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February 13, 2026

Board of Commissioners of Public Utilities
Prince Charles Building
120 Torbay Road, P.O. Box 21040
St. John's, NL A1A 5B2

Attention: Colleen Jones
Assistant Board Secretary

Re: Application to Supply and Install Runner – Unit 2 – Cat Arm Hydroelectric Generating Station

Please find enclosed Newfoundland and Labrador Hydro's ("Hydro") application for the capital expenditures related to the purchase and replacement of a Pelton runner at Unit 2 of the Cat Arm Hydroelectric Generating Station ("Cat Arm"). The runner is at the end of its service life, and failure of the runner would have implications for the operation of the Cat Arm and its reliability.

In Board of Commissioners of Public Utilities ("Board") Order No. P.U. 16(2025) regarding Hydro's previous application for the replacement of the Cat Arm Unit 2 runner, issued on April 14, 2025, the Board accepted the findings of Hydro and its consultants in relation to the need to replace the Pelton runners. However, the Board denied Hydro's application, stating that Hydro had not demonstrated a full evaluation of the alternative of refurbishment of the Unit 1 runner as a replacement for the Unit 2 runner. The Board believed approval of the purchase of a new replacement runner for Unit 2 required an assessment of whether refurbishing the Unit 1 runner could be completed and installed in a similar time frame, and whether the potential refurbishment of the Unit 1 runner could be completed at a lower cost. Hydro has had an external consultant complete an analysis of the potential use of a refurbished Unit 1 runner and has determined that the purchase and installation of a new runner would be the least cost approach.

The details of the analysis, description of the project, and the associated costs are described in Schedule 1 to the enclosed application. The total cost of the project is $4,836,900, with completion in 2028.

The proposed capital expenditure is necessary to ensure that Hydro can continue to provide service which is safe and adequate, and just and reasonable, as required by Section 37 of the *Public Utilities Act*. Submission of this proposal within Hydro's 2027 Capital Budget Application would delay approval until the end of 2026 or early 2027. In consideration of the recommendations regarding the timeline for replacement made by third-party consultants, and in contemplation of current procurement lead times, Hydro determined that a supplementary application was necessary.

Should you have any questions, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO

Shirley A. Walsh
Senior Legal Counsel, Regulatory
SAW/mc.kd.rr

Encl.

ecc:

Board of Commissioners of Public Utilities
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Regulatory Email

Supply and Install Runner – Unit 2

Cat Arm Hydroelectric Generating Station

February 13, 2026

An application to the Board of Commissioners of Public Utilities

newfoundland labrador hydro

IN THE MATTER OF the *Electrical Power Control Act, 1994*, SNL 1994, Chapter E-5.1 ("*EPCA*") and the *Public Utilities Act*, RSNL 1990, Chapter P-47 ("*Act*"), and regulations thereunder; and

IN THE MATTER OF an application by Newfoundland and Labrador Hydro ("Hydro") for approval of capital expenditures for the purchase and installation of a runner at the Cat Arm Hydroelectric Generating Station ("Cat Arm") pursuant to Section 41(3) of the *Act*.

To: The Board of Commissioners of Public Utilities ("Board")

THE APPLICATION OF HYDRO STATES THAT:

A. Background

1. Hydro, a corporation continued and existing under the *Hydro Corporation Act, 2024*, is a public utility within the meaning of the *Act,* and is subject to the provisions of the *EPCA*.

2. Hydro is the primary generator of electricity in Newfoundland and Labrador, utilizing a number of facilities, including Cat Arm, located on the Northern Peninsula. Cat Arm was first placed into service in 1985 and has two hydroelectric units producing 67.5 megawatts ("MW") of power each, for a total plant capacity of 135 MW. The plant has a total output of 680 gigawatt-hours annually.

3. The two hydroelectric units have identical Pelton turbine designs and installations, whereby high-pressure water is directed through a nozzle assembly, which discharges a water jet stream towards a Pelton runner consisting of 21 buckets.

4. During an annual unit outage in late 2023, Hydro executed field inspections and reviews of turbine components in Cat Arm in consultation with the turbine's original equipment manufacturer ("OEM"). These inspections concluded that the runners on Cat Arm Unit 1 ("Unit 1") and Cat Arm Unit 2 ("Unit 2") are at the end of their life cycle and, due to their age and the increase in the pitting of the metallic surfaces of the turbine parts (cavitation), should be replaced. As the OEM was not on-site for those inspections, Hydro engaged a third-party

expert to conduct on-site inspections during the annual unit outage in 2024. The consultant's inspections confirmed that the runners are at the end of their service lives and require replacement.

5. On February 19, 2025, Hydro filed a supplemental capital application with the Board requesting approval of the procurement and installation of a new replacement runner for Unit 2. Hydro intended to replace the Unit 1 runner with the spare Pelton runner in inventory through Hydro's Hydraulic In-Service Failure Program.

6. On April 14, 2025, the Board issued Order No. P.U. 16(2025), in which they accepted the findings of Hydro and its consultants in relation to the need to replace the Pelton runners. However, the Board denied Hydro's application for the purchase of a new replacement runner for Unit 2. The Board stated that Hydro had not demonstrated that it had fully evaluated the alternative of refurbishment of the Unit 1 runner and noted that Hydro did not provide a timeline for the assessment and potential refurbishment of the Unit 1 runner to determine if this option could be completed earlier than or in the same time frame as a new runner and at a lower cost.

