



Io Engineers^{INC}

MECHANICAL | ELECTRICAL | PLUMBING | FIRE PROTECTION

3000 N. WICKHAM RD
SUITE 10
MELBOURNE, FL 32935

P 321 752 4949
321 752 4948
F 321 752 4947

POETKER@IOENGINEERS.COM
WWW.IOENGINEERS.COM

AVIATION & AERONAUTICS

PROJECT EXPERIENCE

Aerospace & Aeronautical

U.S. Air Force – Eastern Processing Facility Cape Canaveral Air Force Station, Florida



Large satellite processing facility for the U.S. Air Force. Facility includes three 140 foot tall Class 100,000 clean rooms and one 180 foot tall Class 1,000 clean room. Project includes the design of high pressure gaseous nitrogen (GN₂) and gaseous helium (GHE) process piping systems, propellant fuel and oxidizer piping systems, fuel incinerator, oxidizer scrubber, mechanical HVAC systems, stainless steel ductwork, desiccant dehumidifier systems, 3,300-ton central chiller and 30 mmBtu heating water plants, breathing air systems of high and medium pressures, safety ventilation systems, and a PLC-based Facility Automated Management System (FAMS). Mechanical HVAC systems were computer simulated with computational fluid dynamics modeling to assure systems would perform with all the cleanliness levels and transient recovery requirements stipulated in the design criteria.

Vought Aircraft Industries, Inc. – Manufacturing Plant North Charleston, South Carolina



Mechanical engineering services for a 340,000 s.f. manufacturing plant that will support the fuselage production for the new Boeing Dreamliner 787 aircraft. Project includes offices and support spaces interior to the building and on two levels of mezzanines for a total of 114,000 s.f. Mechanical systems include central chiller plant of water-cooled centrifugal chillers of 2,430 tons capacity, cooling towers, primary/secondary chilled water pumping arrangement, central compressed air plant with two 500 horsepower centrifugal air compressors with desiccant dryers, and central vacuum plant of two 50 horsepower rotary vane vacuum pumps producing 29.5" of Hg for process requirements. Air handling units are located indoors on the top mezzanine level and provided as an N+1 arrangement as the building is zoned with the Production areas, Clean Room, and Office areas on the first floor and first mezzanine level. Air handling units are easily accessible for maintenance and operations. Clean Room area of 75,000 s.f. is physically separated from the Production areas within the building with the

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PROJECT EXPERIENCE

Aerospace & Aeronautical



environmental requirements dictating two desiccant wheels for controlling very low humidity levels with six air handling units controlling the filtration and space temperature to maintain a Class 100,000 cleanliness level for the composite production of the fuselage section. Two dedicated outside air units provide ventilation air and pressurization for the entire facility. Heat for the facility provided by indirect gas-fired heaters located inside specific air handling units. Industrial grade walk-in freezer (-10°F) and cooler (40°F) provided for storage of raw carbon material used in the composite production. Separate split-system direct-expansion air conditioning equipment provided with an N+1 arrangement. Smoke removal fans were provided for the Clean

Room and Production areas. Facility includes 38 robotic production cells and the largest autoclave in the World.



PROJECT EXPERIENCE

Aerospace & Aeronautical

Global Aeronautica, Inc. – Fuselage Assem- bly Plant North Charleston, South Carolina

Mechanical engineering services for a 252,000 s.f. manufacturing plant that will assemble the fuselage for the new Boeing Dreamliner 787 aircraft. Project includes offices and support spaces interior to the building and on two levels of mezzanines totaling 60,750 additional s.f. Mechanical systems include central chiller plant of water-cooled centrifugal chillers of 1,008 tons capacity, cooling towers, primary/secondary chilled water pumping arrangement, and central compressed air plant with two 300 horsepower centrifugal air compressors with desiccant dryers. Air handling units are located indoors on the top mezzanine level and provided as an N+1 arrangement. Air handling units are



easily accessible for maintenance and operations. Two dedicated outside air units provide ventilation air and pressurization for the entire facility. Heat for the facility provided by indirect gas-fired heaters located inside specific air handling units. Facility required stairwell pressurization fans and smoke removal fans for life/safety. Two dedicated outside air units provide ventilation air and pressurization for the entire facility. Heat for the facility provided by indirect gas-fired heaters located inside specific air handling units. Facility required stairwell pressurization fans and smoke removal fans for life/safety.



