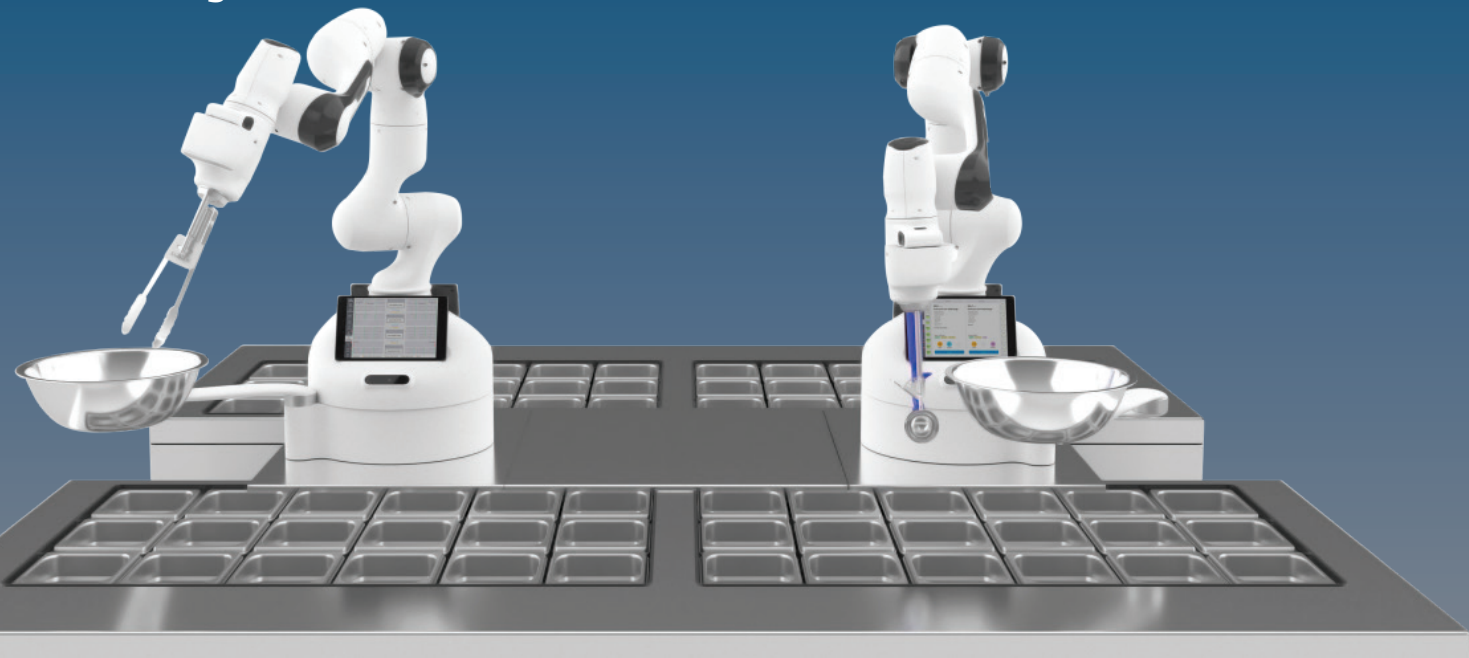**3S SOLID**WORKS

DEXAI ROBOTICS

DEXAI ROBOTICS
ACCELERATING DEVELOPMENT OF ALFRED, THE ROBOTIC SOUS-CHEF, WITH 3DEXPERIENCE WORKS SOLUTIONS

Case Study

Dexai Robotics added **3D**EXPERIENCE Works collaboration, PDM, and PLM solutions to its existing SOLIDWORKS installation to accelerate development of Alfred, the robotic sous-chef.

3S DASSAULT SYSTEMES

Challenge:

Accelerate the development of a robotic sous-chef for restaurant kitchens by acquiring collaboration, product data management (PDM), and product lifecycle management (PLM) capabilities.

Solution:

Add **3D**EXPERIENCE Works collaboration, PDM, and PLM solutions to its existing SOLIDWORKS installation.

Results:

- Increased design visibility and optimized design time
- Leveraged SOLIDWORKS digital twin for robot learning
- Doubled size of its product development team
- Moved from R&D to multiple restaurant placements

Dexai Robotics is revolutionizing the food industry through the development of Alfred, a robotic sous-chef that helps restaurants and commercial kitchens boost productivity while addressing many operational challenges specific to food service businesses. This sleek, hygienic robot operates using unique computer vision algorithms to provide seamless and efficient automated food preparation and can be deployed anywhere food is prepared. In developing robots that automate common kitchen tasks, Dexai is fulfilling its mission of safeguarding access to prepared food, enabling more affordable and sanitary meals, and helping food-related businesses overcome labor shortages while reducing the risk of food-borne illnesses through cutting-edge robotics and artificial intelligence.

Recipient of a 2020 Red Dot Design Award, Dexai's Alfred can fully assemble meals by working with any ingredient and utensil, in any existing commercial kitchen.

Alfred empowers kitchen staff to manage orders and robot activity, leveraging proprietary machine learning algorithms to reduce waste through accurate and consistent portion control, as well as provide restaurants with invaluable business analytics for better menu decision-making. Moreover, the robotic sous-chef helps short-staffed restaurants meet new health and safety guidelines as well as deal with long-standing hiring challenges.

According to Co-founder and CEO Dave Johnson, the idea for a robotic sous-chef arose from a chef friend who lamented that only a few minutes of his day were focused on hospitality and the majority was unfulfilling, repetitive work. "When we started the company, it was just four of us working out of the Greentown Labs technology incubator using SOLIDWORKS® design software," Johnson recalls. "But as we grew and continued to advance the technology, we realized that we would need product data management and product lifecycle management tools to continue to support growth."

