ANSA™
DATA ANALYTICS

CLARITY™
POWERED BY PRISM

AI GUIDED MFC DATA PROCESSING USING PRISM WORKFLOW

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EXECUTIVE SUMMARY

Processing Multi-Finger Caliper (MFC) data involves well-documented challenges that typically require significant effort from the experts. Depending on the specific complexity of a well, these manual tasks can be exceptionally time-consuming. To improve efficiency and consistency, it is necessary to implement automated modules for each stage of the interpretation process.

The **PRISM Suite**, integrated within the **Clarity** environment, provides a set of modularized and semi-automated processes. This suite is designed to democratize MFC processing, making high-quality analysis accessible to analysts of all experience levels. By utilizing the **PRISM workflow**, the system linearizes the path from raw data acquisition to final report generation.

While the workflow is particularly beneficial for junior analysts, it also remains a valuable tool for seasoned experts looking to streamline routine tasks. The system is designed for flexibility, although the workflow is linear, it is not restrictive. Users maintain the ability to break away from the automated sequence to address the unique requirements of complex jobs.

ELEMENTS OF MFC

Multi-Finger Calipers (MFC) are the primary tools utilized for the assessment of well integrity. While the technology is standard, the subsequent interpretation of caliper data involves a series of manual processes by the subject matter experts, that are often labour-intensive and time-consuming. The transition from raw sensor acquisition to a finalized integrity report requires several critical processing stages:

- **Centralization:** The raw data must undergo mathematical calculations to counteract the effects of tool eccentricity, which is necessary to accurately reflect the pipe's condition rather than the tool's position within it.

- **Depth Correction :** Analysts must account for "stick and slip" and line stretching phenomena, where the tool's movement through the well is inconsistent.

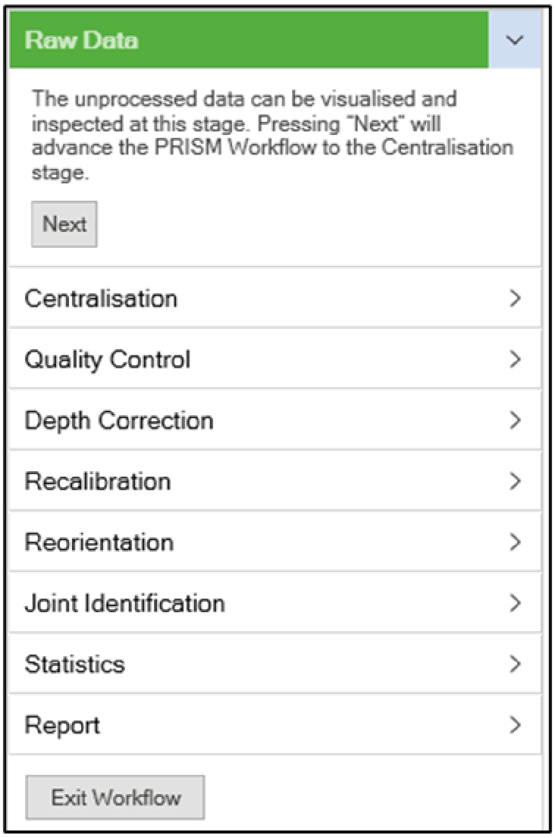
- **Recalibration :** Additional calibrations are frequently required to mitigate residual effects caused by downhole temperature variations or tool-specific errors.

- **Joint Identification :** This phase involves the demarcation of the top and bottom of each pipe joint or completion item by manually or semi-manually identifying collars.

- **Statistical Analysis and Reporting :** The final interpretation stage focuses on generating statistics for every identified joint to provide a summary of the pipe’s condition.

