



Stantec

Advanced Manufacturing





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#1

**TOP 300 A/E FIRMS,
BD+C 2023**

Our value comes from the breadth and depth of our services, our geographic reach, the experience of our entire organization, and the personal attention that comes with having a core team that understands your needs and goals.

We are Stantec

Creating communities is our purpose.
Designing with community in mind is our promise.

The Stantec community unites more than 28,000 employees working in over 400 locations. We collaborate across disciplines and industries to bring buildings, energy and resource, environmental, and infrastructure projects to life. Our work—professional consulting in planning, engineering, architecture, interior design, landscape architecture, surveying, environmental sciences, project management, and project economics—begins at the intersection of community, creativity, and client relationships. Creating communities is our purpose.

Designing with community in mind is our promise. Since 1954, our local strength, knowledge, and relationships, coupled with our world-class expertise, have allowed us to go anywhere to meet our clients' needs in more creative and personalized ways. With a long-term commitment to the people and places we serve, Stantec has the unique ability to connect to projects on a personal level and advance the quality of life in communities across the globe. Stantec trades on the TSX and the NYSE under the symbol STN.

Ⓢ BOMBARDIER AEROSPACE MANUFACTURING FACILITY

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28K EMPLOYEES **400** LOCATIONS **900+** AWARDS **1954** FOUNDED

We are ready to serve you

Whether selecting our integrated approach or complementing your current team with one of our specialized disciplines, we can provide integrated industrial architecture, engineering, and management services throughout the entire project cycle – regardless of location. From upfront analysis and evaluations, to detailed design documents and start-up through commissioning, our team will combine our world class expertise with our local knowledge to help your project succeed.

WORLDWIDE RANKINGS

- #1 | ARCHITECTURE / ENGINEERING FIRMS (2023), BUILDING DESIGN + CONSTRUCTION
- #1 | TOP 100 GLOBAL MOST SUSTAINABLE CORPORATIONS IN NORTH AMERICA (2022), CORPORATE KNIGHTS
- #1 | TOP 10 IN MANUFACTURING, TELECOM–MINING (2022), DESIGN, ENR
- #2 | INDUSTRIAL SECTOR ARCHITECTURE + AE FIRMS (2023), BUILDING DESIGN + CONSTRUCTION
- #2 | TOP 10 BY REGION–UNITED STATES (2022), INTERNATIONAL
- #4 | TOP 10 IN GENERAL BUILDING–DISTRIBUTION & WAREHOUSES (2022), DESIGN, ENR
- #4 | TOP 5 IN MANUFACTURING, TELECOM–ELECTRONIC ASSEMBLY (2022), DESIGN, ENR
- #5 | WORLD’S MOST SUSTAINABLE FIRM (2022), CORPORATE KNIGHTS
- #6 | TOP 10 BY MARKET–BUILDING (2022), INTERNATIONAL, ENR
- #8 | TOP 10 IN MANUFACTURING, TELECOM–AEROSPACE (2022), DESIGN, ENR
- #10 | TOP 10 IN MANUFACTURING, TELECOM–PHARMACEUTICALS (2022), DESIGN, ENR
- #10 | TOP 30 DATA CENTER SECTOR ARCHITECTURE + AE FIRMS

WANT A COMPETITIVE ADVANTAGE?

Stantec can help. Recognized worldwide for excellence in sustainability, functionality, engineering and cost-effective design—we're committed to helping you discover your competitive advantage, from initial concept to project completion.

Our passionate people develop integrated designs based on a deep understanding of markets, function, and best practices to help clients meet business objectives. Our team approach involves all stakeholders and disciplines to ensure environmentally, socially, and economically responsive design solutions.

Unique value

Supporting Your Vision

Stantec unites approximately 28,000 employees working in 400 locations across six continents. We collaborate across disciplines and industries to bring buildings, energy and resources, environmental, and infrastructure projects to life. Our work—engineering, architecture, interior design, landscape architecture, surveying, environmental sciences, project management, and project economics, from initial project concept and planning through design, construction, and commissioning—begins at the intersection of community, creativity, and client relationships.

Since 1954, our local strength, knowledge, and relationships, coupled with our world-class expertise, have allowed us to go anywhere to meet our clients' needs in more creative and personalized ways. With a long-term commitment to the people and places we serve, Stantec has the unique ability to connect to projects on a personal level and advance the quality of life in communities across the globe.

Enhancing Your Mission

Stantec helps industrial organizations around the world improve their operations and achieve long-term success through process improvements and our facility designs. Our approach involves understanding your vision, using spaces more effectively, reducing costs, and optimizing production flows.

Speed To Market

Not just fast, but right. Fast track has evolved into schedule stacking, which pulls both design tasks and construction activities out of their normal sequence. This allows projects to be completed faster but requires additional coordination to minimize the risks. Our integrated team approach ensures ongoing coordination and open communication with all stakeholders, while enabling our team to focus on the project's critical path tasks. Our experience with ultra-fast-track projects, and our ability to quickly engage additional team members helps Stantec meet our client's schedule needs on major projects and multi-site rollouts.



Efficiency By Design

We create value for you as our client. Combining our experience and understanding of your needs, we help you achieve high performance in safety, quality, and cost efficiency for industrial facilities.

Focused On What Matters

Our core values guide us in all that we do. The way we protect our people, our clients, and our communities reflects who we are, what we believe in, and how we do our work. At Stantec, we do what is right, which means our health, safety, and environmental programs are the foundations of our business.

- Health and Safety: ISO 45001:2018 Certified
- Quality Assurance and Control: ISO 9001:2015 Certified
- Environmental Services: ISO 14001: 2018 Certified

Sustainability

We believe sustainable design is a game-changer and essential in today's world. We believe it can defy expectations and propel our communities into the future. Informed by data and grounded in the market, we design to support human resilience, health, and wellness while delivering value through life-cycle cost analysis and reduction of energy and carbon use. We're also helping clients realize the full potential of their projects with designs that consider optimization of Building Automation System controls to allow connections to Smart Buildings.

Integrated Design Team

We assemble truly integrated design teams that actively involve all disciplines concurrently during design, versus a traditional approach to design sequencing. This helps us quickly and efficiently develop coordinated design solutions that meet each project's requirements. This integrated approach can reduce design time and cost, and produces better project outcomes for our clients. Our integrated project delivery services for industrial projects include:

- Facility design
- Feasibility and planning
- Optimizing production
- Process engineering
- Energy reduction and sustainable design
- Project and program management
- Environment, health, and safety
- Water treatment



Advanced Manufacturing

To secure a sustainable future for our planet, diversifying energy production is one of the most important global challenges we must solve in this decade. This future depends on advanced technology built on the other side of the world. With the resiliency and reliability of the global supply chain in question, there's a push to bring the technology closer to the end user while diversifying our energy supply in the process. If the technology we use to achieve the transition to renewable energy is closer to home, we stand a better chance of keeping up with demand while strengthening our economic security against foreign energy sources.

ADVANCED MANUFACTURING

Our advanced manufacturing experience includes three kinds of products: semiconductors, solar panels, and batteries for electric vehicles. These industrial projects include sophisticated robotic automation, contain hazardous material, and require wastewater mitigation and various levels of clean room space at a large scale. Semiconductors and solar panels use similar raw materials: primarily sand transformed into polysilicon.

Stantec provides semiconductors and related industries with engineering, design, and construction services. Our leadership in the areas of lean construction, virtual design, construction, and integrated project delivery drives out waste, reduces overall project costs, and compresses schedules. Delivering high-quality cleanroom facilities, processes and operations, process systems, process equipment layouts, process equipment installation design, and more—work together to facilitate a seamless, reliably executed, and fully supported from the start of design through commissioning and turnover.

Complex code issues often emerge during facility upgrades as occupancy requirements change, technology processes evolve, and improved facility optimization is required. Stantec brings experience to minimize the potential for delays and surprises to ensure that production requirements are achieved on schedule.





