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# PENNDULUM

*"To Infinity and Beyond!"*

## **BRING IN CHANGES!:**

Save The Seafarers  
by Radio Officer G.Mohandas

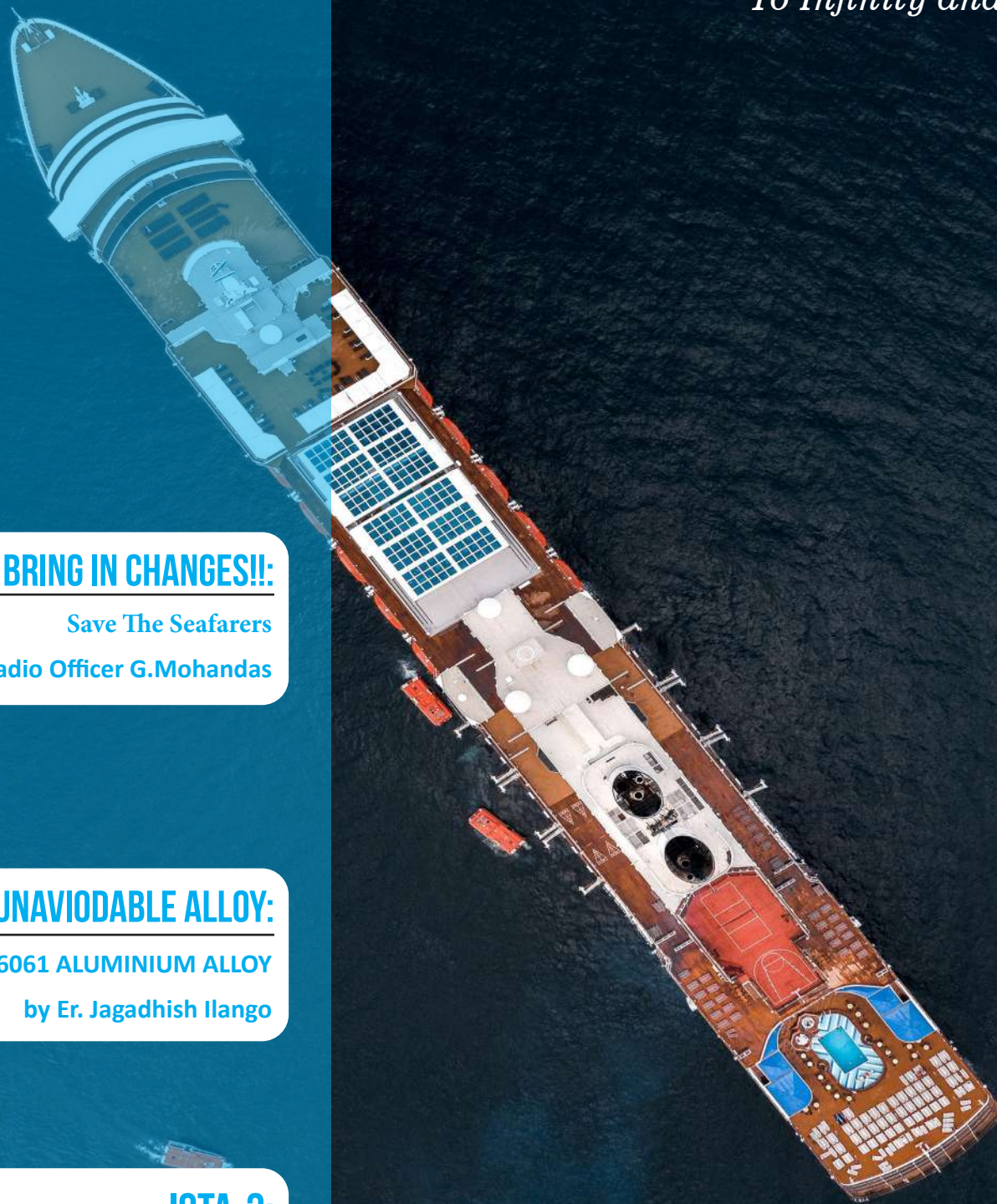
## **FUTURE UNAVOIDABLE ALLOY:**

6061 ALUMINIUM ALLOY  
by Er. Jagadhish Ilango

## **IOTA-3:**

Future Ship Evolution  
by Ch.Er.Abdul Rasheed

JANUARY 2024  
5th Digital Edition  
Article



## EDITORIAL POLICIES

PMA and its Pendulum magazine and web adhere to the following principles:

1. Provide accurate, verified, and engaging reports.
2. Maintain fairness and impartiality in coverage.
3. Publish stories regardless of potential dissent or controversy.
4. Follow legal, objective, accurate, and ethical journalism standards.
5. Avoid unnecessary profanity; editors will decide what qualifies.
6. Edited quotes for profanity will be noted and shared with sources for approval.
7. Journalists can request non-profane quotes when necessary.
8. Letters, opinions, and commentaries are from contributors or invited experts.
9. Cover community, state, national, and international news relevant to readers.
10. Reserve the right to withhold or request revisions for unprotected speech or grammatical errors.

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## Editorial Board



## Message from Chief of Editor

**Mrs. Arul Josphin Mary | Director of PMA  
Chief of Editor**

On behalf of our editorial team, I would like to offer a word of thanks to our reader, data contributors, marine authors, editors and anonymous reviewers, all of whom have volunteered to contribute to the success of the magazine and for its mission towards in the maritime education and research. Without research, education system cannot be fulfilled to meet the industry requirements **IMO's** dream about **GREEN VOYAGE 2050** and government of the India dream about **MARITIME INDIA VISION 2030**, we encourage contribution to ensure continuity of a successful maritime magazine We also welcome comments, suggestion that could improve the quality of the magazine Thank you, we trust and hope will find the magazine more informative in the future / ahead endeavor.

## Editorial board Members



**Capt. Suresh Jagadeesan**  
Principal - **LEAD EDITOR**



**Ch. Er. Abdul Rasheed**  
Faculty - **EDITOR**



**Er. Maheshkumar Anbalagan**  
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**Mr. G. Mohandass**  
**SECTION EDITOR**



1. Know Your Law
2. Fancy or Fantasy V.1
3. Lesson Learnt From Mistake
4. Bring In Changes!! Save The Seafarers
5. The Marine Ship Propellers
6. Future Unavoidable Alloy In Shipping
7. Artificial intelligence controlled ships era (iota-3)

# Know Your Law

## NATIONAL SHIPPING BOARD

Establishment of National Shipping Board

To provide for registration, Certification, safety and security of Indian ships and generally to amend and consolidate the law relating to merchant shipping.

Board Members:

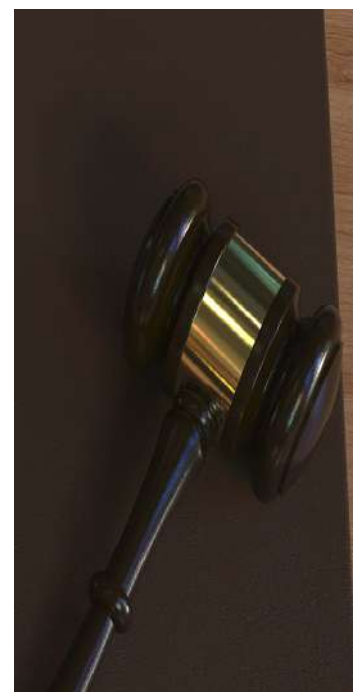
- Six members elected by parliament, four by house of the people from among its member and other two by the council of states from among its member
- Such number of other members not exceeding sixteen as the central government may think fit to appoint the board to represent: -
  - > The Central Government
  - > Shipowners
  - > Seamen
  - > Other interest (represent by Central Government)
- Central government shall nominate one of the members of the board to be the Chairman of the board,

### FUNCTIONS OF NATIONAL SHIPPING BOARD:

- On matters relating to Indian Shipping, including the development.
- On such other matters arising out of this act (Merchant Shipping Act 1958) as the central government may refer to it for advice



