ अनुबंध पर हस्ताक्षर करेगा।

वह दो इंजन वाले 14 भारी हेलीकॉप्टर खरीदने पर भी विचार कर रहा है। तटरक्षक बल की नजर एयरबस के यूरोकॉप्टर पर है लेकिन उसे इन्हें प्राप्त करने में दो वर्ष का समय लग सकता है क्योंकि इस मामले में रक्षा मंत्रालय में प्रस्ताव लंबित है। एक वरिष्ठ सरकारी अधिकारी ने कहा, 'हम दो इंजन वाले

हेलीकॉप्टर खरीदने पर विचार कर रहे हैं जिनसे समुद्र में लंबी दूरी की यात्रा करने में मदद मिल सकती है। मौजूदा चेतक हेलीकॉप्टरों के पास समुद्र के बीच बहुत आगे जाने की क्षमता नहीं है। दो इंजन वाले हेलीकॉप्टर अधिक लंबी दूरी की यात्रा कर सकते हैं।'

एक वरिष्ठ सरकारी अधिकारी ने कहा, 'इनका इस्तेमाल मिनीकॉय और इसी प्रकार के उन स्थानों में हो सकता है जहां हमारे पास हवाई पट्टियां नहीं हैं।' भारतीय तटरक्षक बल के अभियानों में हवाई उपकरणों ने अहम भूमिका निभाई है। जब 21 दिसंबर 2014 की रात को गुजरात तट के निकट विस्फोटक सामग्री लेकर जा रही संदिग्ध पाकिस्तानी नौका में सवार लोगों ने नौका को विस्फोट से उड़ा दिया था, तब समुद्री सुरक्षा बल की हवाई और समुद्री इकाई ने संयुक्त रूप से अभियान चलाया था। तटरक्षक बल छह और एमएमएसए के संबंध में विचार कर रहा है। हालांकि तटरक्षक बल इसके लिए भारतीय वायुसेना के साथ एक प्रस्ताव तैयार होने का इंतजार कर रहा है क्योंकि वह विमान उसके साथ खरीदना चाहता है।

The Pioneer

09 February 2016

## Body of soldier retrieved by cutting 30-foot high ice wall

Six days after a massive avalanche swept away one of the forward Indian posts at a height of 19,600 feet in Northern Siachen glacier in Ladakh, rescue workers on Monday retrieved the body of a jawan after cutting through a 30-foot high "ice wall" at the camp site. Ten soldiers, including a Junior Commissioned Officer were buried in the wee hours of February 3. Since then rescue teams have been camping in the area in search of the bodies of the missing soldiers. Ministry of Defence spokesman based in Udha-mpur, Colonel SD Goswami said, "After intense search operations on the sixth day, rescue parties managed to hit the camp site and recovered the mortal remains of one martyr." The identity of the soldier whose body was recovered is yet to be made public by the Army authorities. Meanwhile, a new camp has been established at the location to coordinate the rescue efforts as well as to continue vigil in the sensitive area. According to Defence spokesman, the rescue teams are facing frequent snow blizzards, extreme freezing temperatures, and low visibility apart from the effects of rarefied atmosphere in such high altitude. He said the teams are working round-the-clock and observing all precautions since the unstable ice and snow in the region could trigger fresh avalanches. Rescue efforts will continue till all our soldiers are found, he added.