Stantec Services

ARCHITECTURE & INTERIOR

DESIGN BUILDINGS ENGINEERING

FACILITY DESIGN

FEASIBILITY & PLANNING

OPTIMIZING PRODUCTION

PROCESS ENGINEERING

EQUIPMENT DESIGN & CONTROLS

ENERGY REDUCTION

PROJECT & ASSET MANAGEMENT

ENVIRONMENTAL , HEALTH, & SAFETY

WATER & GEOTECHNICAL

- Architecture
- Asset Management
- Assessment and Permitting
- Bio-Process Engineering
- Carbon Capture, Utilization & Storage
- Civil Engineering
- Commissioning & Validation
- Control Systems Integration
- Construction Management & Inspection
- Data Analytics/Operations Research/Optimization
- Discrete Event Simulation & Static Modelling
- Electrical Engineering
- Energy Analysis
- Energy Reduction & Sustainable Design
- Environmental Approvals, Planning, & Compliance Services
- Facility Design & Engineering
- Functional Programming & Planning
- Industrial Process Engineering & Equipment Layouts
- Industrial Safety System Design & Regulatory Compliance Certification
- Information & Communications Technology
- Lean/Six Sigma/Continuous Improvement/Process Improvement/Operational Excellence
- Machine Design & Automation
- Machine Safety Risk Assessment
- Materials Management/Supply Chain/Logistics
- Mechanical Engineering
- Project Planning, Design & Delivery
- Project & Program Management
- Site Selection & Feasibility Studies
- Structural Engineering
- Sustainable Energy & Electrification
- Sustainability & Building Performance
- Time & Motion Study/Predetermined Motion-Time Systems/Engineered Labour Standards
- Work Productivity and Optimization
- Water Treatment
- Wastewater Treatment
- Work Methods/Human Factors Engineering/Ergonomics



Facility Design

Our integrated facility design approach is the foundation for success. Stantec offers financially sound, practical solutions to complex facility planning, process, and manufacturing challenges. To minimize delays, every project begins with a permitting plan and a systematic outline for working through the approval process with regulatory agencies. Stantec's depth of knowledge of local and federal requirements specifically includes: FSMA / FDA, CFIA, HACCP, GFSI (e.g., FSSC22000, SQF, BRC), AIB, and GMPs.

Firmly committed to continuous innovation, our design and project management approach is highly collaborative, creative, and visionary. Characterized by clear ideas rooted in deep understanding of context, function, and best practices, Stantec's designs meet our clients' business objectives.

Our design team works closely with our clients and their operations and maintenance personnel to develop modern production facilities built around the clients' process. We give special attention to developing unified facility design so lighting, HVAC, refrigeration, sanitation, and communication systems enhance the operation of the main process equipment.

Our engineers, architects and interior designers consider and respond to the safety, quality, and comfort of the work environment. From cost assessments to furnishings, Stantec plans with the client's goal in mind.

FACILITY DESIGN SERVICES

- New builds and expansions, and brownfield conversions
- Decommissioning
- Land development and rezoning
- Workplace design for offices, locker rooms, and cafeterias
- Landscape architecture, fencing, gates, and signage
- Architectural services and permitting
- Structural, mechanical, communication, and electrical building services
- Fire protection and HVAC systems, specialty exhaust
- Warehouse and office design
- Process utility piping
- Site servicing, paving, and grading
- Utility upgrades and connections
- Sanitary design for HACCP, GMP, and GFS
- Cost estimating
- Geotechnical and environmental services
- Traffic flow studies
- OSHA Occupational Safety
- Feasibility & Planning Services
- Strategic facility master planning
- Concept design and feasibility
- Site evaluation and fit
- Due diligence reviews
- Distribution network and transportation studies
- Equipment and build-phased growth strategies
- Alternative floor plans and layouts designed around process
- 3D concept renderings with simulation
- Business case development
- Functional programming

Feasibility & Planning

Stantec recognizes the unique challenges faced by industrial manufacturers. Tight budgetary constraints. Pressure on productivity and efficiency. Regulatory and permitting delays. Rising utility costs. It can be a hard road, but it's one we can help you navigate.

It's our job to find innovative ways to expand or build capacity by leveraging existing resources to implement your vision. We provide the concept design and the numbers that make the most of your capital and keep you moving forward.

A keen understanding of market expectations is critical to ensuring that a facility plan reflects a client's capacity, capability, and flexibility requirements. Using a highly inclusive approach involving stakeholders from all levels of a client's organization, Stantec designs effective and functional programs that include material input / output evaluation. This program ensures that the physical size of the building can accommodate operational requirements while serving as the foundation for future flexibility. We plan for maintenance and operational space requirements, including lay-down space for goods, access, and guarding.

FEASIBILITY & PLANNING SERVICES

- Strategic facility master planning
- Concept design and feasibility
- Site evaluation and fit
- Due diligence reviews
- Distribution network and transportation studies
- Equipment and build-phased growth strategies
- Alternative floor plans and layouts designed around process
- 3D concept renderings with simulation
- Business case development
- Functional programming

Optimizing Production

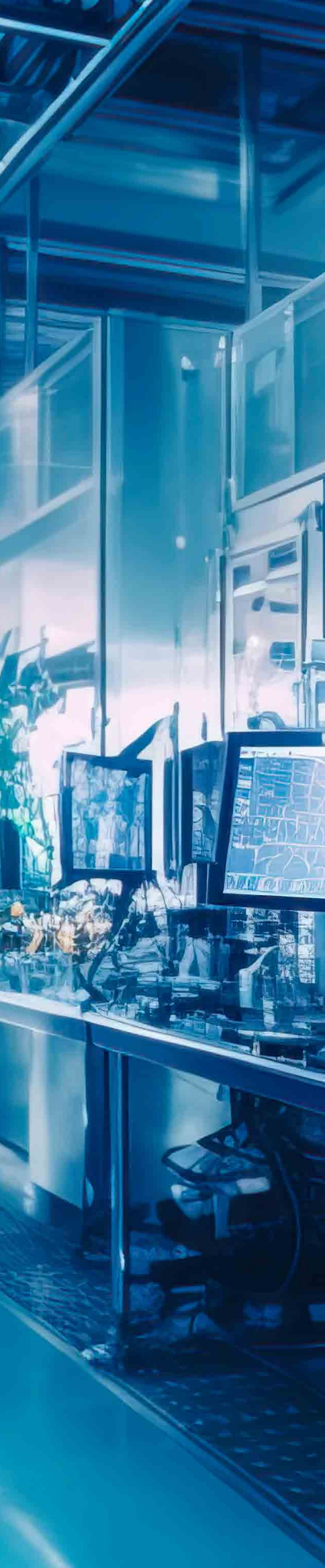
If you're looking for optimum efficiency, reliability, and sustainability in your manufacturing facility, then we're a match. Our industrial engineers have the creativity and skills to find you complete solutions for your challenges, from generating plant and warehouse layouts that optimize productivity, to finding ways to reduce product loss.

Stantec's teams look for ways to recover operational space in your existing structure, reduce labor with work standards, time, and method studies, and right-size production steps and production flows. We can upgrade and expand current capacity with minimal downtime, balance the flow of materials through packaging lines, show you how through our simulation models, and improve your ability to measure productivity and KPIs.

Our experts can facilitate Lean Optimization, as well as Kaizen and Change Management. And, the Stantec team provides HACCP and Good Manufacturing Practice (GMP) audits.

By developing solutions that don't impede process efficiency, our clients realize better cost, schedule, and safety performance.





Process Engineering

Stantec knows industrial processors require innovative, economical, and high-quality solutions to thrive in a competitive marketplace. Advantages in process design and equipment technologies, together with strict attention to GMP, can go a long way in achieving business objectives.

Our process engineers are experts in the areas of process design, process engineering, conveying and packaging, custom equipment design and system integration, and automation and controls.

Whether you need one, a handful, or all of the following solutions, Stantec has the specialists that design processes to make your business cutting-edge and efficient.