THE PRISM WORKFLOW

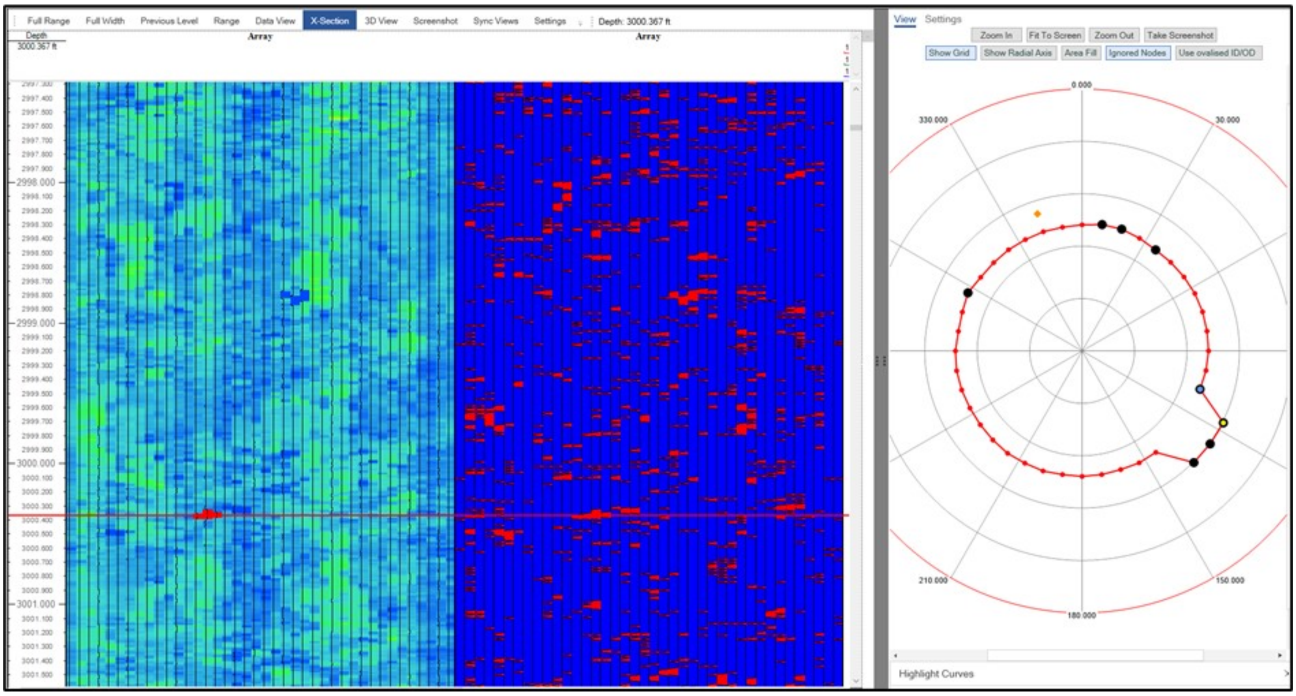
From a technical standpoint, the manual nature of these steps introduces two primary risks which are subjectivity and inefficiency. When centralization or joint identification is performed manually, the results can vary between analysts. Furthermore, the time required to manually identify hundreds of collars in a deep well significantly delays the delivery of the final integrity report.



The PRISM workflow streamlines these elements into a sequential, "user-guided" interface where the analyst is led through subsequent stages via a simplified "Next" button. Despite this linear structure, the system allows analysts to break off from the automated path to address the nuances of complex jobs.

PRISM CENTRALISATION

The workflow starts with **PRISM Centralisation** which calculates eccentricities, ovality, and regression parameters. An advantage in Clarity is the ability to store the matrix of outlier arms, enabling the user to view which arm was explicitly omitted during centralisation. The second panel on the figure below shows the arm selection omitted for centralisation (red), where the corresponding x-section can also be seen on the right where removed arms are shown as black circles.