**Defence sector now open to private players, MoS Defence Rao Inderjit Singh****By Siddhartha Rai**

He also underlined the fundamental problem that made private investment in the defence sector manufacturing restrictive along with the initiatives taken by the government to do away with them. The Indian defence industry is the locomotive of PM's Make in India dreams, said Minister of State for Defence Rao Inderjit Singh. "While the defence sector had been kept as a preserve of the public sector undertakings in the past 30-40 years, we decided to open it on a par with other industries to private initiative, though a very limited opening had earlier been provided in 2002," said Singh. He also underlined the fundamental problem that made private investment in the defence sector manufacturing restrictive along with the initiatives taken by the government to do away with them. "The first and foremost problem in the sector for the entry of private players is that they have to depend only on government purchases and the forces. Hitherto, private players loathed to invest, but it is changing as we have tried to ensure purchasing leverages," Singh said. He added the Centre has created three categories of private investments in defence manufacturing with varying caveats of concessions and guaranteed purchases, along with hedging investments. "We have also tried to take into account the small industries in this field to give them a level-playing field," Singh added. Though the government has so far been optimistic in its Make in India vision, not many enterprises have started working on the ground. "A number of licences have been granted to private parties, only around 35 have started actual production. Still we are optimistic as those who have not are still holding on to the licences," Singh said. Another positive initiative of the ministry has been to make mandatory for defence PSUs to spend their CSR funds in skilling the labour force. "We want to turn the labourer into a skilled worker," said Singh. Singh also went into the procurement procedure and its problems. He said the procurement manual had been revised in 2016 to make procurement more transparent and quick. He added the procedure for blacklisting of defence MNCs needed to be considered differently. "Procurement becomes problematic when one blacklists the entire enterprise for the bad practices of just one of its sister concerns. Blacklisting should be dealt with on a case to case basis and not in a straight jacket way," he said. Over the contentious One Rank One Pension issue, Singh said it had been used politically by earlier regimes as a "parting shot" before seeking re-election. "We are the first government that has taken the bull by the horns and sought to implement it," Singh said. Last but not the least, Is India prepared to ward off Pakistan on the border and vis a vis terrorism that it has been sponsoring on India soil? "Yes we are. Pakistan may indoctrinate its establishments with the belief that it can take on India, but when push comes to shove they know they cannot afford a show down with us," Singh said.

---

**The Pioneer****09 February 2016****Six arrested for travelling in car with Defence Ministry sticker**

The Bengal Police have arrested six people from Jamalpur village of Burdwan district for travelling in a car with Defence Ministry sticker. The incident took place in the small hours of Monday when the police intercepted a white car with a red sticker affixed on its bumper reading: "Government of India, Minister of Defence." The vehicle had Kolkata registration number. The letters were written in golden, sources said adding the youth who were coming from Tiljala area of south-eastern Kolkata could not give satisfactory answers to queries. "They gave incoherent answers and were detained for questioning" police sources said adding the six persons were identified as Sk Irfan, Sakil Ahmed, Salim, Sk Asrafuddin, Abu Akhtar, Sk Shahrukh. They are residents of Topsia Road in Tiljala area, sources maintained. The incident takes place more than a year after the Khagrargarh blast where two Jamat ul Mujahideen Bangladesh terrorists were accidentally killed while making bombs. Khagrargarh is barely half-an-hour from Jamalpur area also in Burdwan. The Khagrargarh incident threw the lid off a well-planned terror conspiracy hatched by the JMB even as a number of terror moles were arrested subsequently. As recently as last year a Trinamool leader and his son were arrested from Garden Reach area of Kolkata on charges of their ISI connection. A Bangladeshi was arrested early this year while taking photographs of the Army Command Hospital at Alipore in South Kolkata.

## Korean missile shield a Diplomatic imperative

South Korea and United States could begin discussions on various Defence parameters Official moves towards the deployment - - fiercely opposed by China -- of a US missile defence system in South Korea highlight the inherent dangers of disunity in dealing with North Korea's growing military threat, analysts say. Hours after North Korea's long-range rocket launch yesterday, South Korean and US military officials announced they would begin formal discussions on placing the Terminal High Altitude Area Defence System (THAAD) on the North's doorstep. The rationale was a clear necessity to upgrade the defence posture of the South Korea-US military alliance "against North Korea's advancing threats," said Yoo Jeh-Seung, Seoul's deputy defence minister for policy. Yoo's reasoning is hard to fault in the wake of the North's fourth nuclear test on January 6 and Monday's rocket launch, which was widely regarded as a covert ballistic missile test. "This nuclear testing coupled with the testing of ballistic missile technology ... was always likely to strengthen the argument that South Korea needs to bolster its missile defences," said Ben Goodlad, principal weapons analyst at IHS Aerospace, Defence and Security. But beyond the strategic logic lies a diplomatic imperative, which suggests an eventual THAAD deployment may be less motivated by what North Korea is doing and more by what China is not doing. China is North Korea's main diplomatic protector, and both Washington and Seoul have been pressing Beijing to take a tougher line with Pyongyang over its nuclear weapons programme. But China, wary of the consequences of a collapsing North Korea on its border, has resisted punitive sanctions before, and looks set to do so again as the UN Security Council debates its response to Pyongyang's latest provocations. According to Joel Wit, a senior fellow at the US-Korea Institute at Johns Hopkins University and the founder of its North Korea website, 38North, frustration with China's stance has driven forward the possibility of deploying THAAD in South Korea. "This is a way of sending a signal to China that what North Korea does has real consequences, including consequences for Beijing's own security interests," Wit said. China's response to that signal was swift and unequivocally negative. While it only managed a rather muted expression of "regret" over the North's rocket launch, it was quick to voice its "deep concern" at the prospect of South Korea introducing the US missile system. SKorea navy fires warning shots at North vessel