7. The Board stated its belief that approval of the purchase of a new replacement runner for Unit 2 was premature without an assessment of the refurbishment and use of the Unit 1 runner.

8. In August 2025, Hydro replaced the Unit 1 runner with the spare in inventory. At that time, Hydro retained Litostroj Hydro Inc. ("Litostroj Hydro"), the consultant supporting the Unit 1 runner replacement, to perform a detailed assessment of the Unit 1 runner to consider its viability as a refurbished replacement for the Unit 2 runner.

9. Litostroj Hydro's review and analysis, detailed in their report provided as Attachment 1 to Schedule 1 to this application, concluded that although it is possible to refurbish the Unit 1 runner, the extent of this refurbishment would require significant excavation and repair work, leaving residual risk of failure in the runner. Additionally, the completion of this extensive refurbishment presents the risk of additional findings which could require further repairs and increase the cost of the refurbishment.

10. Litostroj Hydro noted that refurbishment of the Unit 1 runner would not return the runner to 'like new' condition, and future replacement would still be required at an earlier time frame than a new runner.

11. Litostroj Hydro's recommendation, confirmed by Hydro's cost benefit analysis detailed in Schedule 1 hereto, indicates that the procurement and installation of a new, hydraulically revised, runner is the option that would result in power being delivered to customers at the lowest possible cost, in an environmentally responsible manner, consistent with reliable service by minimizing the operational risk to Unit 2 and supporting reliable operation for the foreseeable future.

12. Hydro determined that, due to procurement lead times, a supplemental application for the replacement of the Unit 2 runner would be necessary to enable the replacement to be completed by October 2028.

B. Application

13. To ensure the safe and reliable operation of Hydro's generating system, Hydro recommends the purchase and installation of a new Pelton runner on Unit 2.

14. Project execution is expected to take approximately two and a half years. The project description and schedule are detailed in Sections 2.0 and 5.2 of Schedule 1.

15. The estimated capital cost of the project is $4,836,900 with approximately $582,200 in 2026, $1,634,600 in 2027, and $2,620,000 in 2028.[1]

16. Hydro submits that the proposed capital expenditure is necessary to ensure that Hydro can continue to provide service which is safe and adequate and just and reasonable as required by Section 37 of the *Act.*

C. Hydro's Request

17. Hydro requests that the Board make an Order pursuant to Section 41(3) of the *Act* approving the capital expenditures necessary for the purchase and installation of a new Pelton runner at Cat Arm Unit 2 as more particularly described in this application and the attached Schedule 1.

[1] Numbers may not add due to rounding.

D. Communications

18. Communications with respect to this application should be forwarded to Shirley A. Walsh, Senior Legal Counsel, Regulatory for Hydro.

DATED at St. John's in the province of Newfoundland and Labrador on this 13th day of February 2026.

NEWFOUNDLAND AND LABRADOR HYDRO

Shirley A. Walsh
Counsel for the Applicant
Newfoundland and Labrador Hydro
500 Columbus Drive, P.O. Box 12400
St. John's, NL A1B 4K7
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Schedule 1

Supply and Install Runner – Unit 2

Cat Arm Hydroelectric Generating Station

Supply and Install Runner – Unit 2

Location: Cat Arm Hydroelectric Generating Station

Investment Classification: Renewal

Asset Category: Hydraulic Plant

Cost: $4,836,900

Executive Summary

The Cat Arm Hydroelectric Generating Station ("Cat Arm") is located on the Northern Peninsula of the island portion of the province and was first synchronized in 1985. The generating station houses two identical Pelton turbine hydroelectric generating units, both rated for a capacity of 67.5 megawatts ("MW"), with a total plant output of 680 gigawatt-hours annually.

During an annual unit outage in late 2023, Newfoundland and Labrador Hydro ("Hydro") executed field inspections and reviews of turbine components in Cat Arm in consultation with the turbine original equipment manufacturer ("OEM"). These inspections concluded that the runners on Cat Arm Unit 1 ("Unit 1") and Cat Arm Unit 2 ("Unit 2") were at the end of their life cycle and needed to be replaced, due to increased operational risk caused by excessive cavitation.[1] While there were no clear indications that the risk of failure was imminent, the risk associated with failure was elevated.[2] As the OEM was not on-site during the original inspections in 2023 and given the magnitude of the expenditure, Hydro engaged GE Vernova, Inc. ("GE Vernova") to conduct additional assessments on-site during the annual unit outage the following year, in 2024.[3] These inspections confirmed that the runners associated with both units were at the end of their service lives and require replacement. Based on these findings, the consultant recommended replacement of the Unit 1 runner within 12 months and replacement of the Unit 2 runner by the end of 2026, as the condition of the runner in Unit 2 was generally better than that of Unit 1. As Hydro's inventory contained only one spare runner, Hydro decided to proceed with the

[1] Cavitation is a phenomenon involving pitting of the metallic surfaces of turbine parts due to the formation and collapse of vapour bubbles.
[2] To mitigate the risk of failure, Hydro continuously monitored key indicators on the unit, such as vibration and temperature, for any changes.
[3] The OEM did not submit a bid on the tender issued by Hydro for the on-site inspection, and Hydro selected GE Vernova as the third-party expert in Pelton runners from the bid proponents best suited to complete this assessment.

replacement of the Unit 1 runner in 2025,[4] with the replacement of the Unit 2 runner to follow. The Unit 2 runner was scheduled for replacement in 2027 due to procurement lead times.[5] This proposal was submitted to the Board of Commissioners of Public Utilities ("Board") as a supplemental application on February 19, 2025.

