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Four ways your data center can benefit from digital twins

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Summary

Since the 1990s, manufacturing companies and data centers have relied on digital twin technology to plan, test and execute their processes virtually. In a recent study, Gartner, Inc. predicted that, by 2021, half of large industrial companies would be using digital twins—which would generate a 10 percent performance improvement in effectiveness (Pettey, 2017).

This paper examines four ways in which new or existing data centers can experience an improvement in effectiveness and planning by incorporating digital twins into their processes.

What is a digital twin?

If this is your first time hearing the term digital twin, you may be wondering what it is. While the term digital twin has been used for more than 30 years in the computer-aided design (CAD) arena, and by NASA who uses them to virtually examine a piece of equipment when they can't physically examine the asset, the term has only recently begun gaining popularity in other industries.

Digital Twin in iTRACS | Real-life scenario

Digital twin is simply a virtual representation of a physical component, from which data associated with the object allows for a better exploration and understanding by providing historical, current operating performance and future trend predictions. The data associated with digital twin technology is often used in simulations and "what-if" scenarios to better guide decision making on the asset itself and the organization as a whole.

Benefits of digital twin technology

There are a number of benefits to incorporating digital twins into a data center. By creating a virtual replication of a real-world asset, companies can simulate real-world situations and collect valuable data on expected performance before any equipment installation occurs.

1 Improve the ability to test, analyze and optimize

One of the most obvious benefits is that it allows you to optimize your assets. By creating a digital twin based on a real-world asset, you can test and optimize the virtual representation of the physical asset before any real-life commissioning takes place.

Implementing the asset virtually allows you to test for space, power and capacity requirements before actually consuming these finite resources in the real world.

Performance can be optimized through actionable insights from the data associated with a digital twin. A connected view of all assets in a virtual environment allows you to view underperforming assets and test simulations to find a better configuration for performance and efficiency.

Digital twins implemented in a common environment allow you to eliminate data silos and unlock value across an entire project's lifecycle by having all historical and real-time data in a single location.

2 Be proactive instead of reactive

Digital twins allow you to be proactive rather than reactive with regards to scheduling, maintenance and changes to requirements within your data center over time. Scheduling of maintenance tasks can be tracked against the digital twin itself—keeping aligned with the idea that all data about an asset is tracked via the digital twin. Assigning all work to be done against the digital twin ensures scheduling happens in a single location.

Beyond scheduling and maintenance, digital twins make being proactive about upcoming space, power, and capacity requirements a breeze. Ever-changing data that is stored against a digital twin can be recorded, which can give a clearer picture of how well a space is utilized, and the rate of change can predict when additional space may be needed or power requirements may need to be adjusted.

A digital twin can be used to run simulations to test for possible outages and uncover weaknesses before a real-life disaster occurs.

For assets that already exist and have a digital twin associated with them, a digital sibling (Rasheed & Kvamsdal, 2020) can be created and can be used to run scenario and risk assessments. A digital sibling is a copy of the digital twin in which different parameters and data points have been assigned to test various "what-if" scenarios. These scenario tests allow you to validate that the changes you are about to perform on the real-world counterpart will prove to be beneficial before spending the time and money resources required to implement these changes.

3 Improve documentation, communication and reporting

Using digital twins can support a more efficient and informed decision support system. A digital twin can deliver a virtually infinite amount of data points, including:

- Conveying information between parties
- Providing a view into the historical, current and future requirements of the asset
- Reporting on the data for informed business decisions

Having all parties reference the digital twin means everybody sees the same view of the asset. If all operating data is fed into the digital twin, then it no longer matters if the person examining the asset is physically at the site location or on the other side of the globe. The digital twin acts as the single source of truth for that particular real-world counterpart.

Since a digital twin contains all of the past and current information about an asset, it makes it easier to make predictions about that asset. The historical data saved against an asset can be used to plot trends into the future to make various predictions. For example, you may be able to understand the rate of capacity increasing or decreasing, and therefore be able to make informed decisions as to when additional space will need to be allocated.

All of this data can be collected so individuals at different levels within the organization's hierarchy can understand the current state of an asset and a location as a whole.

4 Improve interoperability

At the heart of utilizing a digital twin is data. This data can be incorporated into existing business workflows easily. It is much simpler for an organization to implement and begin drawing useful information from a digital twin when they can access and use that data in other areas of the business workflow.

Having a common, open, well-documented and easy-to-use application programming interface (API) achieves this goal. Ideally, the API should follow standards already used commonly throughout the industry, such as a RESTful API. A well-documented RESTful API should come with examples that make it simple to retrieve, update, and delete data against a digital twin.

Being able to extract the necessary data held against a digital twin allows that data to be loaded into other existing business workflow applications. This removes the need to implement entirely new software, which may have a higher level of effort to switch to completely.

Extracting and adding the data to existing business systems through straightforward APIs significantly reduces the need for additional training and workflow changes and allows budgets to be pointed to more mission-critical requirements.

In addition, simple, well-documented APIs make it easier to extract data that is useful for reporting purposes. When the data is easier to extract and manipulate into the desired format, reporting becomes much easier, takes less time and provides more opportunities for spotting areas of improvement.

Appendix

Pettey, Christy. (2017). Prepare for the Impact of Digital Twins

A. Rasheed, O. San and T. Kvamsdal, "Digital Twin: Values, Challenges and Enablers From a Modeling Perspective," in IEEE Access, vol. 8, pp. 21980-22012, 2020, doi: 10.1109/ACCESS.2020.2970143.

Contact information

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