*Ch. Er. Abdul Rasheed*





## February Month Birthday



**Mr. Manikandan**

02-Feb



**Er. Sudhakar Veerappan**

03-Feb



**Mr. Antony John**

13-Feb



**Mr. Jayavel**

19-Feb



**Mrs. Sakshi Jain**

22-Feb

*“Cheers to more fun, more memories, and more cake!”*



## Fancy or Fantasy V.1

**Ch.Er. Pradeep Kumar M.S.**

**G**oogle’s Bard, the AI language model, has taken a significant leap forward by integrating with YouTube. This integration, announced in November 2023, allows Bard to not only access but also understand the vast amount of information contained within YouTube videos. This marks a major turning point in AI technology, potentially revolutionizing how we interact with information.

You can use Bard to brainstorm ideas, write stories, create content, and more. To use Bard, you need to sign in with a Google account and enable the Bard extensions that you want to use.

Google Bard can tap into its existing services: Google Flights, Hotels, and Maps, plus personalized information stored in Google Workspace.

You have the option to turn these on and off via the Bard extensions page. These extensions can help you plan your trips, book your accommodations, and navigate your destinations with ease.

You can also use Bard to access your Google Workspace documents, calendars, contacts, and more. This enables Bard to provide truly individualized experiences, based on the data, Google collected on you, over its existence.

But it’s YouTube’s Bard extension that holds the most promise. With this extension, you can use Bard to search for YouTube videos, watch them, and even create your own. You can ask Bard to find videos related to your interests, hobbies, or queries.

# FUN FACTS

You can also ask Bard to generate video scripts, captions, thumbnails, and titles for you. You can then use Bard to upload your videos to YouTube and share them with your audience.

YouTube's Bard extension is a powerful tool for content creators, educators, learners, and anyone who wants to explore the world of video. You can use Bard to discover new videos, learn new skills, express your creativity, and have fun. Bard is more than just a chatbot, it is your AI companion.

***Bet you didn't know.....***

**Hot water will turn into ice faster than cold water.**

An observation conducted in which a liquid (typically water) that is initially hot can freeze faster than the other liquid which is cold under similar conditions.



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| 2                     | STSDSD      | 04,10,17,24,30 | 06,13,20,27    |
| 3                     | PSFC        | 04,11,18       | 01,08,15,22,29 |
| 4                     | PSSR        | 08,22          | 05,19          |
| 5                     | EFA         | 04,18          | 01,15,29       |

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| 3                         | R-MFA      | 10,18,24,31 | 07,14,21,28 |
| 4                         | R-MEDICARE | 17,31       | 14,28       |
| 5                         | RUTC(ENG)  | 03,10,17,31 | 07,14,21,28 |
| 6                         | RUT(DECK)  | 08,22,29    | 05,12,19,26 |
| 6                         | R-FPFF     | 09,16,23,30 | 06,13,20,27 |
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| 2              | GTFC   | 02,16,29    | 12,26       |
| 3              | TASCO  | -           | 12          |
| 4              | GASCO  | 16          | 26          |
| 5              | CHEMCO | 29          | -           |

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# 2024

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# Structural Damage During Deviation

A vessel was departing from a river port, with Pilot onboard and a tug aft. Winds were southerly and moderate, and there was a northerly current setting. The vessel was taken off the berth and started turning to port.



With the tug pushing at the starboard bow, the vessel was now moving aft at 2.4 knots. After turning about 60° to port, the current and wind started moving the vessel to the north. As she turned about 90°, vessel came 10m near a dolphin on the starboard bow. Despite the tugs push and vessel manoeuvre, the vessel kept drifting, and her starboard bow brushed against the mooring dolphin. The hull was damaged due to the impact.

## Lessons learned form Mistake

- In a very restricted waterway and with strong wind and current conditions, the use of one tug is a hazardous decision.
- Plan a manoeuvre beforehand with ambient conditions in mind. The vessel had to turn 180° and at one point was perpendicular with the current in a restricted channel. The tug could not overcome the forces pushing the vessel to north.