### The South Korean navy

fired warning shots at a North Korean patrol boat that intruded over their disputed maritime border today, a day after the North's launch of a long-range rocket raised tensions. The defence ministry in Seoul said the North Korean vessel crossed the Yellow Sea border just before 7:00am (local time Yesterday). "It quickly retreated after the South Korean navy fired warning shots," a ministry official said. The de-facto maritime boundary between the two Koreas - the Northern Limit Line - is not recognised by Pyongyang, which argues it was unilaterally drawn by US-led United Nations forces after the 1950-53 Korean War. Both sides complain of frequent incursions by the other and there were limited naval clashes in 1999, 2002 and 2009. Incidents like Monday's intrusion are quite common and rarely escalate into anything more serious. However, South Korea is on a high state of alert following Sunday's rocket launch, which Seoul insists amounted to a disguised ballistic missile test.

## Beijing, Moscow slam U.S. missile plans

By Atul Aneja

### U.S. could deploy anti-missile shield in response to North Korea's satellite launch

China and Russia have slammed the possible deployment of an American anti-missile defence shield in South Korea following North Korea's satellite launch. China's Foreign Ministry spokesperson, Hua Chunying, on Sunday stressed that China is "deeply concerned" about the decision by the United States and the Republic of Korea (ROK) to start official negotiations on the deployment of the Terminal High Altitude Area Defense (THAAD) system. The THAAD system comprises advanced U.S. anti-missile defence batteries. Analysts say that each THAAD missile battery would cost \$1.3 billion and will be capable of covering half or two-thirds of South Korean airspace. "When pursuing its own security, one country should not impair other's security interests," said Ms. Hua. She stressed that the deployment of these weapons would escalate tensions on the Korean peninsula. In turn, this would undermine regional peace and stability, and set back efforts to address the current situation. On Monday, China's state-run daily Global Times escalated the attack on the decision by Seoul and Washington to start dialogue on the deployment of the THAAD system. In an editorial, the daily asserted, citing military experts, that "once THAAD is installed, Chinese missiles will be included as its target of surveillance, which will jeopardise Chinese national security". The write up pointed out China has been strictly opposed to the THAAD deployment in South Korea, and in the light of such opposition, South Korea had not deployed it so far. "The abrupt attitude shift at a confusing moment caused by North Korea's test of a long-range missile is a decision of no strategic vision. For the sake of its security, Seoul took an impetuous action, giving no consideration to the long-term strategic impact," the editorial observed.

**Will cause more trouble** - The daily warned that the deployment "will not put an end to the vicious interaction of varied forces in the region, only causing more troubles to northeast Asia". China here has echoed Russia's concerns, aired ahead of North Korea's satellite launch. South Korea's Yonhap news agency had quoted Alexander Timonin, Russia's Ambassador to Seoul, as stating earlier this month that Moscow stood opposed to the deployment of the THAAD system as it could destabilise the region. Mr. Timonin pointed out that Russia and China share "nearly identical" views on resolving the North Korean nuclear issue. On the other hand, Washington is of the view that following North Korea's nuclear test in January, the THAAD system would be required to protect the 27,000 American troops that have been deployed in South Korea. The Yonhap write-up points out that China is reluctant to push the North too hard due to security concerns, including the possibility of an influx of North Korean refugees or the emergence of a U.S.-allied, unified Korea on its borders. In Beijing, Chinese Vice-Foreign Minister Liu Zhenmin "lodged representations" over Seoul's announcement of the decision during an urgent appointment with South Korea's Ambassador to China Kim Jang-soo. "China has also made clear China's stance to the U.S. side through diplomatic channels," Ms. Hua, the spokesperson, observed.

## Spacecraft Aditya gets ready to gaze at the sun

By Madhumathi D.S.

