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Decks cleared for Rs 4,500-crore artillery contract

By Ajai Shukla

L&T and Hanwa Techwin will gain approximately 50 per cent each of the contract

On Friday, the Cabinet Committee on Security (CCS) cleared the Rs 4,500-crore acquisition of 100 tracked, self-propelled guns that will be manufactured in India by Larsen & Toubro (L&T), in partnership with South Korea's Hanwa Techwin.

This acquisition proposal, which the army regards as crucial for equipping its strike corps with tracked guns that can keep pace with fast armoured spearheads, had already come up before the CCS on Wednesday. However, the matter was postponed because of a lack of quorum — the minimum required five ministers were not present at the meeting.

Now, with the CCS sanction accorded on Friday, L&T executives told Business Standard they expect the contract to be signed within a fortnight.

L&T and Hanwa Techwin will gain approximately 50 per cent each of the contract. The guns are required to be delivered in 42 months from the contract, which includes an options clause for an additional 50 guns.

To build the guns, L&T plans to set up a new manufacturing line at its major unit in Hazira. However, until that gears up for production, the L&T facility at Talegaon, outside Pune, will build the gun.

The K-9 Vajra, as the gun is called, consists of a 155-millimetre, 52 calibre gun, mounted on a tracked vehicle.

MAIL TODAY

Sun, 02 Apr, 2017

Army may get homegrown cyber guard

In Line with Prime Minister Narendra Modi's push for enhancing cyber security, the Indian Army is testing the indigenous BOSS (Bharat Operating System Solutions) to guard its communication and information networks from espionage by foreign players. In his maiden address to the senior commanders of the three services, the prime minister had asked them to guard against the threats in the cyber domain and after that, Army's Jammu and Kashmir-based Northern Command started the evaluation of the indigenous operating system for military requirements. "The Northern Command has been evaluating the BOSS at its headquarters as an option for replacing the foreign solutions to provide more security to the critical security-related information of the forces deployed there," government sources told Mail Today.

'BOSS' TO THE RESCUE

■ Protection of vital information in cyber domain is critical for the forces deployed in the command which faces both China and Pakistan

■ Army's Jammu and Kashmir-based Northern Command started the evaluation of the indigenous operating system for military requirements after directions from the PM

"The software, developed by CDAC Chennai, is being customised for meeting the requirements of the military and during the evaluation last week, it was moving ahead satisfactorily," they said. BOSS is a software developed to benefit the usage of free software in the country and considered to be an important initiative by military analysts when cyber is fast emerging as warfare domain. Army sources said protection of vital information in cyber domain is critical for the forces deployed in the command which faces both China and Pakistan as even if the itinerary of a small convoy gets leaked, it can be proven dangerous.

At present, the Indian military is using foreign-origin software, which have been frequently coming under the scanner for working for their countries' intelligence agencies and cannot be considered safe in the prevailing atmosphere of leaks and cyber espionage.

Currently, a number of equipment in the cyber infrastructure used by the public sector agencies supporting military communication is sourced from foreign manufacturers.

Fearing espionage through foreign equipment, an advisory was issued couple of years ago by the Air Force to its personnel against using the phones of a particular phone firm. Army officials from the Corps of Signals — which is responsible for maintenance and looking after entire gamut of military communication — said indigenisation of the information and communication technology (ICT) infrastructure would also help in providing opportunity for ‘Make in India’ products in the sector. India is also coming up with a tri-services cyber agency which will deal with the matters of cyber security and have both offensive and defensive capabilities while dealing with issues in that domain.



Sun, 02 Apr, 2017

Civil-military parity row to end

Government committee to submit report to resolve issue of rank equation

The report of a government-appointed committee is expected to put an end to the contentious issue of parity between military officers and their civilian counterparts in the service headquarters.

The three-member committee was appointed to look into an order issued last October by the Defence Ministry “reiterating” the rank equation between civilian officers and serving military officers based on duties and functional responsibilities.

By the order, a Principal Director is equivalent to a Major-General, a Director is equivalent to a Brigadier and a Joint Director to a colonel. This led to severe displeasure in the services, which see the order as effectively lowering the status of their officers.

“The government has set up a three-member Committee of Officers to look into equivalence between service officers and Armed Forces Headquarters Civil Service (AFHQ CS) officers,” Union Minister of State for Defence Subhash Bhamre told the Rajya Sabha last week.

Order questioned

Serving and retired military officers have questioned the order, citing past orders, court orders and other reports. One of the communications sent to the panel said, “No equivalence can be established between commissioned officers (Group A equivalence service) and AFHQ CS Officers (Group B Service) as no such precedence exists.”

Functional equivalence

The letter pointed out that certain benchmarks can be used to arrive at “functional equivalence”.

The letter suggested an “unambiguous” functional equivalence between Lieutenant-Colonels and Directors in the Central government based on various observations, gazette notifications, court judgments and recommendations of Groups of Ministers.