*Capt. Moovendhan J*



*Bring In Changes!! Save The Seafarers*

*Mr. Mohandass - Radio Officer*

Years before, I sent an e-mail to IMO and requested them to find innovative methods to deal with ENCLOSED SPACES onboard ships to minimize the human entry. As an unusual practice of IMO, I did receive a reply with a long list of STCW courses where this ENCLOSED SPACE ENTRY procedure is taught to seafarers. (We all know that IMO do not communicate with any individuals other than Governments and few NGOs)

Now that INDIA is in the IMO Council, more importantly our beloved Capt. Dr. Daniel Joseph is one of the key personalities in this Council, which is the Executive body of IMO; we should take this opportunity to bring in changes to various problems faced by seafarers.

One of the main areas of concern is the fatalities in enclosed spaces which must be stopped.

Therefore, I feel it is imperative, since we do have many associations in India where all manager level seafarers such as CMM(I), IME (I) do meet and discuss various useful topics.

Please take this topic for discussion and may think in line of introducing Robots, drones, AI and other innovative methods, thereby minimizing the presence of humans in enclosed spaces onboard ships.

The solutions and/or suggestions may be sent as mail to Capt (Dr) Daniel Joseph DDG Tech, Nautical Surveyor MMD, Mumbai, DG Shipping. , who is also a member of CMM (I), Pondicherry Chapter.



*Capt. Suresh Jagadeesan*

# *The Marine Ship Propellers*

## **INTRODUCTION**

When we think of modern marvels, we often overlook the extraordinary engineering behind marine ship propellers. These unassuming devices play a critical role in the maritime industry, propelling colossal vessels across the vast expanse of our oceans. In this article, we will delve into the fascinating world of marine ship propellers, exploring their design, evolution, and the pivotal role they play in the shipping industry.

## **THE BASICS OF SHIP PROPELLERS**

Ship propellers are essential components of virtually all seafaring vessels, from small fishing boats to massive cargo ships. They are tasked with converting the engine's power into forward or backward thrust, allowing ships to move through the water with efficiency and control.

## **DESIGN AND FUNCTION**

Marine ship propellers come in various designs, but the most common type is the screw propeller, which resembles a rotating fan with multiple blades. These blades are carefully designed to optimize hydrodynamic performance and ensure maximum efficiency. Factors such as blade shape, size, and the number of blades all play a crucial role in how efficiently a ship can move through the water.

The evolution of ship propellers has seen numerous innovations, including the transition from fixed-pitch propellers to controllable-pitch propellers, which offer enhanced maneuverability and fuel efficiency. In addition, materials used in propeller construction have evolved, with modern propellers being made from highly durable and corrosion-resistant materials like stainless steel.

## **EFFICIENCY AND FUEL SAVINGS**

The efficiency of a ship's propeller directly impacts fuel consumption and, subsequently, the environmental footprint of the maritime industry. Researchers and engineers constantly seek ways to optimize propeller designs to reduce drag and increase thrust, resulting in significant fuel savings. These innovations are crucial as the industry looks towards greener and more sustainable shipping practices.



## SIZE MATTERS

The size of a ship's propeller is directly proportional to the vessel's size and power requirements. Larger vessels necessitate larger propellers, which are designed to move vast quantities of water efficiently. The monumental propellers of container ships can be several meters in diameter and are true engineering marvels in their own right.

## ENVIRONMENTAL CONSIDERATIONS

As the world grapples with environmental challenges, the maritime industry is under increasing pressure to reduce emissions. Ship propellers are not exempt from this scrutiny. Researchers are exploring alternative propulsion methods, such as electric propulsion systems and the use of renewable energy sources like wind and solar power. These innovations could lead to more environmentally friendly and sustainable shipping practices in the future.



## THE ROLE OF TECHNOLOGY

The integration of technology into the world of marine ship propellers has revolutionized the industry. Advanced control systems allow for precise adjustment of propeller pitch, optimizing performance and reducing fuel consumption. Furthermore, the use of sophisticated simulations and modeling techniques enables engineers to design propellers that are tailored to a specific vessel's requirements.

