/Ansys

ENVIRONMENTAL SUSTAINABILITY IN FOCUS

SIMULATION PRODUCT HANDPRINT:
DIGITAL TWINS

Ansys is the global leader in engineering simulation software and services widely used by engineers, designers, researchers and students across a broad spectrum of industries and academia, including aerospace and defense, automotive, electronics, semiconductors, energy, materials and chemical processing, turbomachinery, consumer products, healthcare and sports.

Engineering simulation is the application of physics-based software solutions across the product lifecycle from ideation, to design, manufacturing and operation, enabling engineers to virtually test operational performance and predict how product designs will behave in real-world environments. Applying engineering simulation solutions significantly reduces cost, shortens time to market and reduces risk of failure by improving product quality.

Ansys is committed to the conservation and sustainability of the planet's resources by operating our business in ways that reduce our environmental impact and carbon footprint. As part of Ansys' environmental sustainability efforts, we submit to the Carbon Disclosure Project (CDP) annually and are committed to taking steps to measure and mitigate the carbon footprint of our operations.

As the global leader in simulation software, Ansys is well positioned to also provide technology solutions that support and enable the sustainability goals of our customers across diverse industries. ***Our solutions can have a positive impact on the environment by helping our customers*** to reduce their use of resources while increasing their efficiency and productivity. Discovering and implementing efficient means of innovative product design and operation — with minimal use of physical resources — is at the very heart of our vision of pervasive simulation.

While measuring and reducing our own environmental impact is essential, the benefits from this process are finite. By contrast, our ***product handprint*** — the use of simulation by customers to reduce their own carbon footprint and the footprint of their products — is nearly infinite. Here we present one in a series of use cases illustrating how Ansys simulation creates these handprint benefits.

PRODUCT
HANDPRINT
INITIATIVE

USE CASE / **INDUSTRIAL DIGITAL TWINS**

A digital twin is a virtual representation of a physical asset in operation. Sensors on the physical asset — such as a manufacturing machine or wind turbine — transmit data regarding the status of the asset back to the virtual digital twin. These sensor-equipped assets and data they communicate are part of the industrial internet of things (IoT). In a sense, the digital twin "ages" in step with the real asset.

Engineers can use the digital twin to monitor and optimize the asset's performance, identify trends in the data, and detect any potential problems before they become critical. They can plan to repair or replace a failing component at the next scheduled shutdown, instead of making an unplanned shutdown, which is costly and time-consuming.

A simulation-driven digital twin, such as one made using Ansys Twin Builder, enables engineers to explore "what if" scenarios. Starting with the current state of the digital twin, which mirrors that of the physical asset, they can run physics-based simulations to determine what would happen if they reduced the speed of rotation of a component, or increased the temperature of a process, or reduced the pressure in a section of the machine, just to give a few examples. These simulations leverage machine learning, predictive analytics, and data modeling. By testing proposed changes virtually, they can see the results before making any changes to the physical asset and be assured that the change will be safe and beneficial to operations.

REDUCING INDUSTRIAL EMISSIONS / **USING DIGITAL TWINS**

Digital twins can reduce GHG emissions by:
• Managing the operation of assets, resulting in lower energy consumption
• Extending the useful life of an asset, saving the manufacturing emissions associated with building a new asset
• Preventing fugitive emissions through real-time monitoring of emissions and potential leakages