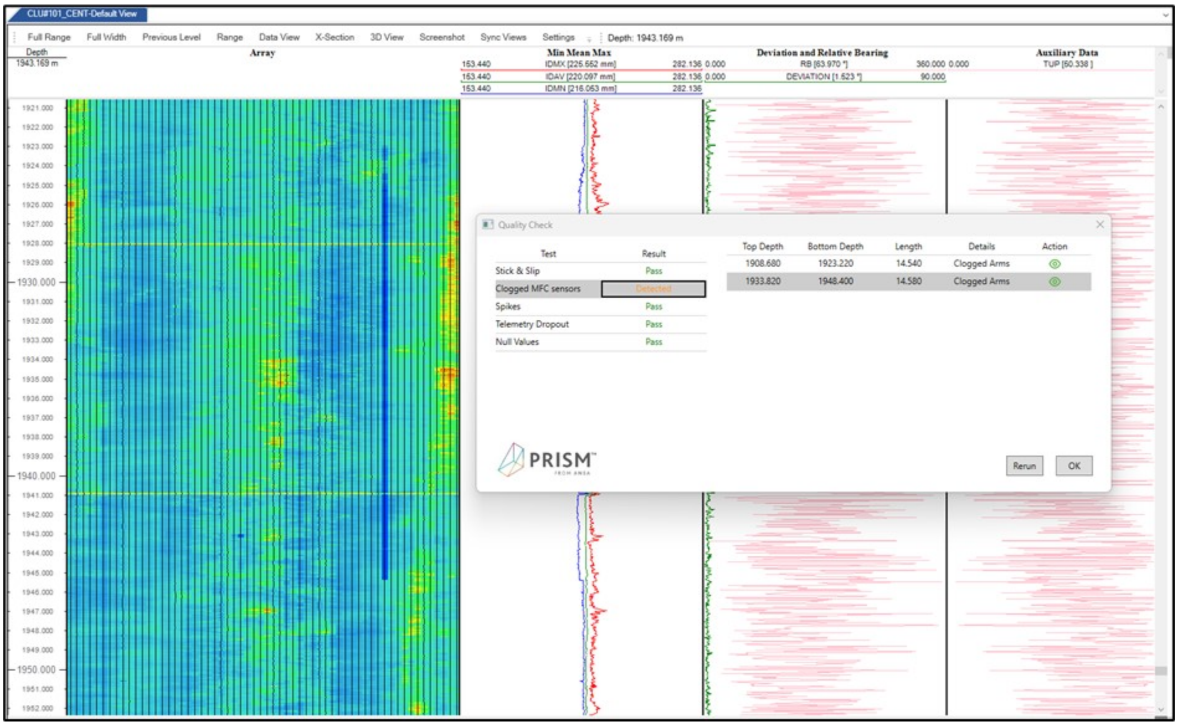


PRISM QC

Following this, the **Quality Check (QC)** module automatically identifies acquisition artifacts, including:

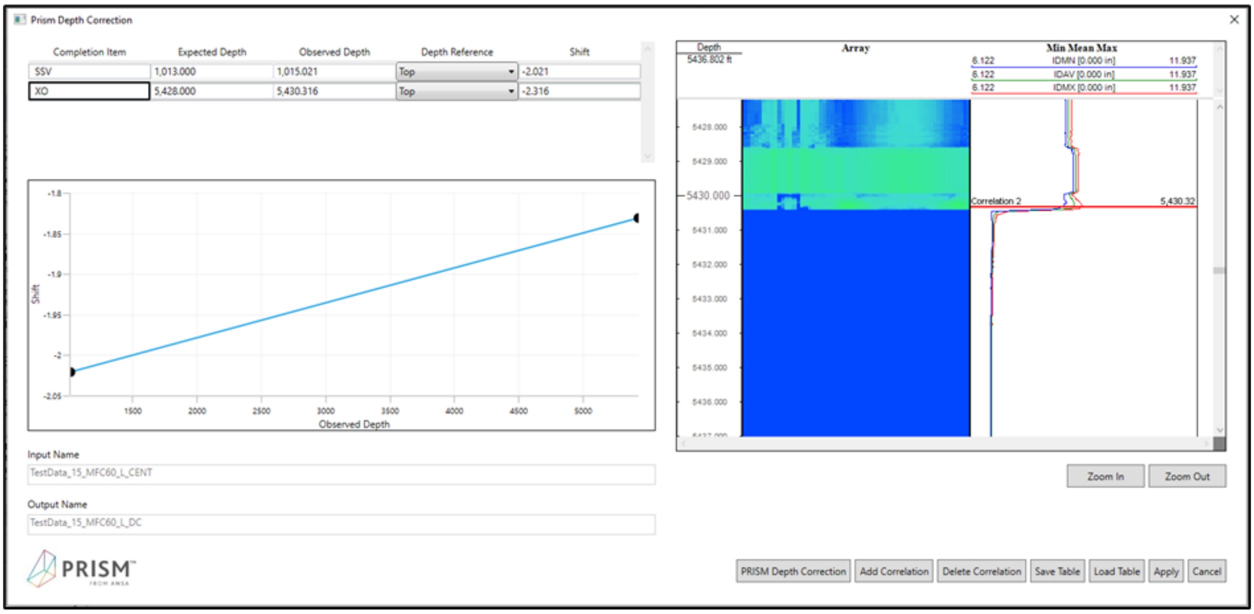
- Clogged sensors and telemetry dropouts.
- Spikes and null values.
- Stick-and-slip occurrences.

