Inside a Nuclear Power Station
• After decades of service, a safety system discharge head needed replacement at the Columbia Nuclear Energy Station.

• A replacement head arrived on-site, but verification was needed to ensure the new head would match field conditions of the original head.

• Columbia Station had a very short window in which to replace the head, there would be no time for misalignments in the field.

• Any dimensional documentation of the existing discharge head could not be verified for accuracy.

• Exact Metrology was brought in to provide 3-D models of the new and old head and provide comparison reports to alert Columbia Station of any potential problems that could arise during the replacement installation.
Metrology Equipment Utilized: Leica Geosystems HDS7000 Laser Scanner

- Fully integrated Laser Scanner
- Onboard scanning
- Battery operated
- Up to 1,000,000 points/sec
- 180 Meter Range
- Accurate to +/-0.125"
- No warm-up time
- Phase Based Scanner
- Captures entire 3-D scene
- Class 1 Laser safety rating
Metrology Equipment Utilized:
Romer Absolute Si PCMM

- Fully integrated Laser Scanner and Probing
- Up to 50,000 points/sec
- Accurate to +/-0.0025”
- Wireless scanning
- Battery operated
- No warm-up time
- Available 2 M – 4.5 M
- Semi-automatic power/exposure
- No part coating necessary
- Automatic probe/scanner recognition
Existing Discharge Head
Existing Discharge Head
Replacement Discharge Head
Stage 1 – Provide 3-D data of as-is condition of the existing discharge head

Coarse overall scan for clash detection

High Detail scans for alignment checks

Data from Leica HDS7000

Data from Romer Si Scanner
Stage 2 – Provide 3-D data of as-built condition of the new discharge head

Dimensional detailing

High Detail scans for alignment checks
Stage 3 - Detailed reporting to compare & contrast all aspects of the fit-up

Detailed spreadsheet deviation reports

Visual data reports
Mismatch on small bore piping

3-D Visualization of discrepancy

Stage 3 - Visual aid reporting providing predictive analysis of fit-ups
Stage 4: Reverse Engineering for fabrication of parts needing replacement

Scan data of bracket

CAD model of reverse engineered bracket
Stage 5: 2-D Fabrication drawing created from as-built scan data
To decrease downtime and dose during the outage, pre-fab dimensioning was provided for any add-on pieces. This allowed for many parts to be pre-fabricated before the outage, and provided exact dimensioning to the field crew when installation occurred.
Conclusion

- Provided as-built data of new and existing discharge heads
- Provided a comparison and virtual fit-up to predict areas of concern with hard data and visual representation
- Reduced install time by providing accurate/easy to use dimensions for field crews
- Reverse Engineered add-on parts
- Provided 2-D drawings for fabricators of add-on parts
- Provided overall predictive maintenance and eliminated any fit-up problems
- Decreased down-time and reduced dose
- All from one visit and one data set