ANSYS TWIN BUILDER IS CRUCIAL / **TO BUILDING AND OPERATING A DIGITAL TWIN**

Ansys Twin Builder helps engineers to model the system that will be represented by a digital twin, including integration of the model with software control solutions, system libraries, input/output ports, and third-party tools to monitor the state of the asset. By partnering with technology leaders like PTC, SAP, Microsoft, and Rockwell Automation, Ansys adds proven solutions for the data analytics and IIoT concerns to make the complete digital twin package.
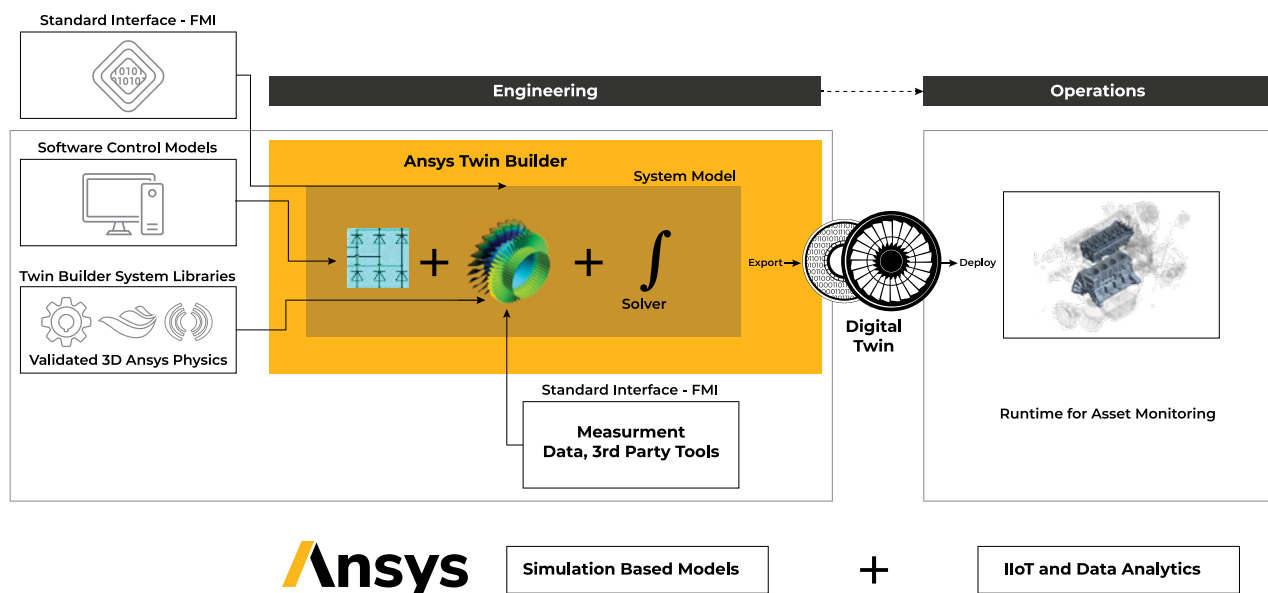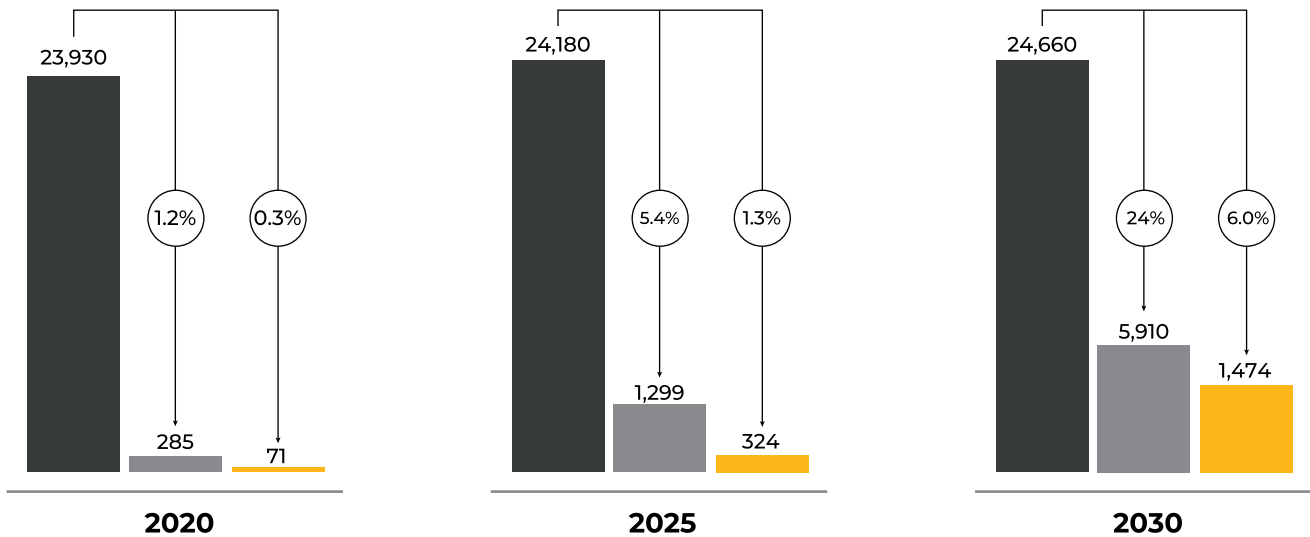
*"By 2022, **40%** of IoT platform vendors **will integrate** simulation platforms, systems, and capabilities to create digital twins. **70%** of manufacturers will be using the technology to conduct process simulations and scenario evaluations."*