By this, a Lieutenant-Colonel or one of equivalent rank in the Army is equal to a Director, while a Colonel has no civilian equivalent. A Brigadier is equivalent to a Principal Director.

The communication from a retired officer noted that the junior commissioned officers in the armed forces have been accorded status of Group B-equivalent gazetted officers by Section 3 (xii) of Army Act 1950 and Para 151 of Defence Services Regulations 1987 (revised).

“In view of foregoing, it is submitted that anything contrary to benchmarked equivalence would not only be in violation of Warrant of Precedence ... but also amount to unacceptable downgrade of the established status of armed forces officers. It is likely to result in serious resentment and court cases in future,” the letter says.

Of 800 appeals against soldiers with disability in SC, just 1 win for Centr

By Vijay Mohan

Point of contention

- *Denial of disability benefits has for long been a sore point for disabled soldiers*
- *Despite multiple favourable decisions by the SC, pension continues to be refused to such soldiers*
- *Pro-soldier verdicts are challenged by the MoD till SC even in cases where point of law has been settled.*

While the Ministry of Defence (MoD) filed close to 800 appeals in the Supreme Court against disabled ex-servicemen in last three years, it managed to win only one case.

Admitting this in Parliament this week, Minister of State for Defence Dr Subhash Bhamre said appeals against soldiers with disability accounted for a whopping 61.50% of all appeals filed by the government.

Appeals are filed by the government in the SC against judgments of the Armed Forces Tribunal (AFT) and the High Courts that have gone in favour of disabled ex-servicemen who had sought redressal of their grievances concerning pension and related benefits.

The matter has been taken up repeatedly with the government by various ex-servicemen's association as well as MPs, who have pointed out that such appeals were continuing despite the Centre's directives to all departments for cutting down litigation.

Recently, the Defence Minister had also issued directions to implement the recommendations of a committee of experts that had come down heavily on the Army and the Ministry of Defence for causing agony to disabled soldiers.

The committee had termed such actions contemptuous and recommended withdrawal of all appeals filed against disabled soldiers and conceding cases that were covered by the Supreme Court and High Court verdicts. Recommendations similar to the expert committee were also made by the 7th Central Pay Commission that were later accepted by the Centre.

The AFT's Chandigarh Bench had a few months ago reminded the MoD and the Army Headquarters that their frivolous appeals against disability pension of soldiers were causing great distress to the system and shaking the faith of the common person in the rule of law. It said the cost of frivolous litigation should be recovered from the officers taking such decisions.

Business Standard

Sun, 02 Apr, 2017

India's 'Indo-Pacific' challenges

New Delhi must synergise its maritime policies with those of other littorals of the Indo Pacific that have similar interests, and develop capabilities that can enable us to support them

In recent years, the concept of Indo-Pacific, first articulated in 2009 by then US Secretary of State Hillary Clinton, has been the subject of discussion at different strategic forums. Sometimes, the theatre has also been referred to as Indo-Asia-Pacific, but shorn of the terminology used, it represents the stretch of unbroken, largely maritime domain, running from the Gulf countries on one side to the littorals of the Western Pacific on

the other. Global security concerns and interests are now getting focused on this part of the world more than on any other.

Several factors have led to the shift in global strategic concerns from Europe to Asia. With the collapse of the former Soviet Union by 1990, the confrontation between the Nato alliance and the Warsaw Pact nations came to an end. The economic rise, first of Japan and then of China, further altered the equations eastwards. The increasing dependence of both on energy resources from the Gulf added to the new scenario.

Several nation-state tensions, some leading to conflict and others simmering just below the surface, were endemic to the region, to which were added the activities of non-state actors, first through piracy and then through terrorism, leave aside other crimes such as drug smuggling and human trafficking. These have created a potentially volatile environment which can have far-reaching effects on the stability of the region. As a major Indian Ocean Region (IOR) littoral state, India cannot remain unaffected.

America has serious military assets in the Western Pacific with bases in Japan, South Korea, Australia and Singapore. Even if former US President Barack Obama's "Pivot to Asia" is no longer talked about, much of the \$54 billion that President Donald Trump is earmarking for beefing up US military capabilities will, inevitably, find reflection in this region. The US cannot accept significant alteration of the status quo and this will always be a source of contestation between it and China, even as the two continue to have a sizeable trade relationship.

In the IOR too, despite reduced dependence on its energy resources, America has and will continue to have a military presence which will outmatch all others. As for China, leave aside its assertive positions in the East and South China Seas, we can expect to see a more proactive IOR stance and naval deployments and initiatives commensurate with it are already being seen in the frequent presence of its nuclear submarines and building of naval facilities at Gwadar and Djibouti.

Japan, a not insignificant military power in its own right, also has naval facilities and with its dependence on Gulf energy, must be reckoned as an important Indo-Pacific player. It has recently commissioned the second of two versatile helicopter carriers, each larger than our own INS Vikramaditya, even as it operates two relatively smaller platforms for the same purpose.