On April 14, 2025, the Board issued Order No. P.U. 16(2025), in which they accepted the findings of Hydro and its consultants in relation to the need to replace the Pelton runners.[6] However, the Board denied Hydro's application for the purchase of a new replacement runner for Unit 2, stating in the Order that:

> Hydro has not demonstrated in the Application that it has fully evaluated the alternative of refurbishment of the Unit 1 runner. The Board believes approval of the purchase of new replacement runner for Unit 2 is premature without an assessment of whether refurbishing the Unit 1 runner could be completed and installed in a similar time frame.[7]

The Board had also noted that Hydro did not provide information on whether the potential refurbishment of the Unit 1 runner could be completed at a lower cost.[8]

Hydro engaged Litostroj Hydro Inc. ("Litostroj Hydro"), the consultant supporting the Unit 1 runner replacement, to perform a detailed assessment of the Unit 1 runner following its replacement with the spare in August 2025.[9] Litostroj Hydro's assessment concluded that, although runner refurbishment is possible, a newly designed runner with revised hydraulics would provide better value and reliability.[10] After reviewing the assessment, Hydro performed a least-cost evaluation that confirmed a newly purchased runner would be the least cost approach for runner replacement.

Without the replacement of the runner, the unit will continue to deteriorate, and its reliability will decrease. The proposed project is required to ensure the continued reliable operation of Unit 2 and fulfill Hydro's legislated mandate to provide reliable service at the lowest possible cost, in an environmentally responsible manner. The replacement of the runner with a newly purchased asset is

[4] Replacement of the existing Unit 1 runner with the capital spare was completed in 2025 under Hydro's Hydraulic In-Service Failure Program. The spare Pelton runner is approximately 40 years old, was procured during the original construction of Cat Arm, and was never used. Hydro plans to further assess the need to replenish its capital spare inventory.
[5] As procurement lead times were approximately 19 months, the 2026 replacement of the Unit 2 runner could not be facilitated.
[6] Board Order No. P.U. 16(2025), p. 3/6–7.
[7] Board Order No. P.U. 16(2025), p. 4/14–17.
[8] Board Order No P.U. 16(2025), p. 3/26–28.
[9] Litostroj Hydro's report is provided as Attachment 1.
[10] Please refer to Attachment 1, page 5 of 105.

more expedient and is the least-cost solution to maintain reliable service. Due to long lead times for runner procurement, currently expected to be approximately 19 months, Hydro is proposing this work as a supplemental application to minimize the operational risk to Unit 2.

This supplemental project has a multi-year approach, with completion planned in 2028 at an estimated cost of $4,836,900.[11]

[11] Hydro notes this estimate is lower than that of the original proposal as this is based on actual execution costs from the installation of the spare runner on Unit 1 in 2025.

Contents

List of Attachments

1.0 Introduction

This proposed project is for the purchase and installation of a new Pelton runner[12] for Unit 2. The Pelton runner includes a series of buckets attached to a circular disk and is a critical component of the hydroelectric generating unit turbine system, as shown in Figure 1. Other major components associated with the Pelton turbine system include the water nozzles, which direct high-pressure water to the buckets on the Pelton runner, and the runner removal platform, which allows maintenance access to the turbine system. The Pelton runners used at Cat Arm are comprised of a specific casted metal alloy and require specialized heat treatment, precluding on-site repairs.[13]