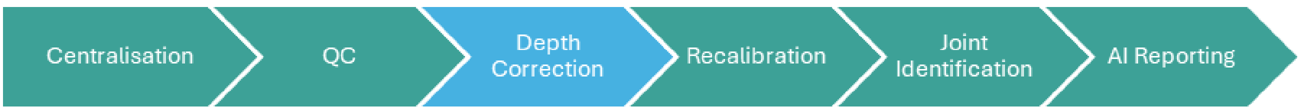
An example here below shows how the quality check module operates. It simply highlights the area of interest on each category. In this case it was a clear clogged arm that stretches just over a joint in length. Some highlighted features like spikes are actionable where the user is also given the option to remove the spikes if they believed that the measurement is an acquisition artefact.



PRISM DEPTH CORRECTION

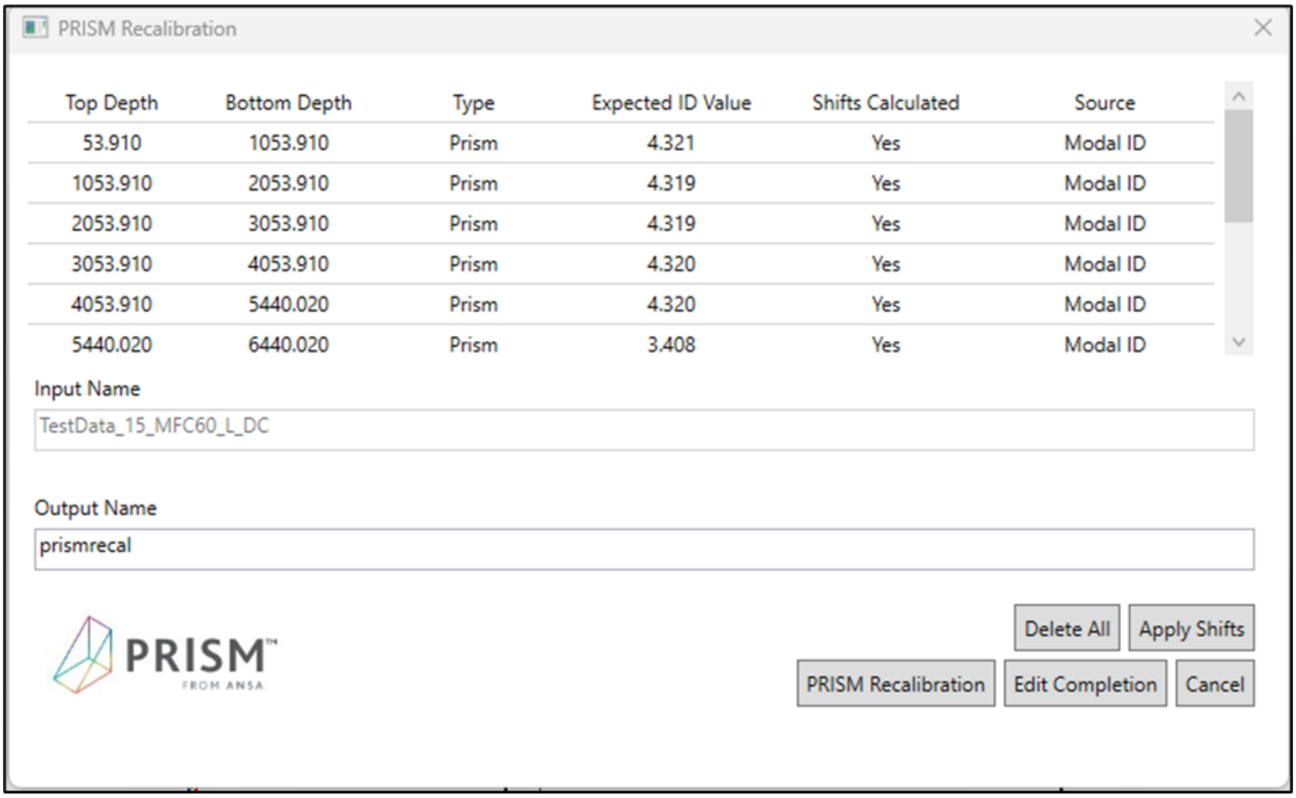
Once the data is cleaned, **PRISM Depth Correction** automatically recommends anchor points by cross-referencing detected items in the arm profile against the user-provided completion table at the start of the workflow. The panel on the right shows the user the arm profile with an intuitive design, where the user will have the ability to zoom in and out of the finger profile and edit the anchor depth points to precision for the depth correction process.



