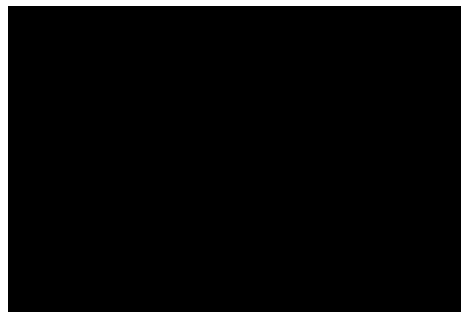
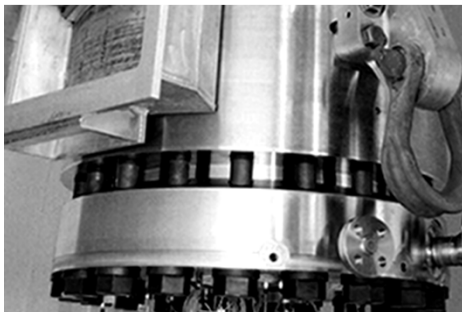


**CURTISS -  
WRIGHT**



# Steam & Air Solutions (SAS)

Business Transition and Quality Management  
System Update



# Background

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- **Curtiss-Wright (C-W) acquired the Terry Turbine Nuclear Safety Related product line from Siemens Government Technologies (SGT) (formerly Dresser-Rand (D-R)) on April 2, 2018 and established the SAS business unit to run the business acquired from SGT.**
- **24-month Supply Agreement Between SGT and C-W**
  - SGT supplier of manufacturing direct labor
  - C-W/SAS will continue to use SGT policies/procedures/approvals, etc.
  - Business and engineering systems remained integrated. SGT and SAS functioning as one organization, vice SGT functioning as an independent supplier to SAS.
- **Coincident with the business acquisition, SGT announced their decision to close the existing facility in Wellsville, NY in 24 months.**
- **SGT manufactured SAS products in the existing SGT facility following the existing SGT Quality Management System.**
- **SAS committed to retaining the existing SGT quality requirements until those requirements were superseded by a corresponding SAS requirement, or otherwise canceled, as a function of transitioning manufacturing to the Summerville, SC facility.**

## Background (cont'd)

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- **SAS personnel in Wellsville, NY operated under the SGT Quality Management System. SAS did not have a Quality Manual.**
- **SGT was obligated to uphold the rigor of the Quality Management System that was in place at the time of acquisition.**
- **SAS transitioned business and manufacturing operations from the Wellsville, NY facility to a new facility in Summerville, SC.**
- **Certain business functions, while administered out of Summerville, SC continue to operate out of an office facility in Wellsville, NY.**
- **The transition out of the SGT manufacturing facility completed in April, 2020.**
- **SAS is now wholly conducting manufacturing operations from the Summerville, SC location with all employees responsible for product quality under the SAS Quality Management System.**

# 2019 NUPIC Audit

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- **NUPIC (Dominion Lead) audited SAS, at the SGT facility, from 21 – 25 Oct 2019**
  - SAS employees performed engineering, sales, and some quality functions (e.g., order entry/review and certifications), with support from SGT personnel
  - SAS Quality personnel reported locally to Wellsville, NY supervision
- **The audit team identified 10 findings, covering most 10 CFR 50 Appendix B Criterion**
- **Concluded the QA program in Wellsville was ineffective**
  - SGT QA Manager remained responsible for Wellsville, NY Quality Management System but managed largely in-absentia
  - Significant SGT QA Department personnel reduction after announcing the planned plant shutdown; one engineer and one part-time QA Manager remained at time of audit
  - SGT imposed restrictions on SAS employee access to manufacturing areas
  - Some SGT personnel were adversarial towards the audit team
  - SAS was under the SGT quality program; SGT was ineffective. Therefore, SAS was ineffective
- **SAS is coordinating with Dominion on actions to formally close the findings from this audit; SAS has responded to all findings**

# Quality Management System Transition

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## ■ SAS Quality Assurance Team

- SAS hired QA Manager in May 2019 to develop Quality Management System for Summerville, SC and manage transition from Wellsville to Summerville
  - Attended 2019 NUPIC Audit and participated as a learning opportunity
  - Recipient of 2019 Audit Report and owned SAS response
- SAS Quality personnel in Wellsville, NY realigned under SAS QA Manager in January 2020
- Fully staffed new Quality Assurance Department
  - Ten personnel in engineering or management roles
  - Two previous SGT Quality employees associated with the nuclear business in Wellsville are part of the SAS team.