PROCESS ENGINEERING SERVICES

- Process equipment layout
- Instrumentation and control
- Utilities and new equipment commissioning
- Structural platforms and equipment upgrades
- Wastewater treatment strategies and design
- Utilities conservation
- Custom equipment design and modernization

PROCESS DESIGN SERVICES

- Raw material receiving and bulk unloading
- Bakery product processing systems
- Solids and powder batching systems
- Liquid batching
- Liquid, gas, and powder storage systems
- Centrifuges
- Homogenizers and pasteurizers
- Clean-in-place (CIP) systems
- Complete fluid piping systems for receiving, batching, processing, packaging, and cleaning
- Plant floor operator interface systems and data collection systems
- Check weighers and metal detection
- Filtration, including micro-filtration, nano-filtration, and reverse osmosis
- Boilers and sterilization
- Refrigeration systems

CONVEYING & PACKAGING SERVICES

- Liquid and aseptic packaging
- Pneumatic and vacuum conveying
- Wrappers and palletizers
- Package fillers
- Boxes, cartons, and jugs
- Belt, roller, pneumatic, bucket, screw, and vibratory conveyors

Equipment Design & Controls

Want to increase throughput and automation while at the same time improve safety, ergonomics, reliability, and quality performance?

We've got you covered. We apply innovative thinking and engineering techniques, along with the latest in computer-based 3D design tools, to deliver safe, cost-effective, and efficient manufacturing solutions.

Our experience includes equipment designed for high-speed packing systems, product processing systems, system integration, and material handling solutions.

Stantec's involvement from concept through commissioning and production means you're well-supported in achieving consistent standards with automation and controls. Our process engineers will review your existing facility capabilities for the support of automation expansion or improvement, identifying infrastructure upgrades (including planning for personnel training), and material management and logistics changes.

We are fluent in multiple platforms, and use PLCs and HMIs to create customizable control systems for client-specific applications. Stantec's people address plant-wide SCADA needs, and combine process with in-house plant cost accounting and MRP software with custom programming and development teams. Our experts, including safety engineers, design and improve electrical control systems and power distribution, and tackle equipment specifications, instrumentation, programming, and component procurement, as well as vendor-independent control systems.





Energy Reduction

Using innovation and solid design expertise, our process engineers can lead the discussion on utility, steam, and energy issues at the earliest stage. Together, we'll arrive at solutions that conserve or re-use energy, capital, and resources for process efficiency.

SUSTAINABLE DESIGN SERVICES

- Capture and re-use of waste heat
- Refrigeration systems upgrade for performance and efficiency
- Ice plant generation for time of day use
- Compressed air systems testing and upgrade
- Design of low-pressure boiler systems that are compatible with the demands of older steam boilers
- Bio-gas digesters to process food waste into energy (cogeneration)
- Electrical efficiency upgrades and national rebate programs
- Centralized energy systems and automation and control



Project and Asset Management

Stantec's project and program management team provides you with expertise and resources for planning, implementing, and controlling capital programs. It's all about supporting better decisions and reducing your risk. You'll always remain firmly in control of the project. We'll maintain project momentum and present high-quality information for better decision making along the way.

PROJECT & PROGRAM MANAGEMENT SERVICES

- Business case and project development consulting
- Contract and tendering administration
- Permitting assistance
- Project oversight and monitoring
- Value engineering and constructability review
- Major project / program risk management
- Project controls (including scheduling, cost management, document controls)
- Communications and reporting
- Phasing construction, transition, and move-in planning
- Construction administration, supervision, and safety
- On-site commissioning and start-up

ASSET MANAGEMENT SERVICES

Industrial retains a significant part of their value in assets. Our asset management experts can help you review, analyze, and make the most out of your existing infrastructure, allowing your facility to run more efficiently and effectively in the future.

- Condition assessment and remaining service life analysis
- Life-cycle cost-benefits-risk analysis
- Risk assessment frameworks and risk management plans
- Extreme weather and climate change vulnerability assessment and adaptation planning
- Asset management policy and strategies
- Condition assessments
- Asset and state-of-the-infrastructure report cards
- Financial gap analysis, financial plans, and funding options
- Decision-support system development, implementation, and training



Environmental, Health & Safety

Stantec's team of professionals assist a wide range of industrial related clients with environmental, health, and safety projects across the globe.

INDUSTRIAL HYGIENE

Our experts in safety and industrial hygiene are focused on compliance assurance assistance. From regulatory audits to program development, and from air and noise monitoring to worker's compensation claim defense, our clients appreciate the wide range of services they can choose, including:

- Air monitoring and exposure assessments
- Diacetyl / flavorings exposure assessments
- Respiratory protection programs and training
- Ergonomics assessments and training
- Asbestos management
- Noise surveys and control
- Hearing conservation programs and training
- Dust control system design

BUILDING & EQUIPMENT CODE REVIEW

Our industrial, mechanical, and electrical engineers provide additional safety services to our clients, such as code review and equipment operation in a number of different areas, including: fire prevention and safety services; arc flash investigation of electrical panels; and CSA verification of foreign-sourced equipment.

Stantec engineers also conduct pre-start health and safety controls reviews (PSHSR) to address inadequate machine guarding—a common cause of serious worker injuries. We develop solutions, including PLC software controls, for machine guarding that doesn't impede process efficiency.

Stantec specialists in hazardous environment classification and code review offer checks for flammable fluids and explosive dust.

ENVIRONMENTAL ASSESSMENTS

With over 900 environmental specialists, our team has the experience you need at any stage of your project. This includes strategic advice at the planning and design stage and assistance with regulatory approvals and permits, environmental construction inspection, and environmental monitoring programs.

ENVIRONMENTAL SERVICES

As stewards of the land, sustaining and preserving the environment is a top priority for our clients and for Stantec. Stantec understands what is needed to meet agricultural environmental requirements and will be there every step of the way.

- Environmental assessment and permitting
- Regulatory support and strategy
- Environmental monitoring
- Baseline and feasibility studies
- Atmospheric and noise assessment
- Compliance auditing
- Community and public outreach / engagement
- Human health and ecological risk assessment
- Phase I and II environmental site assessments
- Contaminant remediation
- Risk management and risk assessment
- Soil productivity and crop performance monitoring using remote sensing and GIS applications
- Agriculture biosecurity using remote sensing and GIS applications



Water & Geotechnical

Whether a client is making semiconductors, solar panels, and batteries for electric vehicles manufacturing industry has a universal connection: water.

WATER PRE-TREATMENT & REDUCTION

Stantec provides project guidance through every stage of the water treatment lifecycle, from water quality analysis, conceptual design, and piloting design, through to construction and commissioning. We help our clients reduce and reuse water while maintaining GFSI standards.

WASTEWATER TREATMENT

Our modeling system reduces consumption and discharge, characterizes process streams, addresses hydraulic loading and variability, and troubleshoots process problems. At the same time, we identify pollution prevention alternatives and sustainable technologies specifically suited to each project.

The impact of climate change is seen in recent wastewater legislation and water reduction advisories across North America that have hit the industry hard. Stantec's specialists in biological nutrient removal not only design effective treatments at the end of the pipe, but also look upstream with you to eliminate waste and to safely and cost effectively reuse water where suitable.

WASTEWATER RECLAMATION & REUSE

Stantec is a leader in engineering water reclamation and reuse systems. We understand that existing systems often cannot keep pace with demands created by growing production, product expansion, drought, and other unforeseen occurrences. Water reclamation is a vital solution to our clients' businesses.

Stantec designs water reclamation and reuse systems that are used for a variety of services, including: vineyard and agricultural irrigation; encouraging groundwater replenishment; plant cooling and ventilation; and reuse in facility operations. We are dedicated to working along side you to conserve and protect our environment.

GEOTECHNICAL SERVICES

Geotechnical engineering is an important aspect to starting your project off well and maintaining your project over the long term. Whether it's a new facility, drainage system, or rail system; our geotechnical team can provide a deep source of information. Our combination of technical expertise and local area knowledge helps us optimize design and minimize costs. This ultimately helps you execute a more successful project.

- Building foundations
- Bridge foundations
- Earthen structures (embankments, lagoons, dams, dykes)
- Site characterization studies (landfill, intensive livestock operations)
- Slope stability studies
- Hydrogeological studies
- Asphaltic concrete pavement design
- Linear structures
- Above ground storage tanks
- Below grade structures (reservoirs, electrical vaults, underground storage tanks)
- Horizontal direction drilling
- WEAP and PDA testing (piles)
- Subgrade assessment (footings)
- Engineering analyses of bearing capacity, settlement, slope stability, seepage, and pile lateral load



Projects

Industrial processing and production is seeing renewed investment as organizations modernize plants and build new facilities to remain competitive. While new technologies, trends, and regulations are driving industry change, Stantec's focus remains the same: helping clients realize better cost, schedule, and safety performance.