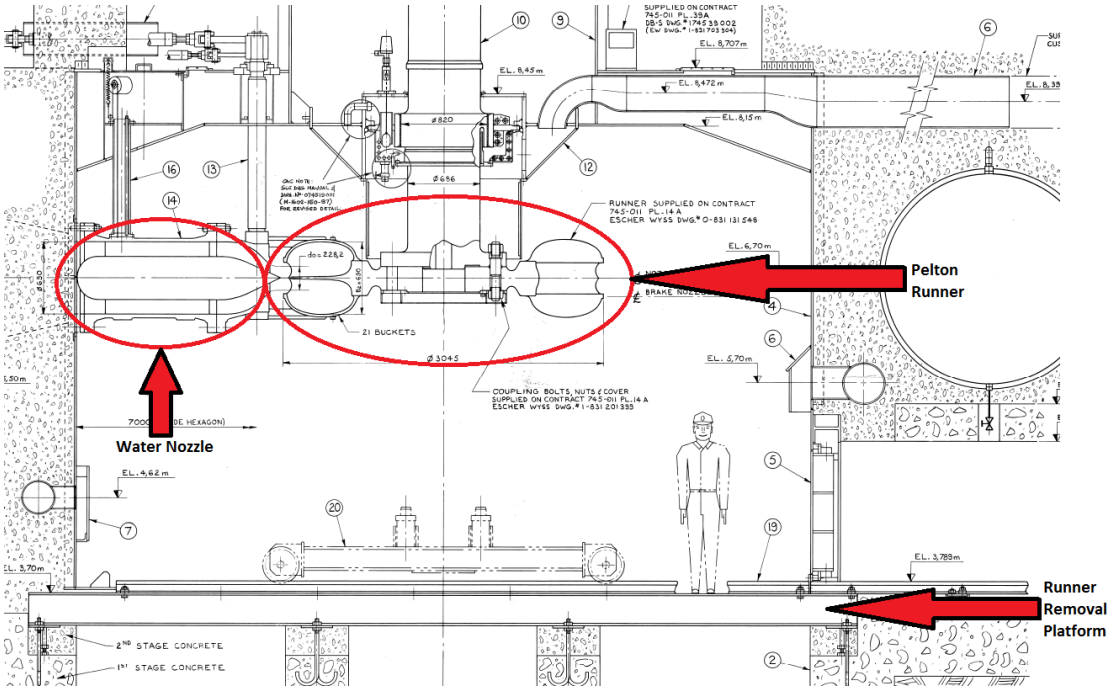

Figure 1: Sectional Profile of Pelton Turbine in Cat Arm

The Unit 2 runner was first assessed by the OEM in 2023 with the recommendation of replacement of the runners on Unit 1 and Unit 2 that were deemed to be at the end of their service life. Excessive cavitation was noted on each runner, with the condition of Unit 2 considered to be better than Unit 1.

[12] A Pelton runner is also referred to as an impulse runner, whereby the impulse of the water (kinetic energy) is captured in the bucket of the runner, converting the energy from kinetic to mechanical.
[13] The Pelton runners in use for Units 1 and 2 are different than Hydro's other turbine fleet which is mainly comprised of Francis turbines, and one single Kaplan turbine.

While the OEM indicated that temporary repair may be possible, and there were no clear indications that the risk of failure was imminent, the OEM indicated that cavitation repairs on-site presented a material risk to the asset.[14] In 2024, additional on-site inspections by GE Vernova confirmed both runners were at the end of their service lives, with replacement necessary. In February 2025, Hydro applied to the Board for approval of capital expenditures related to the purchase and replacement of a Pelton runner at Unit 2, providing information and evidence regarding the condition and need for replacement of both the Unit 1 and Unit 2 runners. In Order No. P.U. 16(2025), the Board accepted the findings of Hydro and its consultants in relation to the need to replace the Pelton runners; however, the Board did not approve the purchase of a new replacement runner for Unit 2. The Board found that Hydro had not sufficiently assessed the potential of utilizing a refurbished Unit 1 runner.

In 2025, Hydro utilized the spare runner in inventory to replace the Unit 1 runner. Hydro engaged Litostroj Hydro to perform a detailed assessment of the removed Unit 1 runner to determine if refurbishment was possible and identify the work required. The results of Litostroj Hydro's review and analysis concluded that although it is possible to refurbish the old runner, the extent of this refurbishment would require significant excavation and repair work, leaving residual risk of failure in the runner. Additionally, completion of this extensive refurbishment presents the risk of additional findings which could require further repairs and increase the cost of the refurbishment. This refurbishment would also not return the runner to 'like new' condition, and future replacement would still be required.[15]

Litostroj Hydro recommended the procurement and installation of a new, hydraulically revised[16] runner to minimize the operational risk to Unit 2 and to promote reliable operation for the foreseeable future. A least-cost evaluation completed by Hydro supports this recommendation.

[14] The OEM was not on-site to complete the inspection and instead reviewed the results obtained by Hydro crews.
[15] The report completed by Litostroj Hydro assumes the service life of the refurbished runner to be 5 years at minimum, and 25 years at maximum. A newly designed Pelton runner is expected to provide 50 years of operation. Please refer to Attachment 1, page 4 of 105, footnotes 1 and 2.
[16] A hydraulically revised runner was recommended by Litostroj Hydro to better mitigate the occurrence of cavitation, compared to the original design. This option is approximately $85,000 more than the like-for-like refurbishment. Complete elimination of cavitation development is not currently possible.

2.0 Project Description and Justification

Hydro is proposing this project to supply and install a newly designed runner on Unit 2 in Cat Arm. Work activities in 2026 will include contract development, tendering, and procurement of the new runner, which will take approximately 19 months. In 2027, detailed engineering plans will be developed to install the new runner in 2028 during the annual maintenance season.

This project is required to ensure the reliable operation of Cat Arm. As confirmed by the OEM and two third-party consultants and accepted by the Board in a previous Board Order, the runner on Unit 2 is at the end of its service life and requires replacement. Without the replacement of the Pelton runner, cavitation will continue to exponentially accelerate deterioration, impacting the reliable generation of the unit. Hydro considered the alternative of refurbishment of the removed from service Unit 1 runner as a replacement for the Unit 2 runner; however, as indicated by Litostroj Hydro and confirmed through Hydro's analysis, a new runner is the least cost solution for reliable service. Litostroj Hydro expects the service life of the newly designed Pelton runner to provide 50 years of operation.

3.0 Asset Overview

3.1 Asset Background

Cat Arm is located on the Northern Peninsula of Newfoundland, near the Cat Arm Reservoir and White Bay, and was first placed into service in 1985. The generating station has two hydroelectric units producing 67.5 MW of power each, for a total plant capacity of 135 MW. The two hydroelectric units are of identical Pelton turbine design and installation, whereby high-pressure water is directed through a nozzle assembly, which discharges a water jet stream towards a Pelton runner consisting of 21 buckets. As shown in Figure 2, the faces of the bucket are surfaces of double curvature, ellipsoidal in shape, and subjected to impulses of high kinetic energy.