Then there are others which are either geographically "two-ocean" nations such as Australia, or sit astride the three vital chokepoints that connect the "Indo" part with the Pacific — Indonesia, Singapore and Malaysia. The fact that one of the vital shipping routes of the world runs across the stretch only adds to global concerns.

India's responses to the developing situation need to be analysed at two levels. American interests and its presence in the region are positive to India's concerns. The US sees India as a major IOR littoral power which can and should act as a "net security provider", be it for ensuring the safety of commons or providing relief during natural disasters such as tsunamis and other assistance; its presence is not detrimental to our interests. Much the same can be said of Japan, which has serious dependencies on Gulf oil and with which we can act in tandem.

China, however, falls in a different category. While its participation in anti-piracy operations in the Gulf region starting 2008 was not an issue, Chinese moves in setting up naval facilities at Gwadar and at Djibouti must arouse concern — the first given its close linkages with Pakistan, and the second because they will enable extended deployment of naval forces. Its assertive postures in the South China Sea may well be replicated in some way in the IOR.

The second issue is that of our own naval capabilities. Without elaborating on them, it can safely be said that these have been allowed to get degraded considerably in the last decade when, in fact, they should have been enhanced. The navy's share in the already dismal defence budget (lowest in several decades at 1.63 per cent of GDP) is simply not good enough to ensure that our maritime capabilities will be able to cope with the increasing volatility. This is disturbing, as it is in the IOR that we enjoy intrinsic advantages over China. There is an urgent need to invest in platforms — air, surface and underwater — that will allow us to deploy and operate across the area of our interest as the major littoral power.

Forty per cent of our GDP comes from trade, of which 90 per cent moves across the Indo-Pacific sea routes, more than half of it through the Western Pacific. India is not a littoral of that region but has an interest in seeing that those waters permit safe and free movement of commerce in keeping with international laws. It must also help the smaller littorals in exploring their waters for oil and gas, as it is doing in Vietnam, and later in deep sea mining for minerals. All this can happen only if there is stability in the region, which China's postures could quite easily affect.

Our policies must first synergise with those of other littorals of the Indo-Pacific which have similar interests, and concurrently lead to capabilities that can support them. It is not certain if this is happening. Even the defence cooperation mechanisms that we have with many of them are languishing for want of funds, leave aside our inability to provide any significant military hardware. The Chinese, on the other hand, are moving at full steam. It is time India weighs anchor.

India's defence cooperation mechanisms with many Indian Ocean Region powers are languishing for want of funds. The Chinese, however, are moving at full steam. It is time India weighs anchor.



Sun, 02 Apr, 2017

Indian Army's neighbourhood diplomacy is in good steed

New Delhi: The Indian Army breeds some of the finest horses and the equines seem to have cemented their reputation as the force's favourite gift to countries in the neighbourhood.

Army chief General Bipin Rawat presented seven animals — a stallion light breed, two brood mares, two gelds and two donkey stallions — to his Nepali counterpart General Rajendra Chhetri earlier this week, during his fourday visit to the Himalayan country. The Indian Army's horses are much sought after and sometimes given voluntarily as a goodwill gesture or following a request from a neighbouring army.

The Indian Army's animal transport units play an important role in carrying rations and stores to remote posts where vehicles cannot reach.

The President of Nepal conferred the title of Honorary General of the Nepalese Army on General Rawat at a special investiture ceremony on March 29. The tradition is a reciprocal arrangement between the two countries that has continued uninterrupted since 1969. General Chhetri was given the title of Honorary General of the Indian Army during his first official visit to the country in February 2016.

Nepal is not the first country to receive Indian Army's horses.

In 2008, the then army chief General Deepak Kapoor handed over two stallions and four mares to the Bangladesh army as a token of goodwill and friendship. Kapoor handed over the reins of the horses to his Bangladeshi counterpart General Moeen U Ahmed at a special ceremony. The animals were bred at the army's Remount Veterinary Corps stud farms at Hisar and Babugarh.

The transfer of horses has not always been smooth. A few years ago, the Sri Lankan army had sought six horses from India. The proposal, however, got stuck in red tape. Very promptly, the Pakistani Army stepped in and provided the horses that Sri Lanka had sought.

India did gift six horses to Sri Lanka Military Academy (SLMA) in Diyatalawa for training two years ago but it was much after Pakistan had met the requirement.

Army officials said Myanmar has also received horses as gifts from the Indian Army. Around a year ago, the army gifted 26 horses and mules to the neighbouring army. So impressed was the Myanmar army with the well-bred animals that within a few months it bought 15 more horses from the Indian Army.

"Our horses are as sturdy as our men and in high demand," said a senior officer.

Sat, 01 Apr, 2017

Eye on Pak - India could jettison no-first-use of nukes

By Chidanand Rajghatta

Nuclear doctrines have come a long way from the time Ronald Reagan declared in 1984 that “a nuclear war cannot be won and must never be fought.” Forced to counter Pakistan's persistent use of terrorism under a nuclear cover and the slippery slope that introduced to the region, India may be re-interpreting its no-first-use of nuclear weapons policy to allow pre-emptive strikes against its neighbour, the nuclear pundits community is deducing, based among other things on cryptic statements from the Indian establishment.