Our approach involves using space more effectively, reducing costs, and optimizing production flows. We design spaces that help increase productivity, ensure quality products, and drive success in the face of a competitive global market.

Whether it's optimizing an operational layout; implementing plant infrastructure to house and support the process; maintaining a work environment for effective production; or monitoring operational conditions, we design spaces that help industry master efficiency.

Qcells Solar Panel Manufacturing Facility

Qcells' new, state-of-the-art facility will manufacture 3.3 gigawatts of solar ingots, wafers, cells, and finished panels annually. Qcells is a subsidiary of Hanwha Solutions, one of the world's largest photovoltaics (PV) manufacturers. Qcells plans to boost its solar module production capacity in the United States from 1.7 gigawatts in 2022 to 8.4 gigawatts by 2024.

The company is investing \$2.5 billion, the largest solar investment in U.S. history, to build a new solar power manufacturing facility in Georgia near its existing 300,000 SF solar panel factory. With 3.3 gigawatts annual manufacturing capacity per value chain, the new facility will be the nation's largest fully integrated solar manufacturing site, employing an additional 2,500 workers.

Gray Construction, a leading global builder in the manufacturing industry, and Stantec, a global leader in sustainable design, were selected by Hanwha to design and deliver the massive project.

WHAT THEY ARE MAKING

There are numerous similarities between the manufacture of semiconductors and solar panels. In both, manufacturers grow crystals in a high-temperature, controlled environment, sew the silicon into thin wafers, process or coat them into a cell and then laminate/wire/encase them into a final product.

UNDER ONE ROOF

The largest of these projects brings together multiple industrial processes under one roof. Hanwha Qcells' new facility in Georgia combines four processes and will be among the world's largest advanced manufacturing facilities. Its massive assembly lines will transform quartz sand to polysilicon, produce finished solar panels, and ship them out. The new facility will house the entire solar panel manufacturing process, including ingot production, wafer processing, cell processing, and module production. Advanced manufacturing facilities face their own set of challenges, many of which we believe require an integrated approach.

DAY ONE OPERATIONS

These sophisticated, complex, large-scale buildings for global manufacturers tend to be fast-track delivery projects. Staying on schedule is always a priority, but the scale of investment in advanced manufacturing, and its high operating costs, require precise planning and execution to meet business goals. So, opening on day one is key to the financial success of these projects. Thus, we must approach the design and procurement of materials and equipment as simultaneous undertakings to meet deadlines. This is where the integrated approach of a firm like Stantec is highly advantageous. On the Hanwha project, Stantec provides integrated services across disciplines and locations, including architecture, MEP (mechanical, electrical, and plumbing) services, structural engineering, fire protection, environmental, civil engineering, and water and wastewater components.

Form Factory 1 Iron-Air Battery Production Facility

Form Energy's first commercial product is a rechargeable iron-air battery capable of continuously discharging electricity for 100 hours.

The active components of the iron-air battery system are some of the safest, cheapest, and most abundant materials on the planet—low-cost iron, water, and air. When discharging, an iron-air battery breathes in oxygen and converts iron to rust. While charging, an electrical current converts the rust back to iron and the battery breathes out oxygen.

Time to market is critical for battery production plants amid the increase in renewable energy generation and associated demand for energy storage solutions. That's why Form Energy had to fast-track their new manufacturing facility set to produce 100-hour iron-air batteries.

Our job? To provide architecture, buildings engineering, and industrial engineering services on Form Factory 1—a project which also brought new purpose to the former Weirton Steel Mill site in West Virginia.

Form Factory 1 is expected to begin operation in mid-to-late 2024. When fully operational, the facility will have an annual production capacity of 500 megawatts of batteries and support technologies capable of cost-effectively storing electricity for multiple days—during extended periods of extreme weather, grid outages, or low renewable generation

Mercedes-Benz Canada Inc. – Fuel Cell Stack Manufacturing Clean Room

The new 13,000 SF clean room facility is located in the existing base building of Ballard Power Systems in the Glenlyon Business Park in Burnaby, BC. The clean room is being designed to ISO Class 8 equivalent standards and will be commissioned for manufacturing of fuel cell stacks used in Mercedes-Benz F-Cells cars worldwide.

The facility houses a clean room, a liquid injection moulding room, fuel cell stack final assembly room, and locker room. Stantec designed the auxiliary services for the desired functioning of the clean room by designing the corresponding mechanical and electrical systems. Clean room specific cranes were designed to avoid any contamination in the manufacturing operations and three air-showers were designed to provide the required level of cleanliness at the employee entrances.

Stantec provided services in upgrading the foundation of the clean room to withstand additional weight of heavy mechanical equipment. This was performed to avoid additional weight to the base building and comply with the current building standards.

With the manufacturing of fuel cells on large scale for passenger vehicles, Mercedes-Benz (Daimler) is taking the lead role in shaping the future of passenger cars, and thus changing the face of hybrid cars by introducing emission-free driving with fuel cell.

