

V.O. Chidambaranar Port, India's First Digital Twin Port

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V.O. Chidambaranar Port Authority has become the first port in India to launch a Digital Twin initiative for port management.

What is a Digital Twin?

A **Digital Twin** is a **virtual, real-time digital replica of a physical system or infrastructure**. It uses **sensors, data analytics, and simulation tools to mirror real-world operations in a digital environment**.

In the context of ports, the **Digital Twin platform creates a live virtual model of the port's infrastructure, operational assets, vessels, and logistics activities**. By continuously collecting and analyzing data from different sources, it **allows port authorities to monitor operations in real time and make informed decisions**. The Digital Twin system **integrates several advanced technologies** that help capture and analyze real-time operational data. These include:

- **Internet of Things (IoT)** sensors for monitoring equipment performance and environmental conditions.
- GPS tracking to monitor vessel movements and cargo logistics.
- LiDAR mapping for accurate spatial mapping of port infrastructure.

- Drone imaging for aerial monitoring and inspection of facilities.
- CCTV networks for continuous operational surveillance.
- Artificial Intelligence and data analytics for predictive insights and decision-making.

Together, these technologies enable a continuous flow of data that mirrors real-world port operations in the digital system.

Benefits of the Digital Twin Platform

The Digital Twin platform offers several operational and strategic benefits that can significantly improve the efficiency, safety, and sustainability of port management.

- **Real-time operational monitoring:** Enables continuous tracking of berth occupancy, vessel movements, crane utilisation, and yard capacity, thereby improving operational visibility.
- **Predictive maintenance:** AI-based monitoring helps identify potential equipment failures in advance, reducing downtime and improving reliability of cargo handling operations.
- **Optimised vessel scheduling:** Facilitates efficient planning of ship arrivals and cargo operations, helping reduce port congestion and waiting time.
- **Reduced vessel turnaround time:** Improved coordination and monitoring can reduce vessel turnaround time by up to 25%, enhancing port efficiency.
- **Enhanced operational safety:** Real-time alerts and monitoring mechanisms help detect risks early and improve overall safety standards.
- **Energy efficiency and emission reduction:** The platform tracks energy consumption and emissions, supporting environmentally sustainable port operations.

The initiative aligns with the broader goals of **India's maritime policy framework** and supports the objectives of **Maritime India Vision 2030** and **Amrit Kaal Vision 2047**, which aim to modernise the maritime sector and enhance the global competitiveness of Indian ports.

About V.O. Chidambaranar Port

V.O. Chidambaranar Port, located in Thoothukudi in Tamil Nadu, is one of the major ports of India and plays an important role in facilitating maritime trade in the southern region of the country.

- It is **one of the 12 major ports of India**, located in Thoothukudi in Tamil Nadu along the Gulf of Mannar.
- Earlier known as Tuticorin Port Trust, it was **renamed in 2011 after freedom fighter V. O. Chidambaram Pillai**.
- The port functions under the administrative control of the **Ministry of Ports, Shipping and Waterways**.
- It is an **all-weather artificial deep-water port**, which allows ships to operate throughout the year.
- The port is an **important gateway for trade in South India**, handling cargo such as coal, containers, fertilizers, petroleum products, and other bulk cargo.
- It plays a key role in supporting industrial and export activities in southern India and contributes significantly to the country's maritime trade.