Hardware Engineering Team Lead Justin Rooney began researching potential PDM/PLM solutions when SOLIDWORKS reseller Trimech informed him about the cloud-based **3D**EXPERIENCE® platform and **3D**EXPERIENCE Works collaboration and data management solutions. "As we started growing the hardware team, we needed reliable CAD storage, and the traditional data management solutions are built around expensive IT paradigms with server rooms and yearly software updates," Rooney recalls. "After thoroughly researching potential solutions, I discovered the **3D**EXPERIENCE platform. I was specifically attracted to the **3D**EXPERIENCE platform because it does not require servers or IT staff, and it integrates so well with SOLIDWORKS. Since the majority of our team has been using SOLIDWORKS for years, adopting the **3D**EXPERIENCE platform didn't require an additional training investment."

> "Our initial product feature was salad assembly, where the robot would scoop and pick romaine lettuce, tomatoes, and cucumbers, among other ingredients, to assemble into a meal. Due to health regulations, the robot needs to use separate utensils and return them to the respective areas to avoid cross-contamination that might trigger a food allergy. As we move onto other tasks, such as chopping, frying, and grilling, the combination of SOLIDWORKS and **3D**EXPERIENCE Works solutions are equipping us with the necessary tools to quickly roll out these capabilities."
>
> — Justin Rooney, Hardware Engineering Team Lead

EFFICIENT COLLABORATION SAVES DESIGN TIME

Since adding **3D**EXPERIENCE Works collaboration, product data management (PDM), and product lifecycle management (PLM) capabilities to its SOLIDWORKS installation, Dexai has continued to grow—more than doubling its staff from 10 to 22 and moving from R&D into many restaurant placements. The company utilizes the platform not only for product data and lifecycle management, but also to collaborate more efficiently and effectively. For example, because the solutions work over the cloud, a few designers can work concurrently rather than sequentially on different aspects of a design, saving design time in the process.

"There are three main phases in our hardware design process: functionality, reliability, and manufacturability. A designer will typically focus on each phase in sequence, all while keeping in mind usability," Mechanical Engineer Rana Odabas notes. "Working on the cloud has saved us considerable design time because we can have multiple people working on

the same project simultaneously. That's a huge improvement from the days when we were passing zipped CAD files back and forth over Slack. Back then, everyone only had a subset of the system on their local drive, which greatly impacted productivity, especially when understanding how various subsystems interfaced together and with the rest of the system. Using the **3D**EXPERIENCE Works PLM capabilities is paying real dividends in terms of our productivity."

LEVERAGING SOLIDWORKS DIGITAL TWIN

In addition to using the combination of SOLIDWORKS and **3D**EXPERIENCE Works solutions to develop its robotic sous-chef, Dexai leveraged a complete SOLIDWORKS CAD model of the robot—referred to as Alfred's digital twin—to teach the robot about itself to advance machine learning and nurture artificial intelligence. "One of the core decisions we made very early on is that the robot's digital twin is based on a SOLIDWORKS CAD model of the product," Johnson notes.

"We even use that SOLIDWORKS CAD model to tell the robot what it looks like, so the robot has this model of itself and knows where its arm and other parts are. We could then teach the arm how to prepare a meal or assemble a salad," Johnson adds.

MEETING ENGINEERING CHALLENGES NOW AND INTO FUTURE

Unlike most industrial robotics firms, Dexai faced additional engineering challenges while developing Alfred, since the robot operates in busy kitchens where many other people already work and needs to adhere to strict foodservice regulations. "We need to be extremely sanitary about how we design parts," Odabas stresses. "We're conscious of seams, gaps, and other spaces where food particles could accumulate or mold could grow, creating unsafe working conditions. This is important for the lifetime of the part, the safety of the kitchen staff, and the safety of the customers we're ultimately serving."

"Our initial product feature was salad assembly, where the robot would scoop and pick romaine lettuce, tomatoes, and cucumbers, among other ingredients, to assemble into a meal," Rooney adds. "Due to health regulations, the robot needs to use separate utensils and return them to the respective areas to avoid cross-contamination that might trigger a food allergy. As we move onto other tasks, such as chopping, frying, and grilling, the combination of SOLIDWORKS and **3D**EXPERIENCE

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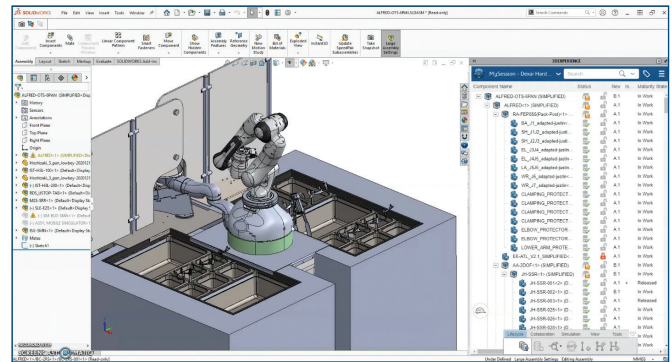
With **3D**EXPERIENCE Works solutions, Dexai Robotics improved collaboration and accelerated development of its robotic sous-chef while doubling the size of its product development team, enabling the company to move from R&D to multiple restaurant installations.

Our **3D**EXPERIENCE® platform powers our brand applications, serving 11 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the **3D**EXPERIENCE Company, is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations. By creating 'virtual experience twins' of the real world with our **3D**EXPERIENCE platform and applications, our customers push the boundaries of innovation, learning and production.

Dassault Systèmes' 20,000 employees are bringing value to more than 270,000 customers of all sizes, in all industries, in more than 140 countries. For more information, visit **www.3ds.com**.

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