The purported evolution of India's nuclear doctrine towards pre-emptive first use is primarily based on throwaway remarks made by former defense minister Manohar Parrikar last November wondering why New Delhi should bind itself to a no-first use policy, instead of saying more cryptically that it is a responsible nuclear power and will not use nuclear weapons irresponsibly. Those remarks (which Parrikar immediately clarified were his personal views), taken together with a more deliberative narration in former foreign secretary Shivshankar Menon's memoir that “There is a potential gray area as to when India would use nuclear weapons first” against a nuclear-armed adversary, has led some nuclear scholars to infer that New Delhi is moving its nuclear doctrine in a new direction.

Some of the conjecture was articulated by Vipin Narang, an MIT nuclear proliferation scholar, at a Carnegie International Nuclear Policy Conference in Washington DC, attracting attention of domain experts across the world. Outlining developments in the subcontinent that had led India to conceive of its Cold Start doctrine (a punitive conventional strike) only to have it countered by Pakistan's development of tactical battlefield nuclear weapons, Narang said it looked increasingly likely that India may abandon its no-first use policy and launch a preemptive strike if it believed Pakistan was going to use any kind of nuclear weapons first.

“India's opening salvo may not be conventional strikes trying to pick off just Nasr batteries in the theatre, but a full ‘comprehensive counterforce strike’ that attempts to completely disarm Pakistan of its nuclear weapons so that India does not have to engage in iterative tit-for-tat exchanges and expose its own cities to nuclear destruction,” Narang said. “There is increasing evidence that India will not allow Pakistan to go first.

Business Standard

Sun, 02 Apr, 2017

China's 2nd aircraft carrier coming this month, India loses edge

By Ajai Shukla

Launch expected on April 23, the Chinese Navy's 68th anniversary

Five years ago, India had two aircraft carriers and China had none. Now, perhaps as early as this month, the People's Liberation Army (Navy), or PLA(N), will match India in carrier numbers.

With INS Viraat decommissioned last month, the Indian Navy has just a single carrier, the Russian-built INS Vikramaditya. The PLA (N) too operates a single carrier, the Liaoning, bought from Russia and refurbished in Dalian, China.

However, at an alarming speed, another Chinese carrier is coming on stream. Naval analysts believe that, on April 23 — the PLA(N)'s 68th anniversary — its second carrier will be officially launched.

China's English language media, including *People's Daily*, quoted China's defence ministry spokesperson Wu Qian as stating on Thursday that a date for the launch would be soon announced, which "won't keep the public waiting for too long".

The new carrier is being named Shandong. While the Liaoning is termed a Type 001 carrier, the Shandong will be categorised Type 001A.

After the Shandong's launch, says China's defence ministry, it would still have to undergo one-two years of outfitting (of weapons, radars, instruments, etc) and another year of sea trials before joining the PLA(N)'s operational fleet in 2020.

Meanwhile, India's second carrier, INS Vikrant, being fabricated at Cochin Shipyard Ltd (CSL), has fallen eight years behind schedule. Originally to be delivered in 2015, it is now expected to be fully operational only in 2023, years after China's second carrier joins the PLA(N) fleet. Worryingly, the Indian Navy plans to commission a partly operational Vikrant by end-2018, without its "aviation complex" (flight operations control) or LR-SAM anti-ship missiles. That means for some time, maybe years, the Vikrant would lack both strike and defensive capability.

Further, a Comptroller and Auditor General (CAG) report revealed last year that the MiG-29 fighter was "riddled with problems" and that serviceability rates were just 15-35 per cent.

While the Vikrant would have taken 14 years to build from the time its keel was laid in 2009, the Shandong would have taken barely half that time, assuming construction commenced soon after 2012, when the Liaoning finally vacated her berth at the Dalian shipyard. India, however, does enjoy superiority in its existing carrier. INS Vikramaditya, a 40,000-tonne carrier that embarks 36 aircraft, including 26 MiG-29 fighters, is a battle-ready platform. The Liaoning, displacing 55,000-60,000 tonnes, is termed by Beijing as a "training and research vessel" and is not yet assigned to a PLA(N) operational fleet.

Even so, it carries a full compliment of 36 fixed wing and rotary wing aircraft, including 24 Shenyang J-15 (modelled on the Sukhoi-33) fighters; and ten helicopters, including the Changshe Z-18, Kamov-31 and Harbin Z-9. Last November, her political commissar declared the Liaoning was "combat ready".

The experience of renovating and operating the Liaoning is evident in Shandong's design. Displacing 65,000 tonnes, it features a ski-jump launch system similar to the Liaoning (as do the Vikramaditya and Vikrant). However, China's defence ministry says it "will have more cargo room, more sophisticated radar, more advanced weapons systems and more reliable engines than the Liaoning."