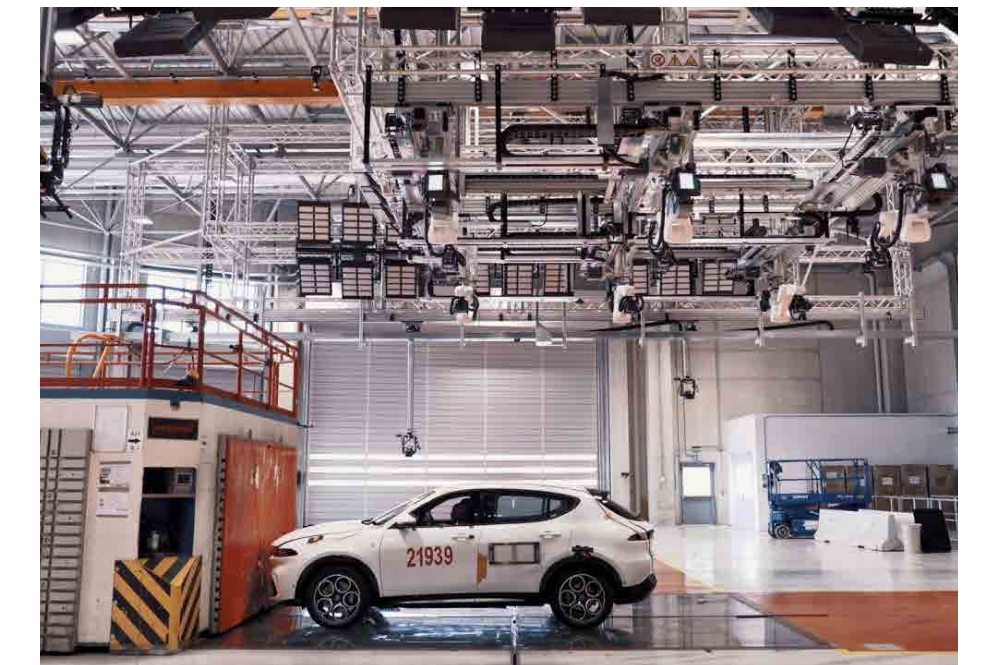
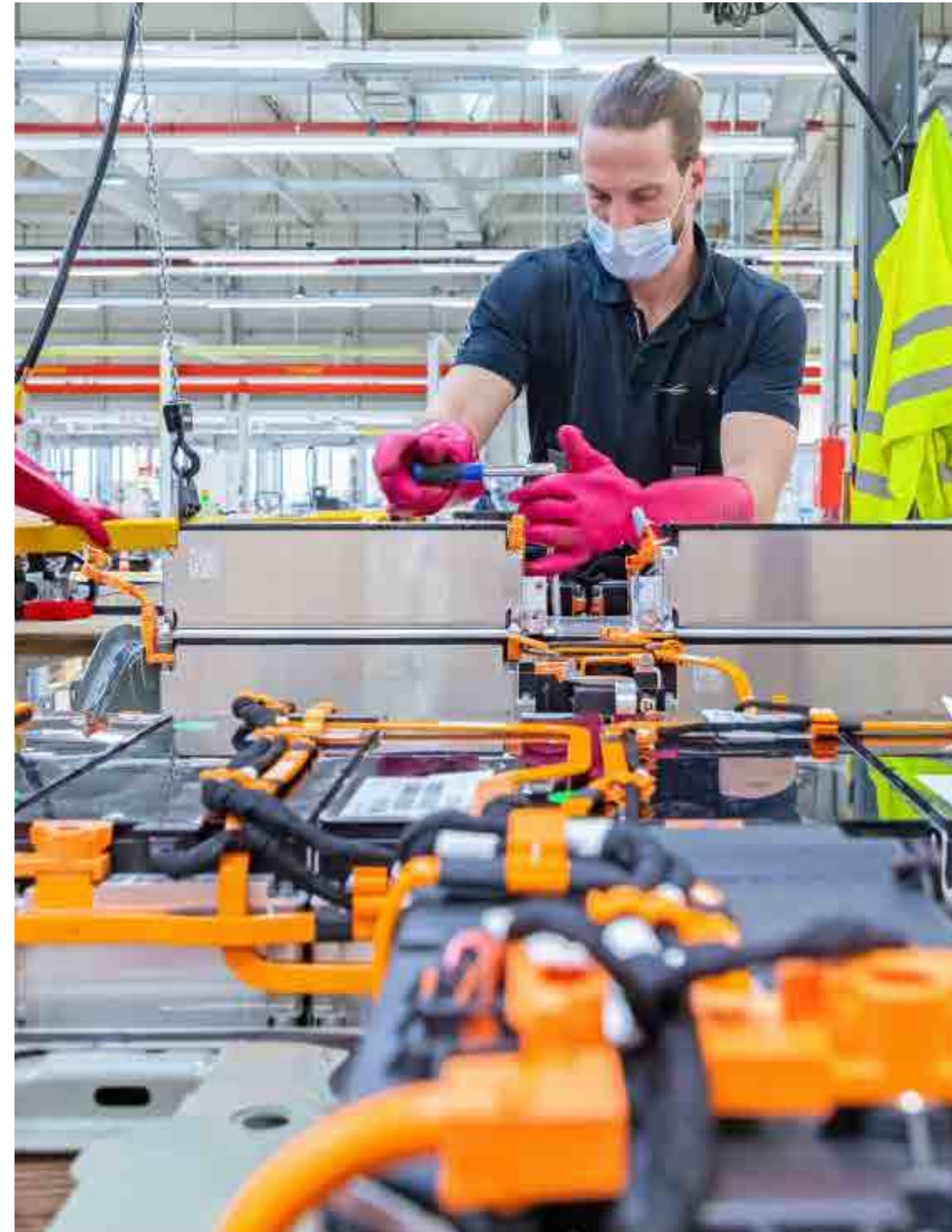
Stellantis Battery Testing Facility

Stellantis (FCA Canada) was in need of a new state-of-the-art battery testing facility to support their new battery production plant for their future vehicle production. With a well-established track record of assisting automotive manufacturers, their tier one suppliers, and equipment vendors to realize their business goals, Stantec was well-equipped to support Stellantis' needs. After some preliminary design engineering support, Stellantis on-boarded Stantec and Roncelli Constructors to validate their design decisions to date and work with their equipment suppliers and internal manufacturing and testing team to develop the building, site, and process facilities for this new electric vehicle battery testing lab.

The scope of work included the design of new 80,000 SF testing lab connected to the existing facility; renovation to the original facilities and processes; and site improvements to support these changes. Stellantis selected their Automotive Research and Development Center (ARDC) at 3939 Rhodes Drive in Windsor, Ontario, as their preferred site due to its proximity to the local assembly plant and battery production facilities.

The design build collaborate team developed the contract documents, project conceptualization, estimating, project criteria design, detailed design and construction documents including construction administration support for the project.

Working with Revit and AutoCAD 3D, the team developed the contract documents, reviewed equipment flow and access for installation, maintenance, and operation in order to reduce the footprint of the building, as part of the design directives. We also looked at the safety systems to protect the workers and environment from potential thermal events associated with the test of Lithium-Ion and similar vehicle batteries. Due to the fast-track requirements for this project, equipment permits were preordered and staged during design, with a focus on critical lead times and early start up of process equipment.



Confidential Infrastructure for New Semiconductor Fab

Stantec recently completed the design of over \$800 M of support infrastructure for a new semiconductor fab in the Western United States. The new facilities include a 111,000 ft² non-hazardous warehouse, a prefab 64,000 ft² – four story office building, 430,000 ft² office building on four levels with a sky bridge connection to a multi-level car park with 2,368 parking stalls. The parking structure is 772,000 ft², that includes ground level and four supported levels of parking. The project also includes a gravel parking laydown area on 65 Acres that accommodated 5,346 park.

Honeywell Aerospace Manufacturing Facility

Stantec conducted a water assessment and recommended eight measures to reduce water use at this Honeywell Aerospace Manufacturing Facility. The project included the completion of the detailed design of two water conservation and reuse measures, and our team managed contractors during the construction phase. Our team provided a three-month commissioning and optimization phase that resulted in increased water savings of seventeen million gallons per year. This project received the Environmental Excellence Award from the Industrial Environmental Association (IEA).