BENGALURU: Aditya-L1, the Indian sun mission due after three years, may turn out to be a unique formation of not one but two spacecraft looking at the sun from two stable orbital points. That is if the Advisory Committee on Space Sciences, which is the brain behind the country's extra-planetary missions, has its way. Internal discussions have apparently been launched. Aditya is the nation's third big extra-terrestrial outing after moon and Mars, all conceived and designed by ADCOS, the multi-faculty body of the Indian Space Research Organisation. ISRO has started activities to send a 400-kg spacecraft to look at the sun from a special stable orbital slot called L1 around 2019-20. L1 or 'Lagrangian' point # 1 is about 1.5 million km from Earth towards the sun. There are four more Lagrangian points L2 to L5 for sun and Earth where space objects can resist the pulls of both the celestial bodies and stay relatively stable in that orbit. According to ADCOS Chairman, and former ISRO chief and cosmic ray scientist U.R. Rao, a second spacecraft can be sent to Point L5, about 1.3 million km away and at a 30-degree angle to L1, for a fuller picture of the sun. It could follow L1 a few months or a year apart, he told ADCOS has designed the 2008 Chandrayaan-1; its future sequel; the 2013 Mars Orbiter Mission and is weighing the pros of either a second Mars mission or a Venus trip - the last of which is attracting other space agencies as potential partners. Dr. Rao said: "Our ignorance about the sun is quite large and we need to understand a lot about it. [For example] why is it that the centre of our star is 6,000 degrees Kelvin while the outer corona is two million Kelvin? Some theories are there. So far, we could study the corona from the ground for only a few minutes during total solar eclipses." Approved by the Centre in 2008-09, the sun mission was firmed up last year into an upgraded project at the distant L1 point and with a bigger spacecraft. Dr. Rao said early discussions have taken place on a possible L5 mission. ISRO, he said, could use the qualification model of the spacecraft which goes through the same tests and is as good as the final flight model. "Activities related to the Aditya-L1 mission have started," confirmed ISRO Chairman A.S. Kiran Kumar. "Two [spacecraft to sun] together will become unique. Having another one at L5 will give a significant advantage in measurements. We have to still take it up and it must go through all the regular approval processes through the Union budgeting." Dr. Rao said older L1 sun missions by the U.S. and Japan could not yield much. The U.S. is now mulling over an L5 mission. Cabinet

### The challenges

And the first task is to build a few ultra-sensitive instruments to accurately measure minute details about the sun. Dr. Rao said the bigger challenge is to create an all-aluminium 20-metre-high magnetic test facility near Bengaluru to specially assemble and test the spacecraft and instruments in a magnetically clean manner with "not one electric material, not even a car, being nearby". A satellite and a launcher each cost around Rs. 200 crore. Can the nation afford a second spacecraft? Dr. Rao said the prototype that qualifies all tests could be sent into L5 as it will be as good as the final one. It would still need another PSLV launcher. "We are trying to see how best to do it at a minimal cost."

**The Times of India** **09 February 2016**  
**Nasa taps sports balls to decode aerodynamics**

**It'll Help Make Earth-Friendly Aircraft, Find The Most Efficient Route To Mars**

Nasa scientists, including one of Indian origin, are studying the aerodynamics involved in sports balls moving through the air in order to learn how to make aircraft more Earth-friendly or help a spacecraft take the most efficient route to Mars. Aerodynamics is the study of how fluids flow around objects. By understanding how fluids flow around basic shapes such as cylinders and spheres, scientists predict how even minor alterations in these basic shapes change flow patterns. "Sports provide a great opportunity to introduce the next generation of researchers to our field of aerodynamics by showing them something they can relate to," said Rabi Mehta, chief of the experimental aero-physics branch at Nasa's Ames Research Centre in California. The way air moves around different shapes plays a significant role in the flight of all sports balls. Researchers can demonstrate the science behind the best way to throw a football and why a ball curves using relatively simple visualisations of fluids flowing over sports balls in small test facilities. Complementing the large and high-speed wind tunnels at Ames, small wind tunnels and water channels used for quick tests provide controlled environments where fluids at known speeds can flow over a stationary test item -in this case a sports ball. With smoke, lasers or brightly coloured dyes inserted in the fluid flow, patterns of smoothness and disturbance appear, making the usually invisible aerodynamics around the items brilliantly visible. "What we are looking for in the smoke patterns is at what speed the smoke patterns suddenly change," said Mehta. "There is a thin layer of air that forms near the ball's surface called the 'boundary layer', and it is the state and behaviour of that layer that is critical to the performance of the ball," said Mehta. "The materials used, the ball's surface roughness and its distribution determines its aerodynamics," he said. For example, a smooth golf ball travels less than half the distance of a dimpled one. The dimples make the boundary layer "turbulent" which keeps the boundary layer attached to the object longer and delays separation. When the boundary layer separates from an object, drag is created from the resulting pressure imbalance, and the object slows down. Kicking is another aspect of football aerodynamics. Ideally the kicker should kick the ball so that it spins along the horizontal axis, if angled the ball veers sideways. If football players can learn more about velocity, direction of motion and spin rates, they can learn how to achieve desirable results, Mehta said.