Like India, China plans to build future carriers with a catapult launch system rather than a ski-jump, which restricts the payload aircraft can take off with. Since they carry less weapons and fuel, fighters operating off a ski-jump carrier have shorter flight ranges and lesser punch.

The PLA(N) carrier that follows Shandong, called the Type 002, would overcome these drawbacks with a catapult launch system. A catapult accelerates aircraft to a higher take-off speed, allowing greater payload and faster launches. It is not clear when the Type 002 would be built, or if it would be nuclear powered.

India's third carrier, INS Vishal, however, is being planned as a technologically cutting-edge warship with American design features. Like the Type 002, it will have a catapult launch system that equips all US Navy carriers. As *Business Standard* reported (*November 7, 2016 Navy's second home-built carrier will be nuclear but will come only in 2030s*) Vishal will feature nuclear propulsion, an "electromagnetic aircraft launch system" (EMALS) and the capacity to embark at least 55 aircraft.

It will be built in India and will join the fleet by 2030-35. Chinese naval strategists say the PLA(N) will eventually operate five -six carriers, with two deployed at all times in the Western Pacific and two in the Indian Ocean. Indian naval planners plan on three carriers — one each based in the eastern and western coasts with a third in reserve for maintenance and repairs.

NASA observatory discovers mysterious cosmic explosion

Scientists, still unclear over source of the detected X-rays, say it indicates a never-before-seen destructive event.

A mysterious flash of X-rays has been discovered by NASA's Chandra Observatory in the deepest X-ray image ever obtained.

This source likely comes from some sort of destructive event, but may be of a variety that scientists have never seen before, NASA said.

The X-ray source, located in a region of the sky known as the Chandra Deep Field-South (CDF-S), has remarkable properties, it said.

Prior to October 2014, this source was not detected in X-rays, but then it erupted and became at least a factor of 1,000 brighter in a few hours.

The event likely came from a faint, small galaxy about 10.7 billion light years from Earth, NASA said.

For a few minutes, the X-ray source produced a thousand times more energy than all the stars in this galaxy.

"Ever since discovering this source, we have been struggling to understand its origin," said Franz Bauer of the Pontifical Catholic University of Chile.

"It is like we have a jigsaw puzzle but we do not have all of the pieces," said Bauer.

Two of the three main possibilities to explain the X-ray source invoke gamma-ray burst (GRB) events.

GRBs are jetted explosions triggered either by the collapse of a massive star or by the merger of a neutron star with another neutron star or a black hole.

If the jet is pointing towards the Earth, a burst of gamma rays is detected. As the jet expands, it loses energy and produces weaker, more isotropic radiation at X-ray and other wavelengths.

Possible explanations for the CDF-S X-ray source, according to the researchers, are a GRB that is not pointed towards Earth, or a GRB that lies beyond the small galaxy. A third possibility is that a medium-sized black hole shredded a white dwarf star.

"None of these ideas fits the data perfectly, but then again, we have rarely if ever seen any of the proposed possibilities in actual data, so we do not understand them well at all," said Ezequiel Treister, also of the Pontifical Catholic University.

The CDF-S source is likely associated with the destruction of a neutron star, white dwarf, or massive star, and is roughly 100,000 times more luminous in X-rays.

It is also located in a much smaller and younger host galaxy, and is only detected during a single, several-hour burst. *The research appears in the journal Monthly Notices of the Royal Astronomical Society.*

New planet that is size of Neptune discovered

Astronomers have discovered a 'lost' planet about the size of Neptune tucked away in a solar system 3,000 light years from Earth. The new planet, Kepler-150 f, was overlooked for several years, according to researchers at the Yale University in the US. Computer algorithms identify most such "exoplanets", which are planets located outside our solar system. The algorithms search through data from space mission surveys, looking for the telltale transits of planets orbiting in front of distant stars.

However, sometimes the computers miss something. In this case, it was a planet in the Kepler-150 system with a long orbit around its sun. Kepler-150 f takes 637 days to circle its sun, one of the longest orbits for any known system with five or more planets.

Nasa's Kepler Mission had found four other planets in the Kepler-150 system several years ago. All of them have orbits much closer to their sun than the new planet does. "Only by using our new technique of subtracting out the transit signals of known planets could we then actually see it for what it really was. Essentially, it was hiding in plain sight in a forest of other planetary transits," said a student of Yale.



Sat, 01 Apr, 2017

Low-cost space travel now a reality with reused rocket

Launch Will Help In Setting Up Human Colonies On Mars: Musk

SpaceX chief Elon Musk hailed a "revolution in spaceflight" after blasting off a recycled rocket for the first time on Thursday, using a booster that had previously flown cargo to the International Space Station.

Experts cheered the launch as a "historic" moment for spaceflight, particularly private industry, as companies like SpaceX and its competitors scramble to lower the cost of space travel.

The slightly scuffed Falcon 9 rocket soared into the sky over Cape Canaveral, Florida at 6.27pm (22.27 GMT), on a mission to send a communications satellite for Luxembourg-based company SES into a distant orbit.