- IDC, January 2020[1]

*"By **2022**, over **2/3** of companies that have implemented IoT (internet of things technologies) will have deployed **at least one digital twin** in production."*

- Gartner, February 2019[2]

Increased digital twin deployments are expected to have an incremental impact on emission savings, with the savings contribution increasing from 0.3% in 2020 to ~6% in 2030.[3]

	2020	2025	2030
Total Emissions	23,930	24,180	24,660
Emissions Saved by Digital Initiatives	285 (1.2%)	1,299 (5.4%)	5,910 (24%)
Emissions Saved by Digital Twin	71 (0.3%)	324 (1.3%)	1,474 (6.0%)

- Total Emissions
- Emissions Saved by Digital Initiatives
- Emissions Saved by Digital Twin

Digital Initiatives includes robotics, automation, 3D Printing, Connected Factories, Industrial IoT, etc.

EFFICIENCY GAINS

*"By **2021**, half of large industrial companies will use digital twins, resulting in those organizations gaining a **10% improvement in effectiveness**."*

- Gartner[4]

PRODUCTIVITY GAINS

*"30% of Global 2000 companies will be using data from digital twins to improve product innovation success rates and organizational productivity, **achieving gains of up to 25%**"*

- IDC[5]

OIL & GAS ENVIRONMENTAL SAVINGS

*"Potential of savings of 350 MTCO2e, equivalent to **cost savings of ~$100 billion** from 2016 to 2025 in **Oil an Gas industry** due to increased adoption of digital twins."*

- World Economic Forum[6]

Power Generation[7]	An international power generation company used digital twins to optimize turbines to changing wind conditions and orchestrate the interaction of individual twins on-site. This led to: • 5% additional output from wind farm • Reduced service disruption and maintenance hours
Mining[8]	A major mining company installed digital twins at their 2 mining sites in 2016 to optimize the mining fleet and plans to install them across its entire business. They expect: • >15% improvement in productivity • >15% improvement in cost savings
Auto Manufacturing[9]	A renowned automobile manufacturer used digital twins across its value chain which helped increase the number of models. They achieved: • 30% reduction in factory energy cost • 40% reduction in development time
Aviation[10]	By using digital twin asset development model to manufacture commercial and military airplanes, a major aerospace company achieved: • 40% improvement in first-time quality of the parts and systems

"Ansys is at the forefront of global digital twin innovation, making it easier than ever for customers to adopt digital twin technologies."

- Dr. R. Soley, E.Dir, Digital Twin Consortium and CEO, Object Management Group[13]

References

(1)   Digital Twins: Bridging the physical and digital, IDC - July 2020

(2)   Gartner Survey Reveals Digital Twins are Entering Mainstream Use, Gartner - February 2019

(3)   Based on Evalueserve calculations and report commissioned by Ansys

(4)   Prepare for the Impact of Digital Twins, Gartner - September 2017

(5)   IDC FutureScape: Worldwide IoT 2018 Predictions, IDC - October 2017

(6)   Digital Transformation Initiative — Oil and Gas Industry, World Economic Forum - January 2017

(7)   Delivering a Digital Twin, GE Digital - November 2017

(8)   Anglo Using 'Digital Twins,' Robotics to Boost Mining: Q&A, Bloomberg NEF - February 2018

(9)   Unlock the Potential with Digitalization, Siemens - 2018

(10)   Boeing CEO Talks 'Digital Twin' Era of Aviation, Aviation Today - September 2018

(11)   Ansys, Microsoft, Dell and Lendlease Unite to Expedite Digital Twin Adoption, Ansys - May 2020

Questions?

Please contact our corporate responsibility coordinator at:
corporateresponsibility@ansys.com.

Investor Contact

Kelsey DeBriyn
Vice President, Investor Relations

724.820.3927
kelsey.debriyn@ansys.com

Visit www.ansys.com for more information.

/\nsys

ANSYS, Inc.
Southpointe
2600 Ansys Drive
Canonsburg, PA 15317
U.S.A.
724.746.3304
ansysinfo@ansys.com