PROJECT EXPERIENCE

Aerospace & Aeronautical

U.S. Air National Guard F-15 Corrosion Control Aircraft Hangar Jacksonville, Florida

Mechanical engineering services for a 10,600 s.f. single-bay corrosion control facility for the F-15 aircraft at the Jacksonville International Airport. Project includes one wash bay, paint room with a prefabricated paint booth, offices, and support spaces. Mechanical systems include full outside air ventilating units for the high bay, heat is provided by a high temperature water boiler, wash water is heated by the same boiler through a heat exchanger, compressed air and breathing air provided by an oil-free reciprocating air compressor, office areas are provided air conditioning from a dedicated packaged heat pump. Plumbing systems include trench drains in the high bay that drain to an existing oil/water separator and emergency shower/eyewash stations located throughout the facility. Fire protection is provided with fire sprinkler system and a high expansion foam system for the high bay.



Boeing Commercial Airplane Group – 787 Dreamliner Showroom Seattle, Washington



Mechanical engineering services for a 461,128 s.f. showroom located inside an existing warehouse. Showroom is intended to be a single-point for the 787 aircraft buyer to review the customized equipment and aspects of the aircraft as represented by actual hardware, equipment, samples, and high quality mockups. Mechanical systems included packaged heat pumps and variable air volume terminal units.

PROJECT EXPERIENCE

Aerospace & Aeronautical

U.S. Army Corps of Engineers – C-130 Corrosion Control Aircraft Hangar Pope Air Force Base, Fayetteville, North Carolina

Mechanical troubleshooting services for a 69,500 s.f. two-bay corrosion control facility for the C-130 aircraft. Project includes one wash bay and one paint bay with offices and support spaces located between the bays. Mechanical systems include full outside air supply units for the paint bay that filter and heat the air with direct-fired gas heaters, and direct-fired gas unit heaters are provided in the wash bay. Exhaust air fans draw the air through the paint bay in a horizontal “push – pull” arrangement and then through three-stage paint filters located in the walls of the large hangar doors. The six exhaust fans are provided with variable frequency drives to control the exhaust air as the filters load up with paint. Fire protection is provided with fire sprinkler system and a high expansion foam system for the two bays. Troubleshooting was required due to Air Force acceptance testing of the paint bay heating and ventilating system. Pre-testing indicated potential problems, but after tweaking the system, ventilating system passed on the first test witnessed by the Industrial Hygienist for the Air Force Base.



PROJECT EXPERIENCE

Aerospace & Aeronautical

Boeing Commercial Airplane Group – Building 45-07 Field Steam Plant Everett, Washington

Project Manager of engineering for a new 8,000 s.f. steam plant to support paint hangar operations for Boeing 747, 767 and 777 aircraft on south field site of Everett Plant. Two diesel-fired boilers each producing 125,000 lb/hr, 200 psig steam are supplied diesel fuel from an adjacent 200,000-gallon diesel fuel storage tank with secondary containment dikes. Steam distribution and condensate return piping were routed through a new utility tunnel from the steam plant to five buildings. All high-pressure piping was computer analyzed for stress and thermal expansion with resulting supports, anchors and seismic bracing detailed on drawings. Standby



power generators were provided with full capacity to start and operate entire steam plant as back-up power source. Plant fire protection design systems were included in project.

Boeing Commercial Airplane Group – Fuel Test Dock Expansion Everett, Washington

Project Manager for developing design of two new fueling positions capable of supporting aircraft fuel system testing for 747, 767 and 777 aircraft. Responsibilities included engineering services for design of utility systems, preparation of weekly project controls efforts, and local contact for Boeing personnel with out-of-state prime consultant. Fire protection fueling dock water spray system was provided for containing fuel spills and fire threats to each dock.

PROJECT EXPERIENCE

Aerospace & Aeronautical

National Aeronautics and Space Administration (NASA) – Hazardous Processing Facilities Conceptual Engineering Study
Kennedy Space Center, Florida

Mechanical engineering services for the review of existing mechanical systems in the existing hazardous processing facilities at KSC to analyze the current condition of the systems. Systems reviewed include Ground Support Pneumatic Systems, Ground Support Hypergolic Systems (mono-propellant), Fire water systems, HVAC systems, compressed air systems, breathing air systems, and plumbing systems. Projected construction costs were developed for converting existing facilities from the shuttle program to the Crew Exploration Vehicle program. Analysis and cost estimates included requirements for new Ground Support Hypergolic Systems (bi-propellant).



National Aeronautics and Space Administration (NASA) – Multiple Propellant Processing Facility Conceptual Engineering Study
Kennedy Space Center, Florida

Mechanical engineering services for the review of existing mechanical systems in the existing hazardous processing facility at KSC to analyze the feasibility of converting the unused facility to office spaces, prototype fabrication shop, warehouse storage, or a combination of all. Systems reviewed include Ground Support Pneumatic Systems, Ground Support Hypergolic Systems (mono-propellant), fire water systems, HVAC systems, compressed air systems, breathing air systems, and plumbing systems. Projected construction costs were developed for converting existing facility to each of the scenarios.