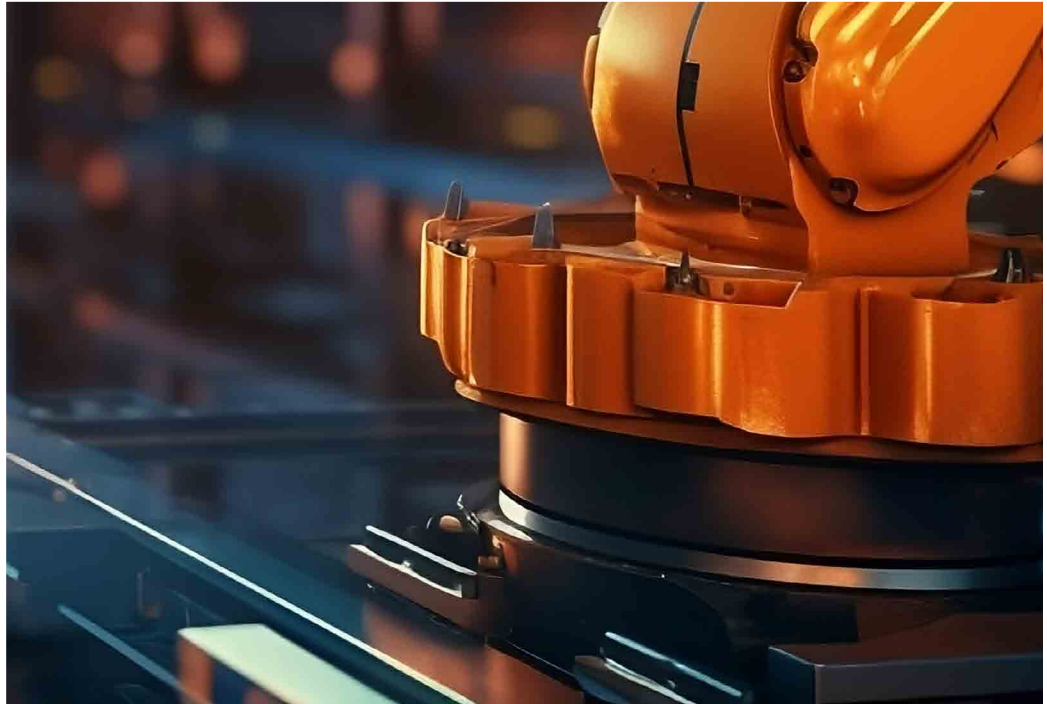
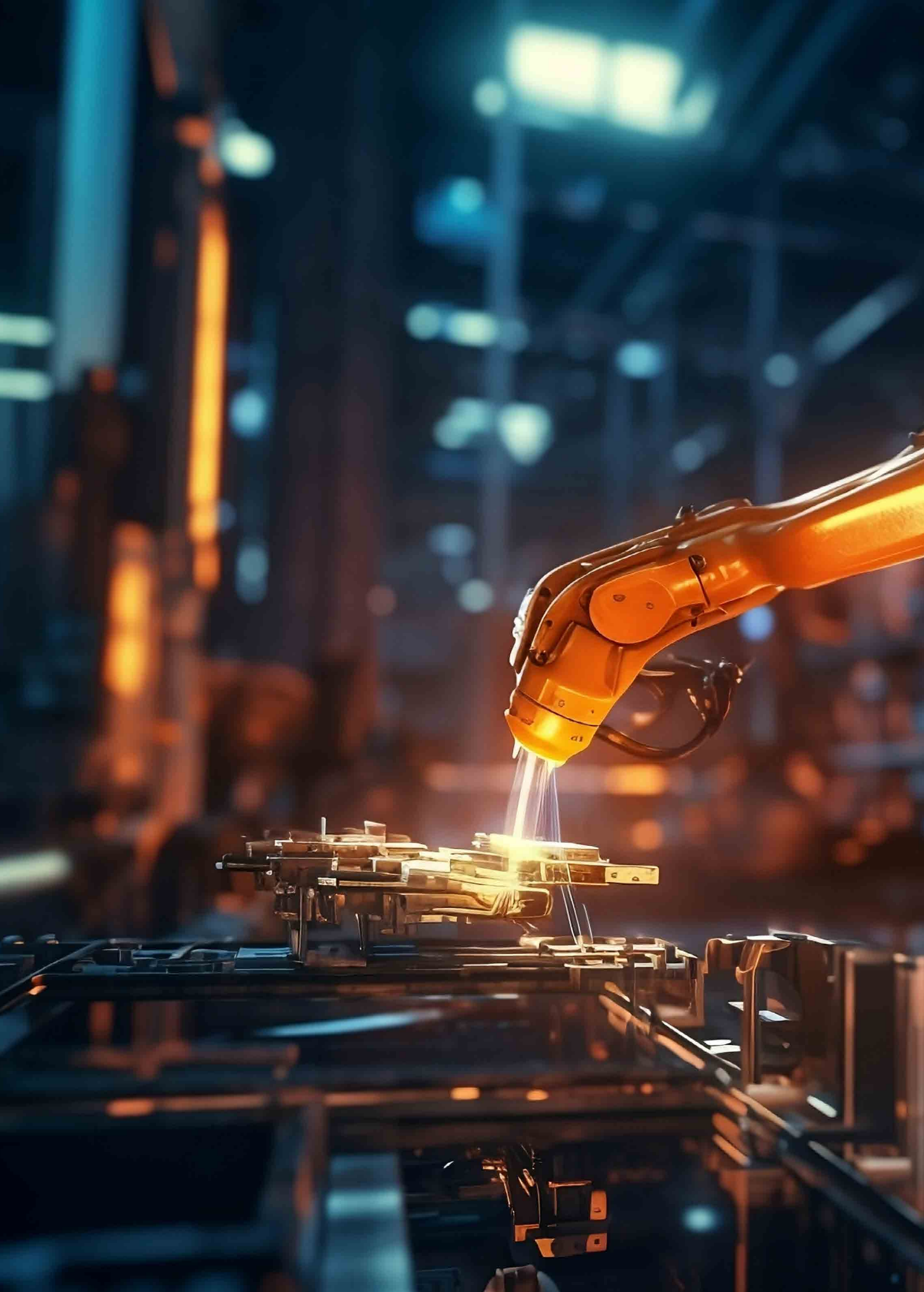


Confidential Medical Equipment Manufacturer, Mexico

Stantec provided architectural and engineering design services for the renovation of an existing 220,000 SF building to accommodate a new clean room manufacturing process for this U.S.-based company. Following the completion of that project, Stantec was retained to design a new 400,000 SF multi-story addition for additional manufacturing space. The new construction triples the production and warehousing space at the site and features a large lobby and cafeteria space to support employees for the entire new campus. The new entrance lobby is designed to handle upwards of 1,200 people per shift and incorporates a mezzanine-level pedestrian bridge connecting the original building to the new central cafeteria. Escalators and an intercommunicating stair provide access to the upper-level production floor for 600+ employees.

Confidential Semiconductor Fab

Stantec has completed the process design and is engaged in the detailed design for the wastewater pre-treatment, post-treatment, and wastewater recycling systems for a new semiconductor fab in Texas. The total design flow for the new facilities is 10.5 MGD. The pre-treatment design includes fluoride removal, hydrogen peroxide quenching, advanced oxidation, moving bed biofilm reactor (MBBR), ion exchange, ammonia stripper, lime softening, and pH control. Seven individual process streams are being pre-treated, including IWW1, IWW2, AWW, AKWW, OWW, CuCMP, and UPW reject. The pre-treated wastewater from the IWW2, OWW, and AKWW streams are combined for treatment in a membrane bioreactor (MBR) with a four-stage Bardenpho configuration. The MBR-treated and remaining pre-treated process streams (IWW1, AWW, and UPW reject) are combined, equalized, and then treated via reverse osmosis (RO). RO concentrate is directed to an evaporator-crystallizer producing a salt product for landfill disposal. The high-quality effluent stream will be suitable for direct river discharge and recycling within the semiconductor process.



Confidential Wastewater Pretreatment for Semiconductor Fab

Stantec is working with a Taiwanese partner to deliver the design of the wastewater pre-treatment and reclamation facilities for a new semiconductor fab in Phoenix, Arizona. The 4 MGD facility includes fluoride precipitation, pH neutralization, ammonia stripping, capture, ion exchange, reverse osmosis, activated carbon filtration, TMAH removal, sludge thickening and dewatering, and advanced oxidation of azole compounds. RO-treated wastewater is recycled within the semiconductor fabrication process. Stantec is also assisting with expediting this new facility's building and industrial discharge permits.