Figure 2: Example of Pelton Runner

In 2014, the Unit 1 runner experienced damage due to a broken piece on the leading edge of a bucket, as shown in Figure 3. Subsequent inspections on Unit 1 and Unit 2 also noted early signs of cavitation on both runners. Upon review, which included trending of key performance indicators, it was determined that both the broken piece and light cavitation would not impact the operation of the units, and the runners could safely be placed back into service. Hydro continued to monitor key indicators on the unit, such as vibration and temperature, for any changes that may give early warning of issues for preventive intervention.

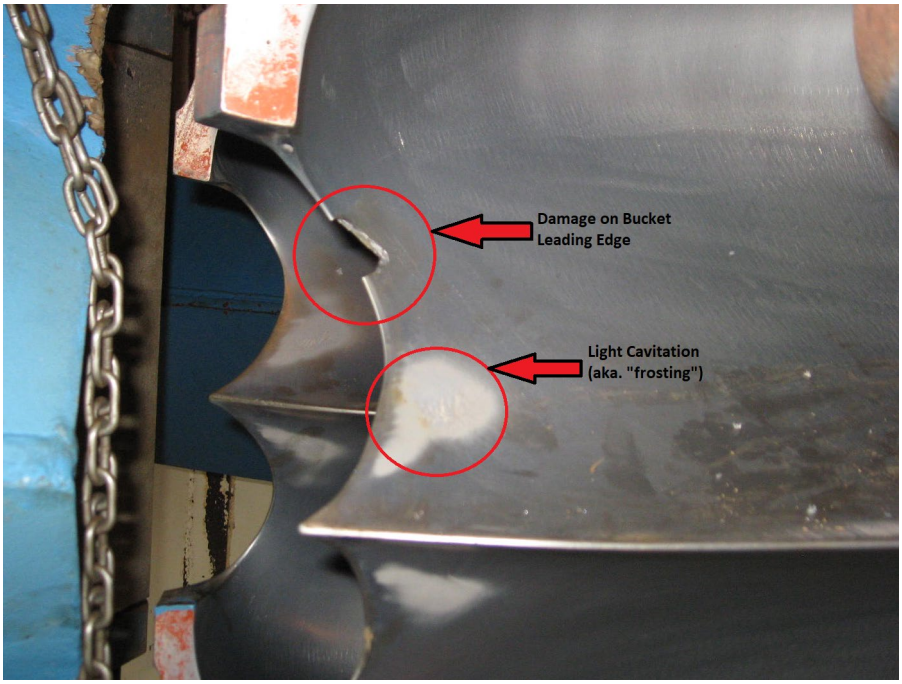

Figure 3: Cat Arm Unit 1 Pelton Runner Damage (2014)

A runner inspection on Unit 1 in 2023 determined that the cavitation, previously noted as light, had progressed. Hydro engaged the OEM for a review of the cavitation observed on Unit 1 and also expanded the services to include Unit 2. The review by the OEM concluded that both runners at Cat Arm are at the end of their life cycle and should be replaced.

After the review by the OEM in 2023, an on-site assessment of the runners was completed in 2024 by an external consultant who specializes in Pelton turbines. The consultant confirmed the runners have reached the end of their service lives and must be replaced. Based on these findings, the consultant recommended replacement of the Unit 1 runner within 12 months and replacement of the Unit 2 runner by the end of 2026. As Hydro's inventory only contained one spare runner, it was decided to proceed with the replacement of the Unit 1 runner in 2025 as recommended, with the Unit 2 runner to be replaced in 2027 due to procurement lead times. A supplemental application for the procurement and installation of a new runner was submitted to the Board on February 19, 2025. In Board Order No. P.U. 16(2025), the Board accepted the findings of Hydro and its consultants in relation to the need to replace the Pelton runners; however, the Board did not approve the purchase of a new replacement runner for Unit 2. The Board found that Hydro had not sufficiently assessed the potential of utilizing a refurbished Unit 1 runner.

In August 2025, Litostroj Hydro performed a detailed assessment on the runner removed from Unit 1 and developed a report on their findings, attached hereto as Attachment 1. Litostroj Hydro concluded:

> The refurbishment of the existing runner requires some significant excavation and repair work, which leaves residual risk of failure in the runner, despite restoring its geometry and allowing it to return in operation. The excavation and repair work also presents the risk of additional findings which could lead to additional repairs and consequently increase the cost of this solution. On the other hand, the replacement of the runner with a new one (either in kind or with revised hydraulics) represents a greater initial investment cost but ensure fresh/sound material and a full lifetime. Based on the above, Litostroj Hydro's recommendation is to proceed with a new runner with revised hydraulics. With equivalent cost per year and less residual risk, it seems like this solution would bring maximum value to NL Hydro.

3.2 Historical Reliability

Since February 1985, Unit 2 has been in service on the Island Interconnected System and has performed as expected. Hydro tracks performance data for its hydraulic units using the derated adjusted forced

outage rate ("DAFOR");[17] this data is filed quarterly with the Board.[18] As expected, the unit has experienced some forced outages over the past 40 years of service associated with various pieces of equipment, with notable issues and remedial actions including:

- Replacement of the direct current solenoid on the quick shutdown valve due to failure;
- Replacement of the air admission solenoid;
- Replacement of deteriorated solenoid coils; and
- Bleeding off level transducers when oil is removed to avoid air pockets, preventing high generator bearing oil levels and accumulator tank low oil levels.