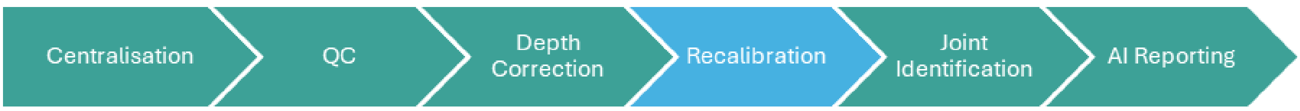


PRISM RECALIBRATION

This is followed by **PRISM Recalibration**, which utilizes temperature data, pipe ID, and collar ID to perform automated adjustments. It automatically selects the zones used for recalibration with the estimated Expected ID value. Using the table of expected value, a shift array are then created for the recalibration. Users then have the option to perform **Reorientation** using the tool's rotation curve.

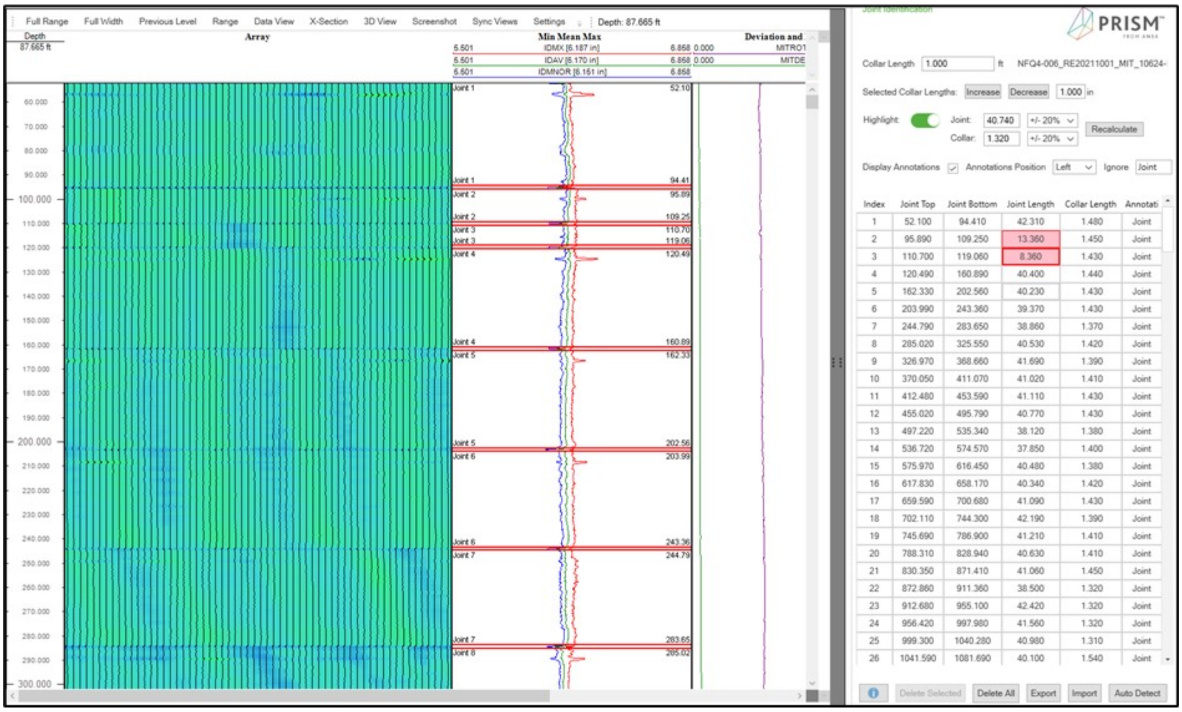


Top Depth	Bottom Depth	Type	Expected ID Value	Shifts Calculated	Source
53.910	1053.910	Prism	4.321	Yes	Modal ID
1053.910	2053.910	Prism	4.319	Yes	Modal ID
2053.910	3053.910	Prism	4.319	Yes	Modal ID
3053.910	4053.910	Prism	4.320	Yes	Modal ID
4053.910	5440.020	Prism	4.320	Yes	Modal ID
5440.020	6440.020	Prism	3.408	Yes	Modal ID