---

**The Times of India**

**09 February 2016**

**Let Science Speak**

**It's not the weight of evidence that's keeping GM mustard down**

Tarikh pe tarikh seems to have become the fate of genetically modified (GM) crops in India. In the 13 years since Bt cotton was introduced here, not a single new GM crop has been approved. The latest to hit the wall is Mustard DMH-11, which on Friday failed to get the approval of the Genetic Engineering Appraisal Committee (GEAC). Developed by a team of Delhi University scientists this GM hybrid promises 25-30% more yield than the best mustard varieties currently grown in the country. The problem is that science seems to weigh less with the regulator than politics and ideology. Look at the weight of evidence on Bt cotton: since its introduction, the country's cotton production has gone up more than 2.5 times. Those who argue that different standards must apply to food crops should note that cotton seeds also yield animal feed and the second largest produced edible oil in the country. No compelling evidence has emerged on damage to either biodiversity or human health. Yet, GM mustard struggles to get approval while ironically India chugs plenty of imported GM soybean and rapeseed oils imports now feed 70% of the domestic demand for edible oils. Housed in the environment ministry, GEAC doesn't really enjoy the desired independence. In the infamous case of Bt brinjal, even when GEAC gave approval it was overruled by then environment minister Jairam Ramesh. An independent regulator was proposed in the Biotechnology Regulatory Authority of India Bill, but this too became the victim of a Parliament more disposed to having rows than legislating. Yet, as better food technology must become an integral part of India's food management plan, so must a truly independent and science-focussed regulator. On the upside, the fact that Mustard DMH-11 has been incubated in Delhi University defies swadeshi warnings about GM being a tool for MNC takeover, suggesting instead that domestic scientific institutions can also supply the urgently needed technological breakthroughs in oilseeds, pulses and other in-demand foods. Thankfully, there seem to be a healthy number of GM candidates for field trials and eventual commercialisation. We must encourage research interest in biotechnology, not tie down scientists and innovators in Kafkaesque red tape. Environment minister Prakash Javadekar says the government is "not rushing through" with GM. But regulator uncertainty and sloth doesn't serve either science or the country well.

## New efficient AI chip may lead to 'Internet of Things'

Boston, PTI: MIT scientists, including one of Indian-origin, have developed a new highly efficient chip that may enable mobile devices to run powerful artificial intelligence algorithms, and help usher in the "Internet of things". Neural networks, large virtual networks of simple information-processing units, which are loosely modelled on the anatomy of the human brain are typically implemented using graphics processing units (GPUs), special-purpose graphics chips found in all computing devices with screens. A mobile GPU, of the type found in a cell phone, might have almost 200 cores, or processing units, making it well suited to simulating a network of distributed processors. Researchers at Massachusetts Institute of Technology (MIT), including Tushar Krishna, designed a new chip specifically to implement neural networks. It is 10 times as efficient as a mobile GPU, so it could enable mobile devices to run powerful artificial-intelligence (AI) or 'deep learning' algorithms locally, rather than uploading data to the internet for processing. "Deep learning is useful for many applications, such as object recognition, speech, face detection," said Vivienne Sze from MIT. "You can imagine that if you can bring that functionality to your cell phone or embedded devices, you could still operate even if you don't have a Wi-Fi connection," Sze said. The new chip, called 'Eyeriss', could also help usher in the "Internet of things" -- the idea that vehicles, appliances, civil-engineering structures, manufacturing equipment, and even livestock would have sensors that report information directly to networked servers, aiding with maintenance and task coordination. With powerful AI algorithms on board, networked devices could make important decisions locally, entrusting only their conclusions, rather than raw personal data, to the internet. The chip has 168 cores, roughly as many as a mobile GPU has. The key to Eyeriss's efficiency is to minimise the frequency with which cores need to exchange data with distant memory banks, an operation that consumes a good deal of time and energy. Whereas many of the cores in a GPU share a single, large memory bank, each of the Eyeriss cores has its own memory. Moreover, the chip has a circuit that compresses data before sending it to individual cores. Each core is also able to communicate directly with its immediate neighbours, so that if they need to share data, they do not have to route it through main memory. The final key to the chip's efficiency is special-purpose circuitry that allocates tasks across cores. The MIT researchers used Eyeriss to implement a neural network that performs an image-recognition task, the first time that a state-of-the-art neural network has been demonstrated on a custom chip.