3.3 Asset Condition

Unit 2 is currently in operating condition and has performed as expected during the past 40 years of service; however, as the Unit 2 runner has reached the end of its service life, capital investment is needed to make the necessary replacement to maintain its condition.

3.4 Condition-Based Remaining Life

The Unit 2 runner has reached the end of its useful service life and must be replaced.

4.0 Analysis

4.1 Evaluation of Alternatives

Hydro has evaluated the following alternatives:

- Deferral;
- Upgrade Life Extension; and
- Newly Designed Replacement.

[17] DAFOR is a metric that measures the percentage of time that a unit or group of units is unable to generate at its maximum continuous rating due to forced outages or unit deratings.
[18] "Quarterly Report on Asset Performance in Support of Resource Adequacy For the Twelve Months Ended December 31, 2025", Newfoundland and Labrador Hydro, February 6, 2026.

4.1.1 Deferral

Deferral is not a viable alternative for this project, as the runner on Unit 2 is currently at the end of its service life at 40 years old. Deferral of this project presents an unacceptable risk to the operation of the generating unit.

4.1.2 Upgrade Life Extension

Litostroj Hydro assessed the runner removed from Unit 1 in 2025. They found multiple indications and defects, including cavitation. Although they concluded that the runner could be reused if proper repairs were performed, the repairs should only be considered a temporary solution. Litostroj Hydro noted that a weld repair always leaves a risk of future failure by fatigue around the previously damaged and repaired area, and in certain circumstances, risks remain that could result in additional rework being required to maintain the effective use of the runner. Litostroj Hydro noted that for proper life extension of the turbine, a replacement runner with high-quality materials should be considered. Litostroj Hydro's recommendation was to consider a newly designed runner as it would provide maximum value and reliability.

Litostroj Hydro also noted that runner refurbishment would require significant excavation and repair work. Furthermore, the full extent of the required refurbishment scope is unknown until the repair work begins, which can result in increased costs if deficiencies are found. This refurbishment would not return the runner to 'like new' condition, and future replacement would still be required within the next 5 to 25 years.

4.1.3 Newly Designed Replacement

This alternative involves replacement with a new, hydraulically revised runner for Unit 2 at Cat Arm. This option was proposed by Litostroj Hydro, as it better mitigates the occurrence of cavitation, compared to the original design.[19] The purchase of a new runner would also provide the benefit of a full lifetime for the runner, approximating 50 years before replacement.

[19] A newly designed runner comes with a manufacturer's warranty for one year, which can be extended as required. A refurbished runner has no warranty other than insurance coverage for the parts during the work.

4.2 Least-Cost Evaluation

Hydro completed a Cumulative Present Worth ("CPW") calculation to compare the refurbishment of the existing Unit 1 runner with the purchase of a newly designed replacement. The results of this analysis are shown in Table 1.

Table 1: Least-Cost Evaluation Summary ($)[20]

Alternative	CPW	CPW Difference between Alternative and the Least-Cost Alternative
Newly Designed Replacement	4,219,035	-
Refurbishment of Existing Runner	4,580,047	361,012

The results of the CPW calculation show that the newly designed replacement runner is the least-cost option.[21]

4.3 Recommended Alternative

The recommended alternative is the newly designed replacement of the Unit 2 runner. Hydro recommends completing the proposed runner replacement to ensure the reliable operation of Unit 2.

4.3.1 Risk of Asset Stranding

Cat Arm is required to provide reliable power to the Island Interconnected System, and there are no plans to decommission this plant; as such, Hydro believes the risk of asset stranding is low.

4.3.2 Risk Mitigation

Hydro assessed the pre- and post-implementation risk of the scope of work for this project in accordance with Hydro's Capital Risk Assessment process. The outcome of this assessment is provided in Table 2.

[20] It is noted that the least cost evaluation used a 25-year service life for the refurbishment option and a 50-year service life for a replacement.

[21] Costs for the refurbishment option are based on the Litostroj Hydro estimate provided in Appendix C of Attachment 1, along with comparable actual costs from the 2025 Unit 1 replacement as required. The costs for the replacement option are based on the actual expenditures for the Unit 1 runner replacement in 2025.

Table 2: Risk Scoring Pre- and Post-Implementation

	Impact	Likelihood	Score
Pre-Implementation	5	4	**20**
Post-Implementation	5	1	**5**
		Risk Mitigated	**15**
		Risk Mitigated per $1 Million	**3.1**

5.0 Scope of Work

This project proposes to supply and install a newly designed runner on Unit 2 in Cat Arm. The scope of this project in 2026 includes contract development, tendering, and procurement of the new runner. In 2027, detailed engineering plans and contracts will be developed for the installation of the new runner, with runner delivery expected by early or mid-year in 2028. The runner will be installed and commissioned during the annual maintenance season in the fall of 2028.

5.1 Project Budget

The estimate for this project is shown in Table 3.