## CONCLUSION

Marine ship propellers are the unsung heroes of the maritime industry, silently powering the movement of goods and people across the world's oceans. Their design and efficiency are crucial to reducing fuel consumption, minimizing the industry's environmental impact, and ensuring the smooth operation of our global supply chain. As we continue to innovate and strive for greener practices, ship propellers will play a vital role in shaping the future of the shipping industry. Their evolution and the integration of technology promise a more sustainable and efficient future for maritime transportation.



*Er. Jagadhish Ilango*

## *Future Unavoidable Alloy In Shipping*

### **6061 ALUMINIUM ALLOY**

In General, if you reduce 1 MT weight in Machinery space you can carry same amount of cargo. So, the Research and development works on this basic. Evolution of Metals made a key role in World War for the invention of new metals as per the industry need and requirements. In this Article we are going to discuss about the aluminium alloy, a light weight material already conquered bicycle and automobile industry. same we can expect in a couple of years in the shipping industry one the manufactures cost reduced by some alternate way of production.

An Alloy is a metal made by combining two or more metallic elements to achieve improved material properties. The process of alloying involves adding specific metallic “alloying” elements into a base metal to give it distinct properties such as increased strength, corrosion resistance, conductivity, toughness, etc., or a desired combination of these traits. Aluminium metal and its alloys are implemented in most, if not all modern industrial processes due to its wide availability and the vast number of uses. The Aluminium Association (AA Inc.) is the foremost authority on and has developed a four-digit naming system used to characterize distinct wrought alloys from one another based on their main alloying elements. In this article, 6061 aluminium alloy will be discussed in detail, highlighting its physical properties.

Alloys with low percentages of alloying elements (around greater than 4%) are classified into wrought alloys and are workable, whereas those with higher percentages (up to 22%) are classified into cast alloys and are usually brittle.

#### **PHYSICAL PROPERTIES OF 6061 ALUMINIUM**

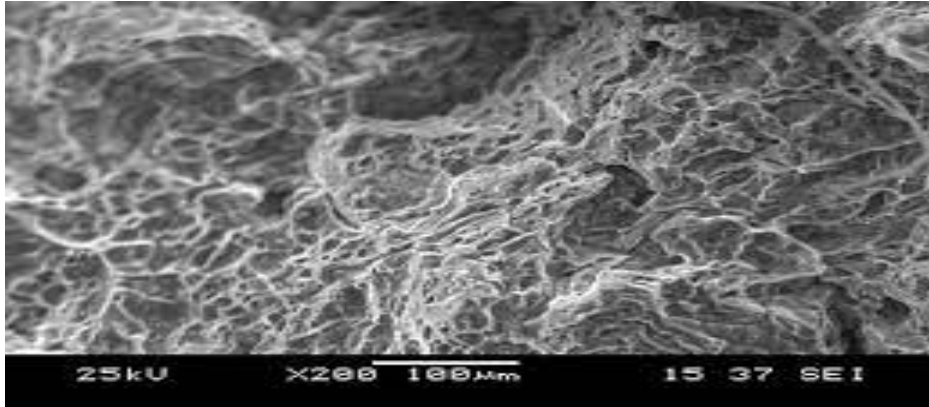
6061 aluminium alloy is heat treatable, easily formed, weld-able, and is good at resisting corrosion. The third and fourth digits are simply designators for individual alloys (note that this is not the case with 1xxx aluminium alloys).

The second digit indicates the degree of impurity control for the base aluminium. When this second digit is a “0”, it indicates that the bulk of the alloy is commercial aluminium containing its existing impurity levels, and no special care is needed to tighten controls.

Type 6061 aluminium is of the 6xxx aluminium alloys, which entails those mixtures which use magnesium and silicon as the primary alloying elements. The nominal composition of type 6061 aluminium is 97.9% Al, 0.6% Si, 1.0%Mg, 0.2%Cr, and 0.28% Cu. The density of 6061 aluminium alloy is 2.7 g/cm<sup>3</sup>.