# Quality Management System Transition (cont'd)

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## ■ SAS Quality Management System Development

- SAS Quality Management System Manual
  - Original revision issued in November 2019 (after the NUPIC Audit in Wellsville)
  - Revised ,with guidance from NUPIC members, to ensure alignment with 10 CFR 50 Appendix B
- Implementing Procedures
  - Developed, or updated where appropriate, new implementing procedures supporting required quality programs
  - Some SGT/D-R programs that align with Summerville, SC operations remain in effect
- SAS implemented corrective actions to address the issues with the SGT QA program and ensure those issues did not transfer to operations in Summerville
- From March 2020 through today, SAS hosted many NUPIC member visits for source inspection and/or source surveillance; feedback afforded external validation of corrective actions and identified opportunities to further improve SAS QA programs

## 2021 NUPIC Audit Update

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- **NUPIC (Wolfe Creek Lead) audited SAS, at the Summerville facility, from 18 – 21 Jan 2021**
- **The audit team identified 5 findings and determined SAS was effectively implementing our Quality Management System**
- **Wolfe Creek and SAS closed out the 2021 audit with all responses accepted and actions completed**
  - Wolfe Creek Itr Ser PA 21-0022; Closeout of Curtiss-Wright, Steam & Air Solution, NUPIC Audit 25032, dated August 12, 2021
  - “Based on the results of this closeout review, CW-SAS has effectively improved the implementation of their QA program for the nuclear industry.”

## 2022 NRC Audit

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- **NRC audited SAS, at the Summerville facility, from 14 – 18 Mar 2022**
- **The NRC inspection team found the implementation the SAS QA program met the applicable technical and regulatory requirements imposed on SAS by our customers or NRC licensees.**
- **No findings of significance were identified**
- **NRC identified three minor issues**
- **SAS is addressing these minor issues via our Corrective Action Program**



# Business Transition QA Lessons Learned

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- **SGT-CW 24-month manufacturing agreement resulted in two organizations under a single quality program**
  - SAS did not protect ourselves from the risk of SGT QA program degradation (risk realized!)
  - After C-W established SAS, SAS should have:
    - Staffed a QA Manager at the beginning of the acquisition
    - Implemented an independent Quality Management System
    - Commenced treating SGT as a supplier
    - Performed a 10 CFR 50 Appendix B audit of SGT
    - Imposed source inspection and source surveillance restrictions on SGT; monitored the SGT QA program health to mitigate risk
- **Records**
  - SAS expected that SGT was maintaining all records necessary to meet 10 CFR 50 Appendix B
  - Uncovered significant gaps in record retention while developing response to 2019 NUPIC Audit findings; too late to take preventive actions
  - SAS should have audited SGT critical personnel and supplier records prior to SGT closing the Wellsville, NY facility and decommissioning their network servers





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**[www.cw-ems.com/sas](http://www.cw-ems.com/sas)**



# Backup Slides

Not part of NUPIC presentation – the following slides are to assist the presenter in answering customer questions about the new facility



- 107,000 sq ft manufacturing & test
- 35,000 sq ft office



# Curtiss-Wright SAS Manufacturing Overview

- **New state-of-the art manufacturing and test facility established November 2019**
- **Manufacturing and Testing of Navy Steam Turbines, Valves and Compressors**
- **Navy Aftermarket Replacement Parts Manufacturing for critical applications focused on a Stellite Manufacturing Cell**