Table 3: Project Estimate ($000)[22]

Project Cost	**2026**	**2027**	**2028**	**Total**
Material Supply	202.8	1,014.0	920.2	**2,137.0**
Labour	46.6	19.1	277.7	**343.3**
Consultant	0.0	0.0	0.0	**0.0**
Contract Work	240.0	240.0	780.0	**1,260.0**
Other Direct Costs	0.0	4.4	40.0	**44.5**
Interest and Escalation	23.6	127.9	308.7	**460.3**
Contingency	69.2	229.2	293.4	**591.8**
Total	**582.2**	**1,634.6**	**2,620.0**	**4,836.9**

5.2 Project Schedule

The project schedule is presented in Table 4. Hydro does not expect any notable impact to the planned schedule of any previously approved capital projects.

[22] Numbers may not add due to rounding.

Table 4: Project Schedule

Activity	Start Date	End Date
Planning:		
Open project and develop work orders.	May 2026	May 2026
Procurement:		
Develop procurement contracts.	May 2026	July 2026
Develop installation contracts.	May 2027	July 2027
Construction:		
Install new runner.	October 2028	October 2028
Commissioning:		
Commission new runner.	October 2028	October 2028
Closeout:		
Closeout work orders.	November 2028	December 2028
Complete lessons learned.	November 2028	December 2028

6.0 Conclusion

Hydro is proposing to supply and install a newly designed runner on Unit 2 in Cat Arm. Without the replacement of the runner, the unit will continue to deteriorate, and its reliability will decrease. As recommended by Litostroj Hydro and confirmed/accepted by Hydro, replacement of the Unit 2 runner with a new runner is the least cost viable option to ensure the continued reliable operation of Unit 2.

Attachment 1

Runner Assessment Report

Litostroj Hydro Inc.

Rev.	Date	Description	Initial
1	2025-12-10	Clarifications added following cusstomer review	JXD

Customer / Client: **NL Hydro**

Agreement / Contrat: **Cat Arm Unit 1 Runner Replacement**

LITOSTROJ HYDRO

Project / Projet: **769**

No. de commande client / Customer Order No.: **2024-101293 JB**

Status	Name / Nom	Signature	Date
Prepared by / Préparé par	JX Denis	JXD	2025-10-29
Checked by / Vérifié par	A Gaudreau	AG	2025-10-29
Approved by / Approuvé par	V Lapointe	VL	2025-11-04

Title/Titre: **Runner Assessment Report**

Department / Département	Internal Doc. No. / No. Document Interne	Project No. / No. Projet	Revision / Révision	Page	Pages
Eng		769	01	1	8

Doc. No. / No. Doc: **769-U1-000-TR-03**

CONTENTS

1 Scope

This document provides a summary of the assessment of the existing runner which was replaced in Cat Arm's unit 1 turbine. It combines the review of the condition of the old runner, the necessary work required for its refurbishment and a cost-benefit analysis of performing such refurbishment in comparison to the acquisition of a new runner.

2 Existing runner assessment

Following the replacement of the existing runner with the spare one in August 2025, Litostroj prepared an assessment report on the existing runner, document 769-U1-100-AR-08.

The general conclusion is as follows:
Multiple indications and defects were revealed after NDT inspection of the runner, including cavitation. Based on the information provided, LHI believes that the runner could be reused if proper repairs (welding and related inspections) are performed.
This assessment report only gives high-level recommendations for the repairs to be done and serve as reference; it does not cover in detail the extent of the repairs to be executed to restore the integrity of the runner. A separate work instruction document should be issued for execution, to describe the repairs to be done.

Litostroj also notes that despite such repairs being possible for extending the life of the existing runner, the following comments should be noted.

If proceeding with a repair approach, one should consider the following:

- Such a repair should be considered a temporary solution. For proper life extension of the turbine, a replacement runner with high-quality materials should be considered.
- A weld repair always leaves a risk of future failure by fatigue around the previously damaged and repaired area.
- Depending on the extent of heating required during the weld repairs, and whether a post-weld heat treatment (PWHT) is applied or not, a risk of dimensional distortion remains and may result in additional rework being required to maintain bucket alignment or assembly tolerancing.

3 Refurbishment

Based on the assessment report, repair recommendations were provided for the costing of the refurbishment. The work includes:

- Excavation and weld repair of the cavitation zones, including intermediate and final NDT
- Excavation and weld repair of the areas with other types of defects, including intermediate and final NDT
- Geometrical inspection prior and after repair
- Cleaning and passivation after weld repair
- Packaging and preparation for shipment
- OPTIONAL sandblast and inspection of remaining painted areas

The cost for such refurbishment work performed under the supervision of Litostroj would of course need to be supplemented with project management, project engineering, QA/QC, transport and markup. However, a budgetary quote for the direct cost related to the repair was obtained from a reputable east-coast workshop and can be summarized as follows (see Appendix C for detailed quote):

Item	Cost
General inspections, cleaning, passivation, packaging	53,245$
Buckets repairs (#1 to #21)	540,630$
OPTIONAL sandblast and inspection of painted surfaces	33,125$
TOTAL DIRECT COST FOR SHOP WORK	**627,000$**

The estimated duration for the work (shop work only) is estimated at 32 weeks.

4 Cost-benefit analysis

While the budgetary estimation for the shop work only comes from a single source, it can be seen that the cost for the refurbishment is substantial. As mentioned above, the total price for performing the work would be marked up and added to the transport and other indirect costs related. The rough order of magnitude following these additions would bring the refurbishment price close to 975,000$.