PRISM JOINT IDENTIFICATION

After going through the process of centralisation and recalibration, the data is now conditioned to for the detection of collars. The subsequent phase is performed by **PRISM Joint Identification**, which is ANSA's proprietary AI model that detects collars with >95% accuracy just by a single click of a button. Within a few seconds a joints table will be presented to the user, where the user are free to edit the top and bottom of each joint and collars.



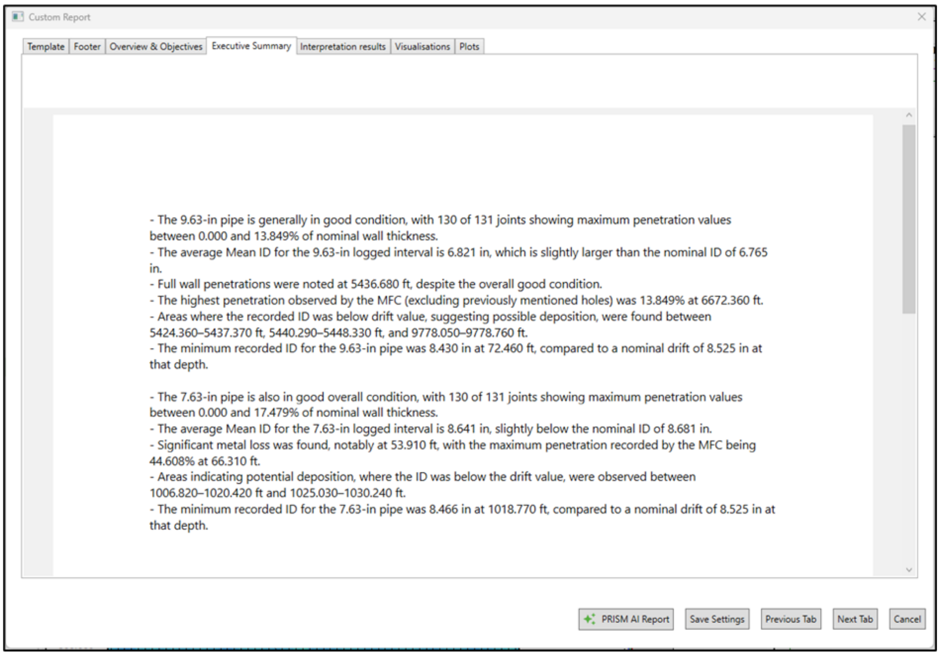
The joint table on the right also highlights the joints with anomalous length. This could be useful for the user to immediately pinpoint a pup joint, completion items, or missing collars.

PRISM AI REPORT

The outputs from the preceding modules feed directly into the **Joint Statistics** calculation stage. This module generates a comprehensive table, including metrics such as maximum penetration and wall loss percentages, presented in a structured tabular format. By aggregating these values on a joint-by-joint basis, the system provides a clear summary of the condition of each individual pipe within the well completion.