Two Advanced Wastewater Treatment for Semiconductor Manufacturing Facilities

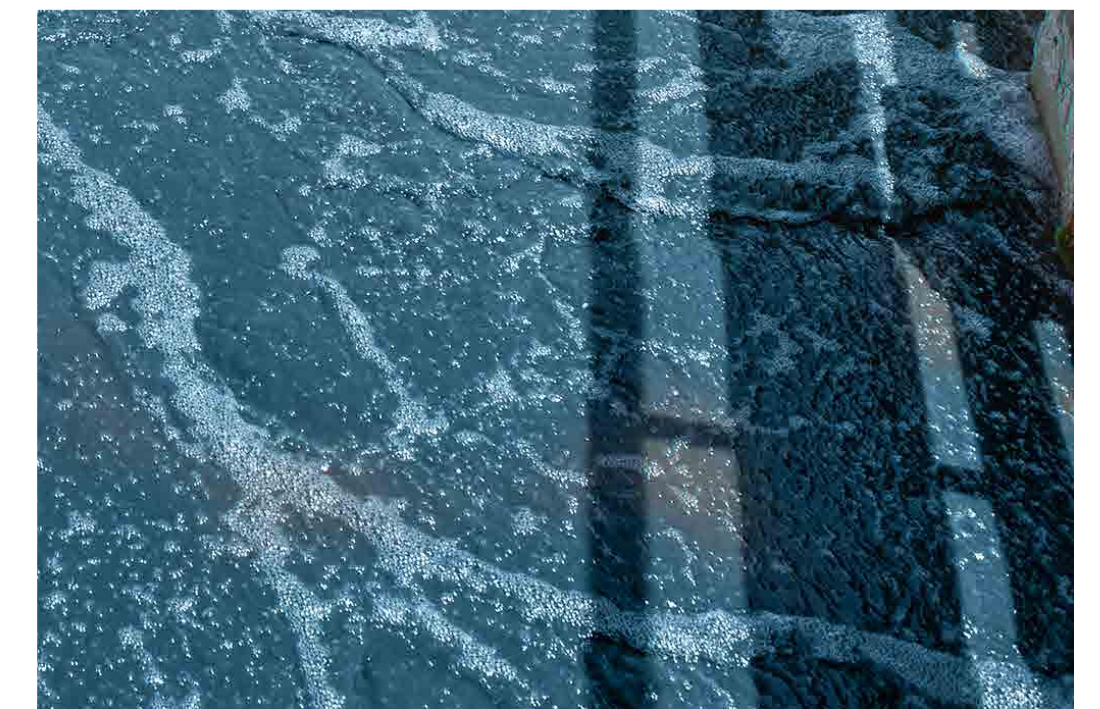
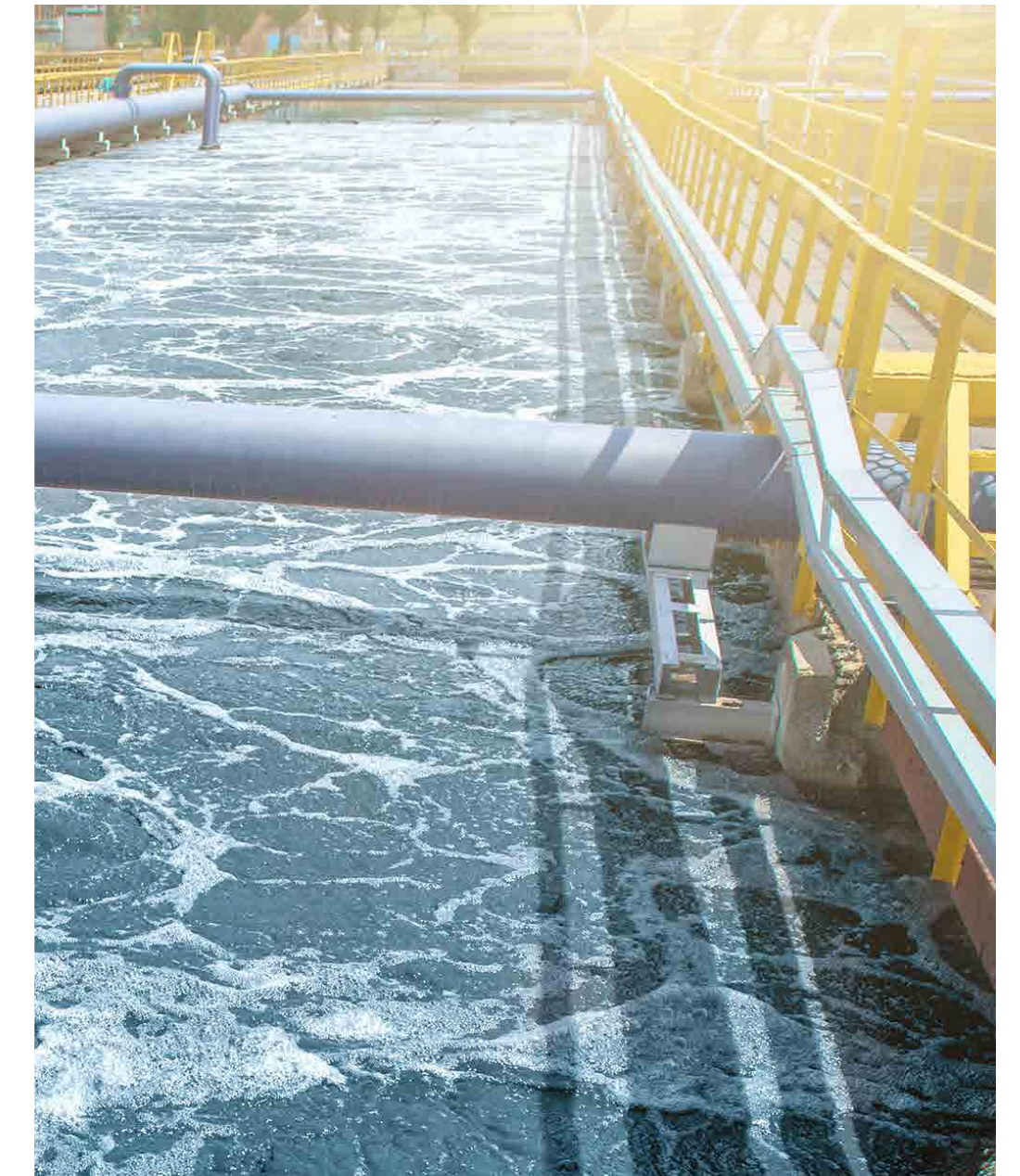
A global semiconductor manufacturer selected Stantec to design and construct two advanced wastewater treatment facilities using biological nutrient removal/membrane bioreactor technology (BNR/MBR) combined with advanced treatment processes and zero liquid discharge. The highly complex, difficult-to-treat industrial waste required intensive bench and pilot scale testing conducted by Stantec's internal Research Group to customize a treatment solution to meet rigorous discharge requirements. Near 100% uptime requirements for the full-scale facilities necessitated full redundancy and elimination of single points of failure throughout the facilities.

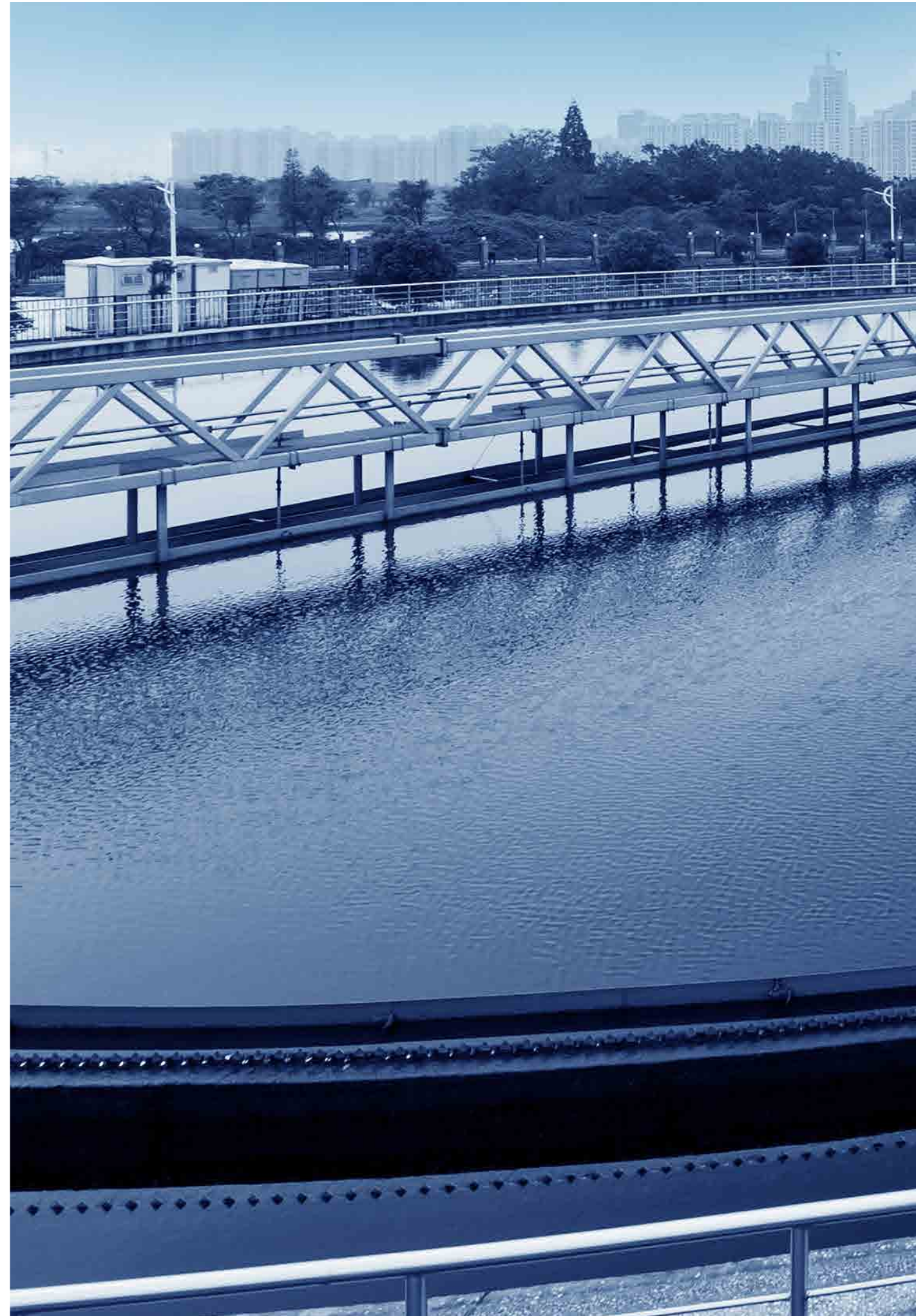
The first plant is in the Middle East and has a capacity of 3.3 MGD. The second facility is in the Pacific Northwest. The 9.95 MGD facility includes emergency and equalization basins, a pretreatment chemical process, BNR/MBR, odor control, ion exchange, high-recovery reverse osmosis, zero-liquid discharge brine concentration, and crystallization, solids dewatering, and chemical stabilization.