## CORROSION RESISTANCE

The amount of corrosion resistance is dependent upon atmospheric/aqueous conditions; however, under ambient temperatures, corrosive effects are generally negligible in air/water. 6061 is particularly good at resisting corrosion from concentrated nitric acid as well as ammonia and ammonium hydroxide. The corrosive effects can be removed entirely by coating the alloy with a protective layer, to which 6061 alloy responds well. When exposed to air or water, 6061 aluminium alloy forms a layer of oxide which renders it nonreactive with elements that are corrosive to the underlying metal.



Scanning Electron Microscopic Image of 6061 Aluminium Alloy

## SUMMARY

The 6061 aluminium alloy is one of the most common and versatile for extrusion. It is generally referred to as structural aluminium since its strength makes it ideal for structural applications. However, because of its good combination of properties, it can also be used in a variety of project types.



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# Artificial intelligence controlled ships era (iota-3)

Ch. Er. Abdul Rasheed

## Future Ship Evolution

### {DIGITAL SHIP}

#### Short Term Evolution

Expected Year - (2022-2026)

#### CONVENTIONAL SHIPS

Intelligent Sensor, Satellite Communication, IOT , Remote Maintenance

#### MASS

Remote Controlled



### {INTELLIGENT SHIP}

#### Mid Term Evolution

Expected Year - (2027 – 2030)

Big Data Analytics, AI , Remote Operation And Control

#### MASS

Reduced Crew



### {SMART SHIP}

#### Long Term Evolution

Expected Year - (2031- 2040)

Robotic Technologies AR , VR, Zero Or Near Zero Emission Technonologies

#### MASS

Fully Autonomous





# Pongal Celebration





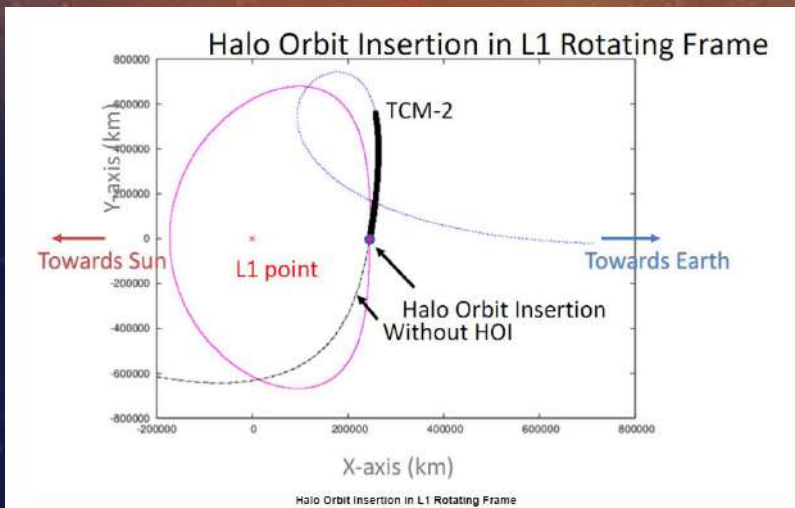
# ADITYA-L1

## Halo-Orbit Insertion Successfully Accomplished

### Halo orbit insertion

The halo orbit insertion process commenced as the spacecraft crossed the XZ plane in the Sun-Earth- L1 rotating system, with the required orbital state. The insertion maneuver is essential to nullify the X and Z velocity components and attain the required Y-velocity in the L1 rotating frame for the required Halo orbit. The targeted Halo-orbit for Aditya-L1 is  $A_x$ : 209200 km,  $A_y$  : 663200 km and  $A_z$  : 120000 km (The semi-axes of the 3-dimensional Halo orbit-refer figure).

The insertion of Aditya-L1 into this Halo orbit presents a critical mission phase, which demanded precise navigation and control. A successful insertion further involved constant monitoring along with the adjustment of the spacecraft's speed and position by using onboard thrusters. The success of this insertion not only signifies ISRO's capabilities in such complex orbital manoeuvres, but it but gives confidence to handle future interplanetary missions.



The picture below shows the Halo orbit insertion process graphically in a two dimension picture. The Aditya-L1 spacecraft was moving from Earth towards the L1 point in the direction of Sun.







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