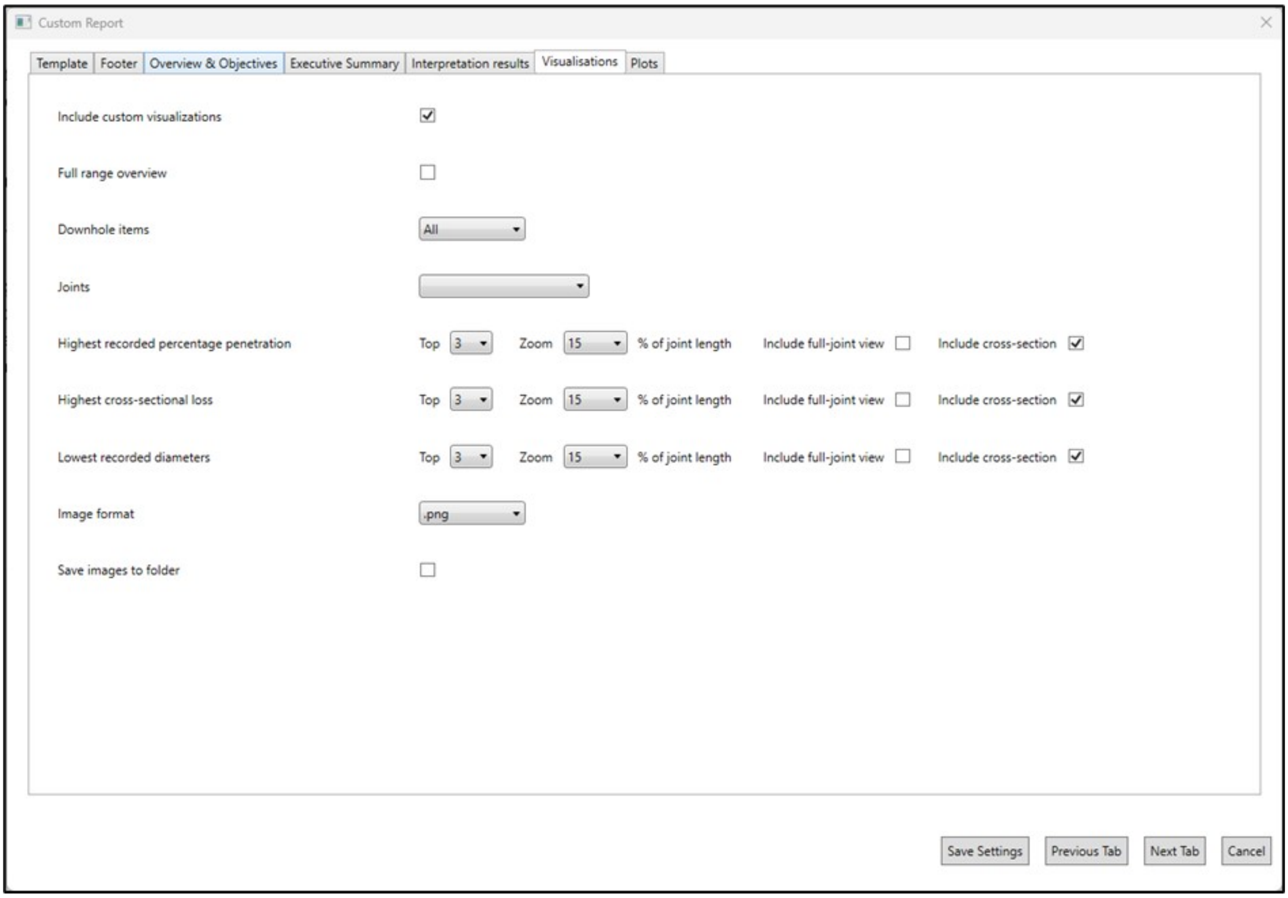
The workflow concludes with **PRISM Report Generation**, which transforms the joints statistical output into a technical summary. This module is designed to highlight critical integrity features, including:

- **Corrosion and Deposition Zones:** Identifying areas of material loss or accumulation.
- **Physical Anomalies:** Highlighting the precise depths of holes and significant penetrations.



PRISM AI REPORT

To further streamline the reporting process, Clarity includes options for automated visual data representation. These visualizations are generated based on critical thresholds, such as the highest recorded penetration values, maximum cross-sectional loss, and minimum recorded diameters. The module also allows analysts to prioritize the "Top X" features in each category, ensuring that the most significant anomalies receive immediate attention in the final documentation.



WHITEPAPER

CONCLUSION

The PRISM workflow addresses the inherent inefficiencies of traditional MFC processing by providing a structured, AI-assisted path from raw data to final analysis. By modularizing and automating complex tasks like centralization and joint identification, the suite delivers a reproducible standard of output that is less dependent on the individual analyst's manual intervention.

While the system is optimized for speed and ease of use which makes it particularly effective for junior analysts, it maintains the technical depth required by seasoned professionals. Ultimately, the workflow offers a balance between automation and user control, allowing for high-efficiency processing without sacrificing the flexibility needed for well with complex processing requirement.