Its tall, columnar portion known as the first stage, or booster, had propelled the unmanned Dragon cargo ship to space in April 2016. About 10 minutes after launch, cheers erupted at SpaceX mission control in Hawthorne, California as the re-used rocket powered its engines and landed upright on a drone ship in the Atlantic Ocean marked with the words "Of Course I Still Love You".

The landing marked the ninth successful touchdown of a first stage rocket for SpaceX -six on ocean platforms, or drone ships, and three on land.

It also marked the first time a single rocket booster had ever been launched -and landed -twice. SpaceX has for 15 years been honing the technology of powering its boosters back to careful Earth landings on solid ground and in the water.

The goal of the entire effort, Musk has said, is to make rocket parts just as reusable as cars, planes or bicycles. It is also a key part of his plan to one day establish human colonies on Mars.

"It is an amazing day, I think, for space (and) as whole for the space industry," Musk said in a video message after the launch.

"It means you can fly and re-fly an orbital class booster which is the most expensive part of the rocket," he added. "This is going to be ultimately a huge revolution in spaceflight." Currently, millions of dollars' worth of rocket parts are jettisoned after each launch.

SpaceX officials have said that reusing hardware could slash costs -with each Falcon 9 launch costing over \$61 million -by about 30%. While the exact life of the re-used boosters is uncertain, SpaceX hopes they could be redeployed as many as 10 or 15 times. SpaceX competitor Blue Origin, run by Amazon.com founder Jeff Bezos, has also successfully landed its New Shepard booster after launch, by powering its engines to guide it down for a controlled, upright landing.

Praise and congratulations for SpaceX poured in on Twitter. "Congratulations on another historic launch," the US space agency Nasa wrote on Twitter. "Congrats, SpaceX," said the Defense Advances Research Projects agency (Darpa). As for the cost of Thursday's launch, Martin Halliwell, chief technology officer at SES, has declined to say publicly the exact amount. However, he dismissed "naysayers" this week and stressed the historic nature of the launch on what he has described as a "flightproven" rocket.

5 IIT-M students come up with tech that disinfects toilet seat

By Manash Gohain

A team of five IIT-Madras students has developed a mechanical device that can lead to safer use of public toilets. The device lifts, sanitises and wipes a toilet seat, and is hands-free.

URINARY INFECTION LED TO INNOVATION

<p>PROJECT STARTED IN SEPTEMBER 2016</p> <p>Total cost incurred in developing the prototype ₹5,000</p> <p>Estimated market cost on mass scale manufacturing ₹750</p>		<p>GENESIS</p> <ul style="list-style-type: none"> ➤ The idea originated when team came in contact with a person from corporate sector who was suffering from urinary tract infection as he used to access public toilets a lot & they were not hygienic ➤ Between age group 25 and 50, 30% of Indian women have suffered urinary tract infection at some point of time
<p>OBJECTIVE: When different people sit on the same toilet seat there will be contamination. Objective was to develop a mechanism which will sanitise the seat</p>		
<p>MECHANISM</p>		
<p>A mechanical device to ensure the sanitation & cleaning of the toilet seat by the push of a foot pedal which can be implemented as an add-on to the existing toilet structure</p>	<p>Mechanism consists of three parts: lifting, spraying & wiping mechanism</p>	<p>Lifting: A foot pedal lifts seat, as seen in dustbin lids</p>
		<p>Spraying: When seat reaches its apex position, five nozzles spray sanitising liquid on to the seat ensuring entire seat is sterilised</p>
		<p>Wiping: Wiper is a rod attached with a removable sponge</p>

Currently, the public toilet experience in India can be summed up, by and large, as horrible. They are hothouses for germs. Over 30% of Indian women in the age group of 25 years to 50 years suffer from urinary tract infection (UTI) at some point of time.

These students have developed a prototype that comprises a simple foot pedal at the base of the commode that lifts, sanitises and wipes the seat. They estimate the product can be marketed at Rs 750 a piece if

mass-manufactured. However, the development cost of it is Rs 5,000.

The estimated 150 million urinary tract infections per annum worldwide cost the global economy in excess of \$6 billion, according to C M Gonzalez and A J Schaeffer's study - 'Treatment of Urinary Tract Infection: What's Old, What's New, and What Works' in the World Journal of Urology 6 (1999).

According to more recent research published in the International Journal of Cell Science and Biotechnology, urinary tract infections (UTIs) are the "second-most common infection. "About 40% to 50% (of women) will suffer at least one clinical episode during their lifetime," it said.

"A lot of people contract UTI due to use of unhygienic public toilets. We met a person from a corporate environment suffering from UTI as he uses public toilets a lot. So our team of Sahay, a group we formed to develop socially relevant technologies, decided to work on a solution at the Centre for Innovation at IIT Madras," said Arvind Pujari, a team member.

The students took five months to develop the device, which can be fitted to the existing toilet structure as an add-on.