---

Deccan Herald

09 February 2016

## Life of a scientist exciting than movie star: S Chandrasekhar

Chandigarh, pti: "Life as a scientist is more exciting than a short-lived movie star," senior scientist S Chandrasekhar said on Monday as he impressed upon youngsters to become scientists. "While youngsters are after celebrities, I strongly believe scientists can attain much more celebrity status than cricketers or movie stars, whose status is short-lived," he said. "With the advancement of their age, the status of the scientists gets bigger, so I believe the life as a scientist is more exciting than a short-lived movie star", Chandrasekhar, who is Director of Council of Scientific and Industrial Research (CSIR)-Indian Institute of Chemical Technology, Hyderabad said here. He was addressing the 18th Chemical Research Society of India (CRSI) meet on "National Symposium in Chemistry", which concluded at Panjab University (PU) on Monday. The three-day event was organised by PU and Institute of Nano Science and Technology here. Chandrasekhar stressed on the translational research so that the academic laboratory work could be translated into products, which are useful to the masses. Noting that a scientist can get inspiration from anything and anywhere, he said, "While snake venom has inspired to discover drugs like Captopril for lowering BP (blood pressure), marine sponges inspired discovery of drugs for cancer," he said. He also stressed on environment protection, emphasising the need for practising green chemistry. "If we can make chemicals without polluting the planet for human well being, that will be monumental," he said. Calling pollution by pharma industry a myth, he said, the sector saves lives of people suffering from TB, cancer, brain disorders and many more. "Thus the public and policy makers should encourage chemistry as the central science rather than criticising it. The natural wealth of India and big coast lines for marine chemicals is the way forward for our country," he said.

## Tech can make buildings quake-proof

Tokyo: Shocking images of a Taiwan apartment complex felled like a tree by a magnitude 6.4 earthquake have highlighted what is needed to build a structure that can withstand seismic shocks. Like Taiwan, Japan is quake-prone -- it suffers about a fifth of the world's most powerful tremors. It has used a mix of ancient and modern technologies to make its buildings increasingly quake-proof. Lessons have been consistently learnt and building standards subsequently raised in the wake of deadly disasters such as the 1995 Kobe earthquake, which killed 6,434 people. When a massive 9.0 magnitude earthquake struck off northeastern Japan on March 11, 2011, the shaking in Tokyo was violent. But buildings -- including the nearly complete 634-metre (2,080 feet) Tokyo Skytree tower and other skyscrapers -- survived intact. Here is a look at advanced technologies that Japan uses to protect its buildings:

**Basic steps to make a building quake-resistant:** Resisting the force of a tremor is the most conventional way to protect structures from earthquakes. That means basically reinforcing the walls and supporting columns. One often-seen example is strengthening bridges by wrapping their support columns with steel frames. After the March 2011 quake, many schools reinforced their buildings by adding cross-beams to window frames, another example of that extra bit of strength that can go a long way to make buildings safer.

**Special mechanisms for protecting skyscrapers:** Tall buildings can be constructed to absorb shocks from an earthquake. The idea is for the building to control the tremor rather than the other way around. Oil dampers -- oil-filled cylinders that work like giant shock absorbers -- are a key technology employed in Tokyo skyscrapers. When a powerful quake hits, such buildings are designed to sway like a pendulum so that the movement effectively absorbs the shockwaves. The high-rise Mori Tower in Tokyo's Roppongi Hills development uses the technology. During the March 2011 quake, not a single glass was broken in a 50th-floor restaurant.

**Fresh ideas:** The latest idea is to "isolate" tremors, which means separating the building from the earth by measures including embedding absorbent rubber in its foundation. "This mechanism is often applied to mid- and low-rise buildings lacking structural flexibility, such as condominiums, rather than high-rise structures," said Kenji Sawada, executive director of the Japan Society of Seismic Isolation. By using "seismic isolation" technologies, the scale of tremors felt in the topping structure could be greatly reduced, experts say. But Sawada also said: "It doesn't mean reinforcing building structure (with beams and steel frames) is an outdated idea. We should examine the structural nature of a building and apply these three types of technologies, depending on suitability."

**Ancient knowledge:** Japan has been dealing with earthquakes for centuries and technological principles from ages past are still valid -- with one used in the construction of the Tokyo Skytree. Parts of the 7th century Horyuji Buddhist temple complex in the ancient capital of Nara, including its five-storey pagoda, are the oldest wooden structures in the world.