Northrop Grumman Wastewater Treatment System Re-Design Engineering Study, BWI Campus

Stantec was awarded a project to provide an engineering study to re-design the existing wastewater treatment plant at the Northrop Grumman BWI Campus in Baltimore, MD. The facility manufactures and assembles electronic components and microchips for space applications. The current treatment system covers two building floors, and operating costs are high. The study's objective was to modify the treatment process to reduce operating costs and modify the process design and physical layout to reduce the footprint by approximately 50%. The project also included the process design of modifications to the water reclaim system, which recycles treated wastewater back to the plating process to increase the volume of reclaimed water.

Stantec evaluated the existing treatment process and identified several options to reduce operating costs and footprint. Options included the replacement of the pretreatment microfiltration system with more efficient ultrafilters, utilization of ion exchange technology to replace the existing cyanide oxidation process, adding reverse osmosis to the pretreatment train to reduce the plant influent volume, upgrades in instrumentation, and modifications to the process flow and tank sizes in the system. Several wastewater treatment system design alternatives were completed that have the potential to reduce the footprint by at least 50% and operating costs by 30 – 40%. The wastewater reclaim system was modified to increase the recycled wastewater volume by 20% by adding a second-stage reverse osmosis system and upgrading controls and sensors.





Apple Engineering Services to Optimize Wastewater Treatment System Operation and Performance, Supply Chain Manufacturing Hubs

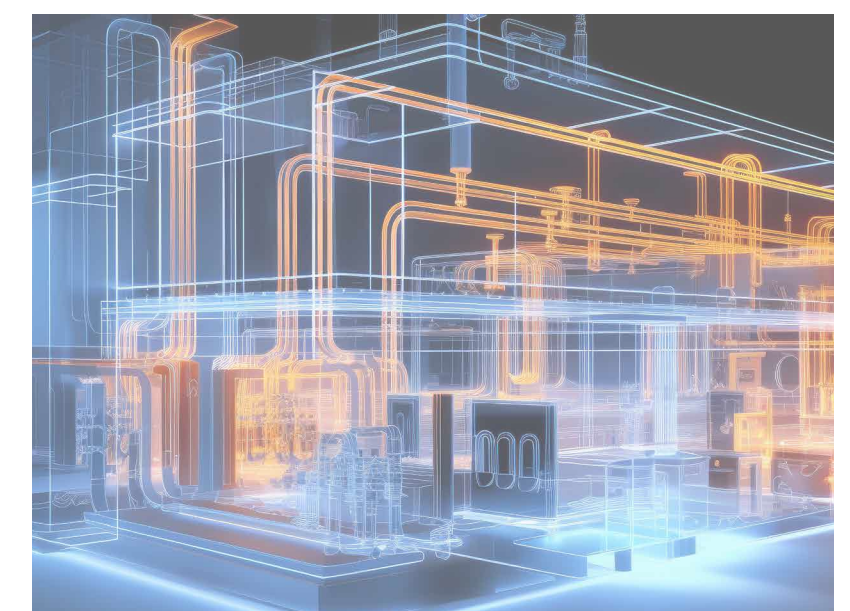
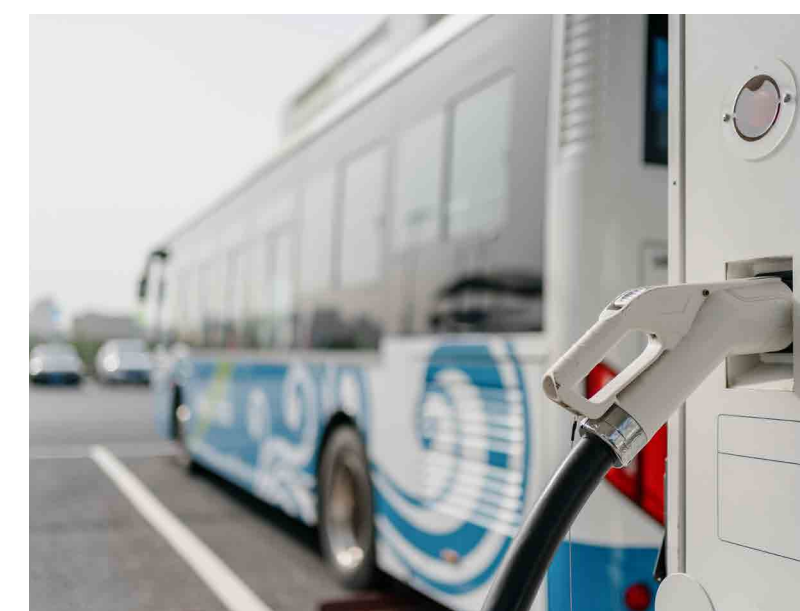
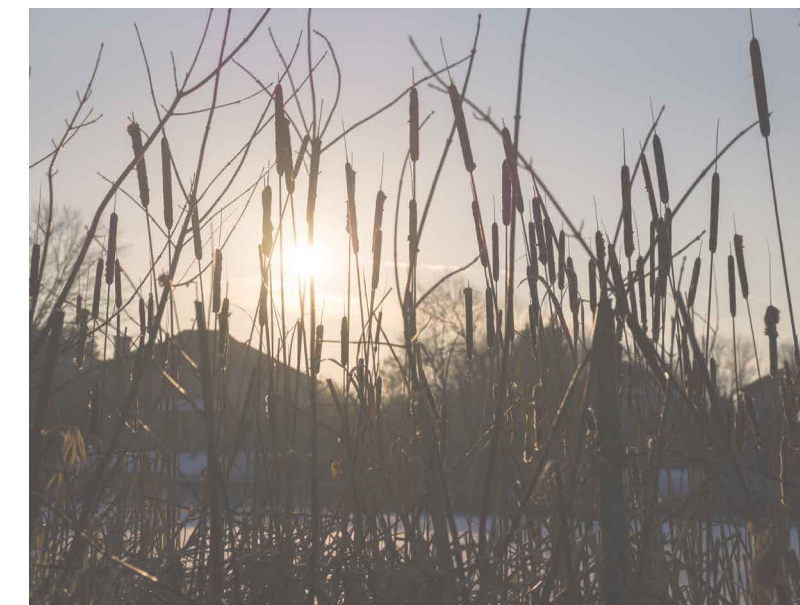
Stantec was awarded a project supporting Apple's Clean Water Program (CWP) to provide engineering services to optimize the operation and performance of wastewater treatment systems at Apple supply chain manufacturing sites in China. The contract manufacturing facilities manufacture and assemble all components of Apple's phone, tablet, and computer product lines. One of the goals of the CWP is to increase the reliability of wastewater treatment systems and reduce the risk of noncompliance with discharge permit limits.

Stantec completed Unit Process Guidelines (UPGs) for twenty-seven wastewater treatment processes currently in use at Apple contract manufacturing sites. The treatment processes were broken down into the following categories: Chemical Precipitation, Biological, Filtration, Reuse, Sludge Treatment.

The UPGs were designed to identify critical process parameters indicators of wastewater treatment performance and develop measures to mitigate potential operating problems. Guidelines included monitoring equipment and ranges for key operational parameters, maintenance procedures, technology selection criteria, and some equipment specifications. The UPGs were incorporated into Apple's CWP guideline manual and distributed to contract manufacturing plants in China.

Thought Leadership

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