The mechanism lifts, sprays and wipes. "And one doesn't have to use the hands," said Pujari.

The product was among the 40 innovations given the Gandhian Young Technological Innovation Award earlier this month by the President of India.

IISc researchers' ecofriendly way of recycling e-waste

The low-temperature crushing reduced e-waste into metals, oxides, polymer without using chemicals

Indian Institute of Science (IISc) researchers have found a novel way to recycle the mounting pile of electronic waste more efficiently and in an environmentally friendly manner. According to the United National Environmental Programme, about 50 million tonnes of e-waste is generated annually across the world.

The new approach is based on the idea of crushing e-waste into nanosize particles using a ball mill at very low temperature ranging from -50 to -150 degree C.

Reduction into constituents

When crushed to nanosize particles for about 30 minutes, different classes of materials — metals, oxides and polymer — that go into the making of electronic items get physically reduced into their constituent phases, which can then be separated without using any chemicals. The use of low-temperature grinding eliminates noxious emission. The results of the study were published in the journal *Materials Today*.

“The behaviour of individual materials is different when they are pulverised at room temperature. While metal and oxides get mixed, the local temperature of polymer increases during grinding and so the polymer melts instead of breaking,” says Dr. Chandra Sekhar Tiwary from Materials Engineering Department at IISc and the first author of the paper. “The polymer starts reacting with the rest of the components and forms a chunk. So we can’t separate the individual components.”

“The deformation behaviour at low temperature is very different from room temperature. There are two processes that happen when milling. The polymer material breaks but metals get welded, some sort of solid-state welding resulting in mixing; the welded metals again get broken during milling. At low temperature mixing does not happen,” says Prof. K. Chattopadhyay from the Materials Engineering Department at IISc and the corresponding author of the paper. There is also a lower limit to which materials can be broken into when e-waste is milled at room temperature. The maximum size reduction that can be achieved is about of 200 nanometre. But in the case of low temperature ball milling the size can be reduced to 20-150 nanometres.

Novel design

The low-temperature ball mill was designed by Dr. Tiwary. The cryo-mill grinding chamber is cooled using liquid nitrogen and a small hardened steel ball is used for grinding the material in a controlled inert atmosphere using argon gas. “The interface remains clean when broken in an inert atmosphere,” says Prof. Chattopadhyay.

“One of the main purposes of ball milling [at room temperature] is to mix materials. But in the case of ball milling at low temperature we did not observe any mixing; the individual components separate out really well. We wanted to use this property more constructively. So we took two printed circuit boards from optical mouse and milled them for 30 minutes,” recalls Dr. Tiwary.

The polymer becomes brittle when cooled to -120 degree C and ball milling easily breaks it into a fine powder. Metals and oxides too get broken but are a bit bigger in size.

The crushed powder was then mixed with water to separate the components into individual classes of materials using gravity. The powder separated into two layers — the polymer floats at the top due to lower density, while metals and oxides of similar size and different density settle at the bottom. The bottom layer when diluted further separated into oxides at the top and metals at the bottom. The oxides and metals were present as individual elements.

“Our low-temperature milling separates the components into single phase components without using any chemicals, which is not possible using other techniques,” says Prof. Chattopadhyay. “Our process is scalable and is environment friendly though it uses higher energy.”

Indian coders to get support for iOS apps

Apple opens accelerator in Bengaluru

Apple Inc, the maker of the iPhone, announced the opening of its App Accelerator in Bengaluru.

The company said that the accelerator would provide specialised support for developers making apps on its mobile operating system iOS, which is the foundation for its products like iPhone, iPad and iPod touch. The firm said that it would also provide tools and best practices to help them hone their skills and transform the design, quality and performance of their apps on iOS.

‘Entrepreneurial spirit’

Apple said that India had one of the most vibrant iOS developer communities in the world and that already tens of thousands of developers in India make apps for iOS.

It said the app accelerator in Bengaluru will help to further enrich the iOS app ecosystem.

“We are impressed by the great entrepreneurial spirit in India, and are excited to provide a platform for these developers to share their innovations with customers around the world,” said Philip Schiller, senior vice president, Worldwide Marketing at Apple, in a statement.

He said that in just the first few weeks, the company had already seen developers at the ‘App Accelerator Bengaluru,’ including Practo and Reliance Games, create innovative apps “that can meet the needs of customers in India and around the world.”

“We are thrilled to be one of the first developers to collaborate with the team at the App Accelerator,” said Shashank ND, co-founder of healthcare tech startup Practo, that provides an app and web service for scheduling appointments with doctors.

Each week, Apple experts will lead briefings and provide one-on-one app reviews for developers.

The first-of-its-kind facility will also provide support and guidance on Swift, Apple’s powerful and intuitive programming language created to build apps for iOS, Apple TV and Apple Watch. Swift enables developers to write safer, more reliable code and create richer app experiences.

New way to fight drug resistant superbugs

It involves removing blood antibodies

Scientists have found that an unusual approach of removing antibodies from the blood stream could reduce chronic infections, an advance that may help humans in the fight against drug resistant superbugs.