# Curtiss-Wright SAS Manufacturing Capabilities

## MANUFACTURING CAPABILITIES

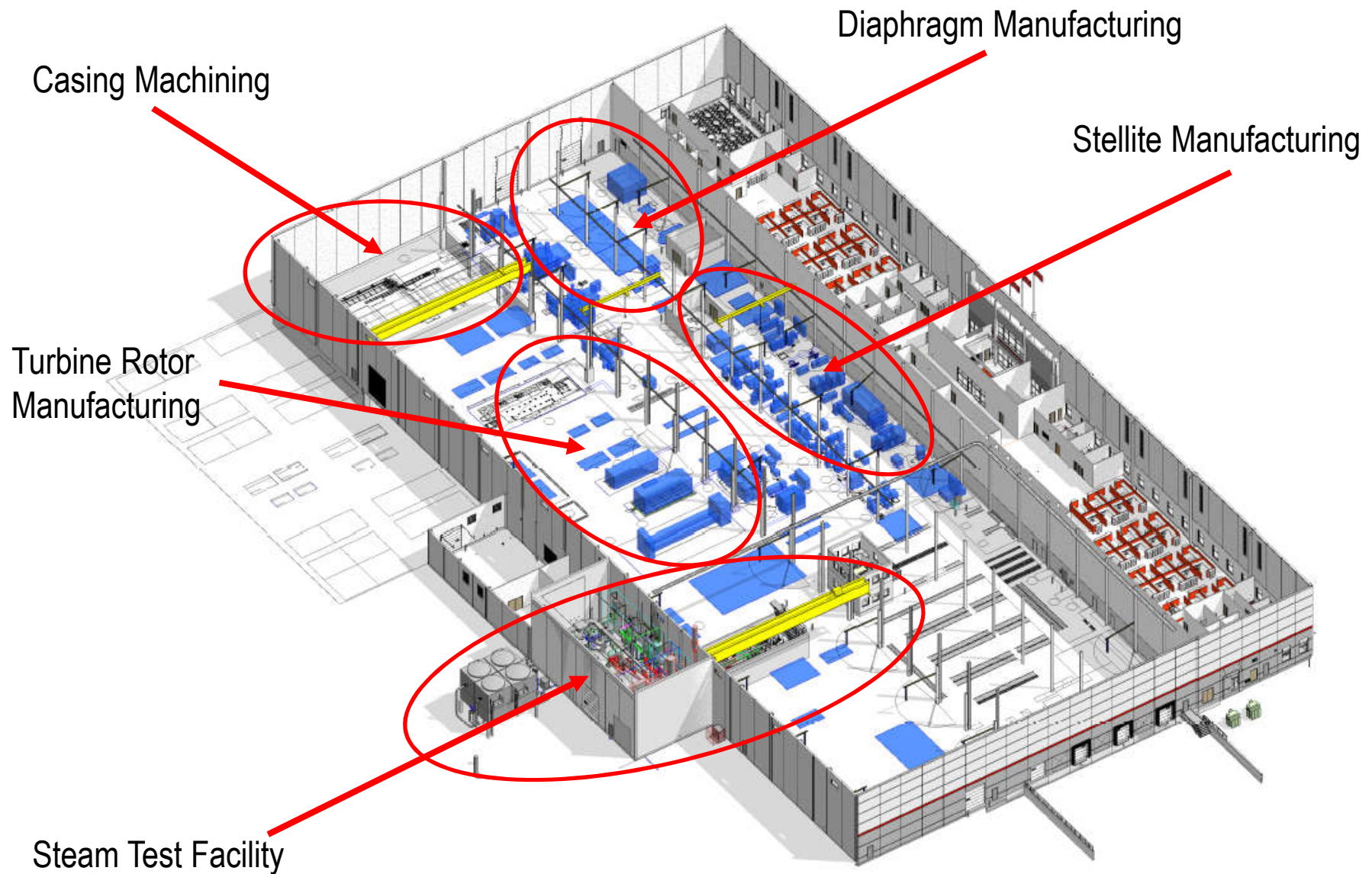
- **Steam Testing**
- **Machining**
- **Grinding**
- **Honing**
- **Weld Fabrication**
- **Heat Treat**
- **Steam Turbine Assembly**
- **Valve Assembly**
- **Electrical Assembly**
- **Hydrostatic Testing**
- **Inspection**