Researchers from the University of Birmingham and Newcastle University in the U.K. identified two patients with bronchiectasis who suffered with chronic *Pseudomonas aeruginosa* infections that were resistant to many antibiotics.

Bronchiectasis is a disease that leads to permanent enlargement of the airways in the lung.

Symptoms are debilitating for patients, and typically include a chronic cough, shortness of breath, coughing up blood, and chest pain. Bronchiectasis often affects patients beyond the age at which lung transplantation is possible.

Like kidney dialysis

Chronic *Pseudomonas aeruginosa* lung infections commonly occur in patients suffering from bronchiectasis.

“We used a process known as plasmapheresis that is somewhat like kidney dialysis,” said Tony De Soyza, Senior Lecturer at Newcastle University.

“The plasmapheresis involved the removal, treatment, and return of blood plasma from circulation, and was done five times in a week in order to remove antibody from the patients,” said De Soyza. “We then replaced antibodies with those from blood donations. This treatment restored the ability for the patients’ blood to kill their infecting *Pseudomonas*,” he said.



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Exam books now lifeline of Bengal’s ageold libraries

Books on competitive exams are keeping alive the trickle of readers to these once grand repositories of knowledge

Kolkata: Layers of dust have covered bound volumes of Bengal’s 19th and 20th century books and periodicals on the first floor room that is hardly opened. On the ground floor, in the room designated for the librarian, shelves are full with publications from the 18th and 19th century, printed in India and abroad. The collection even includes ‘The General History of the Mogol Empire: From its Foundation by Tamerlane, to the Late Emperor Orangzeb,’ printed in London in 1709.

But the members hardly have access to these gems in Serampore Public Library. Established in 1871 at the heart of the town that played a crucial role in Bengal Renaissance during the 19th century, it is run by a lone Group D staff, as the positions for the librarian and two library assistants are lying vacant for years.

The only room full of readers was the students’ corner that houses text books and those on competitive exams. Ironically, books on competitive exams are keeping alive the trickle of readers to these once-grand repositories of knowledge.

The scene is no different in Konnagar and Mahesh Public libraries, both about 150 years old and trying to keep their head above water by attracting students aspiring to crack competitive exams for jobs.

“Footfall decreased over the years due to change in reading pattern but we still attracted about a hundred people daily. Presently, though, there is only a Group D staff and people are not getting service. Students help themselves to find out books stacked in their room,” said Chapal Chakraborty, a member of the managing committee.

Members of the committee volunteer for the library in their spare time. Chakraborty was not exaggerating as it is impossible for a Group D employee to identify books and suggest them to potential readers. Ironically, these are the very institutions that acted as repositories of knowledge and nurtured the Bengal renaissance that is regarded to have flourished between Raja Rammohun Roy (1772-1833) and Rabindranath Tagore (1861-1941). The books and the public library movement were integral to Bengal Renaissance. It picked up pace in the 1850s in the immediate aftermath of the enactment of the Public Library Act, 1851, in the UK, and a series of public libraries and free reading rooms came up in the first decade itself. “Many of the libraries established around that time are still operational. But all of them are struggling to attract readers due to lack of staff and poor service,” said Ashok Basu, secretary of Bengal Library Association.

According to government records, there are more than 3,000 vacancies among the 5,520 sanctioned posts for about 2,000 functional public libraries.

Among the libraries founded in Bengal in the 1850s are Rishi Rajnayaran Basu Smriti Pathagar in Midnapore (1851), founded by Rajnayaran Basu, a prominent face of the Renaissance, and Uttarpara Jaykrishna Public Library (1859), founded by Jaykrishna Mukherjee, another celebrated personality. Other libraries include Hooghly Public Library (1854), Krishnanagar Public Library (1856) and Konnagar Public Library (1858).

Jaykrishna Public Library was patronised by luminaries of Bengal Renaissance, including Ishwarchandra Vidyasagar (educationist, social reformer), Michael Madhusudan Dutt (poet, pioneer of Bengali drama), Keshab Chandra Sen (Hindu philosopher, social thinker) and Mahendralal Sarkar (who founded Indian Association for the Cultivation of Science in 1876 that is one of the country's oldest research institutes). It is one of the three 'Grade A' libraries in the state. Prominent personalities, from linguist Suniti Kumar Chattopadhyay to former chief minister Jyoti Basu, demanded that it be declared a library of national importance because of its rich heritage and exceptional collection of rare and old books and manuscripts. Of the 1.65 lakh books in its collection, more than 60,000 are considered rare.

"Jaykrishna Public Library has 24 sanctioned posts but is presently being serviced by only eight people, half of who are group D staffs. There has been no librarian for months," said a library assistant. "We are struggling to provide service to the hundred-odd people who visit every day, but the district magistrate has instructed to open a students' corner focusing on books on competitive exams," another staff said. Library minister Siddiqullah Chowdhury said, "We have asked the libraries to increase books on competitive exams."