## RESOURCES

- **70-ton Bridge Crane Capacity**
- **High Pressure Steam Boiler**
- **35 machines (10 CNC)**
- **Large Heat Treat Furnace – 1400F**
- **Level III NDE**
- **Certified to ISO 9001:2015, and 10CFR50 Appendix B**



# Manufacturing – Design Layout





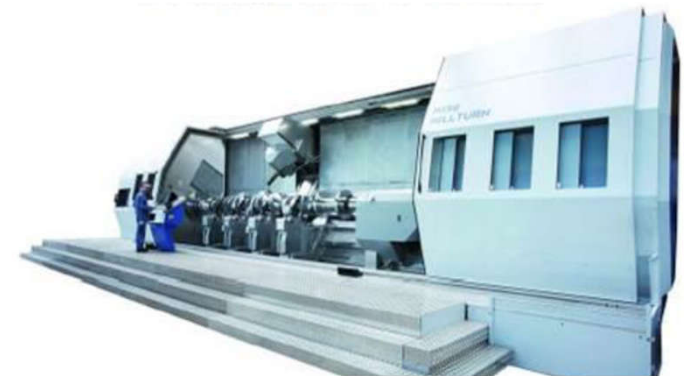
# Steam Testing

- **High Pressure Steam Boiler**
- **Deaerator**
- **Water Treatment System**
- **Surface Condenser**
- **Cooling Tower**
- **Lubricating Oil System**
- **Reconfigurable Testing Area / Test Stands**
  - Mass Flow
    - Up to 50,000 lbs/hr
  - Pressure
    - Up to 1,250 PSIG
  - Temperature
    - Up to 600F



# Large Machining

- **Waldrich Coburg MasterTEC 4500 for Turbine Casing Machining**
  - 4.5 Meter between Rails
  - Two 10 Meter x 3.5 Meter Tables
  - 80 Ton capacity per table
- **WFL MillTurn M150-5000 for Turbine Rotor Manufacturing**
  - 5 Meter center to center
  - 1.5 Meter swing
- **Fives Giddings & Lewis Vertical Turning Center VTC-2000**
  - 2 Meter Table
  - 2 Meter Rail Height
  - C-axis for facing on Centerline Features



# Machining & Finishing

## MACHINING

FIVES Giddings & Lewis V1600

DMG MORI NTX2500 | 1500A CNC Multi-Task

Mazak Nexus 350 II CNC Lathe

MAZAK VMCA - VTC 200/50

FADAL 4020VMC

FADAL 4020VMC

G&L MODEL 70A-D5-T HBM

TUDA Conventional LATHE

36" x 200" with 80" Swing

Warner & Swasey 2A Universal Turret Lathe

4.5" Dia x 36.5" L with 20" Swing

LEBLOND MAKINO REGAL LATHE 19" Swing x 54"

Bridgeport Mill

Bridgeport EZ Trak Mill

## GRINDING AND HONING FINISHING

OKAMOTO Surface Grinder  
ACC 32-80DX (GRIND-X)

JONES & SHIPMAN  
Easy Grind 1500E OD GRINDER

KELLENBERGER OD GRINDER  
Model 1000 U

Brown & Sharp Surface Grinder  
MICROMASTER 824

CINCINNATI MILACRON  
CINCO 15 CENTERLESS GRINDER

SUNNEN Horizontal Hone  
Model MBB-1800

SUNNEN VERTICAL HONE  
Model CV-616

TECHNICA CENTER HOLE GRIND  
Model ZSM 6-5100-810

# Welding / Metal Joining

## WELDING PROCESSES

- Gas Tungsten Arc
- Shielded Metal Arc
- Gas Metal / Flux Cored Arc
- Submerged Arc
- Plasma Transferred Arc (hard-surfacing)
- Stud Welding
- Resistance Spot Weld
- Automatic and Manual

## SPECIAL APPLICATIONS

- PTA Stellite hard-surfacing (valves, stems, and seats)
- Heat Treat to 1,400F (96" x 96" x 48" H)
- Seal Welding
- Dissimilar Metals
- Submerged Arc Overlay
- Soldering per MIL-HDBK-545A, Guideline 5

## WELDING CODES

- Tech Pub 248/278
- ASME Section IX