As mentioned in section 2 above, a series of repairs as suggested in this report still leaves residual risks of subsequent failure on the runner. It is therefore not possible to precisely define the remaining life expectancy of the runner after repairs. It certainly extends its useable life and makes it suitable for reuse, but it is not realistic to expect the runner to last for more than 50% of its original design life (normally designed for 50 years [1]). *NOTE THAT THIS LIFETIME DURATION IS AN ESTIMATE, NOT A PRECISE CALCULATION* [2].

Litostroj had also provided budgetary prices for new replacement runners in May of 2025. Based on this estimation, a first replacement in-kind runner was valued at approximately 1,905,900$. A first runner with revised hydraulic design was valued at approximately 1,989,100$.

[1] Litostroj uses 50 years as design criteria. This is also an industry recognised design criteria found in most new runner specifications.

[2] A best case estimate for repair duration is estimated at 25 years. *A worst case scenario could see a lifetime as short as 5 years.*

Based on the budgetary numbers above, the following table summarizes the cost-benefit analysis:

Runner type	Budgetary value	Lifetime (est) *	$/y	Qualitative comments
Refurbished (worst case)	975,000$	5	194,250$	Risk of premature wear or failure
Refurbished (best case)	975,000$	25	38,850$	Risk of premature wear or failure
New – In-kind	1,905,900$	50	38,118$	
New – revised hyd.	1,989,100$	50	39,782$	Potential reduction of cavitation effect

*: Lifetime durations listed here are for the purpose of the cost-benefit analysis. They can be considered as full-time operation.

5 Final recommendations

In conclusion, the assessment report and this analysis provide relative comparison of the cost related to the reuse or replacement of the Cat Arm U1 runner.

The analysis interestingly shows a similar cost per year for all three solutions, all of them being grouped within 2,000$/y. A few considerations are, however, important to consider:

1. The refurbishment of the existing runner requires some significant excavation and repair work, which leaves residual risk of failure in the runner, despite restoring its geometry and allowing it to return in operation. The excavation and repair work also presents the risk of additional findings which could lead to additional repairs and consequently increase the cost of this solution.

2. On the other hand, the replacement of the runner with a new one (either in kind or with revised hydraulics) represents a greater initial investment cost, but ensure fresh/sound material and a full lifetime.

It should be noted that the analysis presented above is based on Litostroj's knowledge, the observations made through the inspections and the estimations of the value of the work, in preliminary stage. It is meant to provide an appreciation of the cost to NL Hydro and does not represent a firm quote or price.

Finally, it should be noted that a standard warranty for a new runner is 1 year and can be extended if required by NLH up to 5 years (some price impact). For a repaired runner however, no such warranty can be provided besides insurance coverage for the parts during the work.

Based on the above, Litostroj's recommendation is to proceed with a new runner with revised hydraulics. With equivalent cost per year and less residual risk, it seems like this solution would bring maximum value to NL Hydro. The final decision should however be taken by NL Hydro and include all other decision criteria that are relevant to NL Hydro and that may not be visible to Litostroj.

Litostroj remains available to discuss further actions or support NL Hydro in this evaluation.

Appendix A – Assessment report 769-U1-100-AR-08

LITOSTROJ HYDRO

Assessment report

769-U1-100-AR-08 Rev 1

Project: Cat Arm
Project name: CAT U1 Runner Replacement
Unit: 01
NCR/AR title: U1 runner NDT & dimensional inspection

Type: ☐ Non-conformance
☐ Supplier
☐ Site
☐ Others (define):
☒ AR (assessment report)

1- Nature of problem and action proposed: ☐ Replace, ☐ Rework, ☒ Repair, ☐ Use as is

Schedule Impact: ☐ YES ☒ NO	Technical or performance Impact: ☐ YES ☒ NO
Cost Impact: ☒ YES ☐ NO	Operational risk Impact: ☐ YES ☒ NO

See attached inspection report(s).

Attachment no.	Attachments title
1	Rapport Q25-39060A-001—007-VMP-CAT Arm generation station_2025-08-27.pdf
2	AB25-0356 - NL Hydro Cat Arm - Unit #1 old runner wear analysis - 2025-09-23 REV A

Firm	Printed name	Initial	Date
LHI	Stephane Viau	SV	2025-08-20

2- Engineering disposition (LHI): ☐ Replace, ☐ Rework, ☒ Repair, ☐ Use as is

Revision 1:

- General revision. Changes after review of the dimensional inspection report (attachment no. 2).

General:

Multiple indications and defects were revealed after NDT inspection of the runner (attachment #1). Based on the information provided, Litostroj Hydro (LHI) believe that the runner can be reused if proper repairs and subsequent inspections are performed.

Dimensional inspection (attachment #2) has not revealed any significant deviation between the existing runner and the spare runner. Moreover, both runners (spare one installed into unit 1 and the one removed from unit 1) correspond to the OEM drawing.

This assessment report provides high-level recommendations for the repairs to be done and serve as reference; it does not cover in detail the extent of the repairs to be executed to restore the integrity of the runner. A separate work instruction document will be issued for execution, to detail the repairs to be done.

Important notes:

- LHI recommends sending the runner in shop for repairs. Although it is possible to perform repairs on site, shop repairs provide for a more controlled environment, more access to qualified personnel and make machining available if hand grinding and polishing is not sufficient for repairs.
- Repairs described in this disposition are recommended based on the current runner condition, which is affected by its service operation (quality of water, hours of operation per year) prior to its removal from unit 1. LHI based its recommendations for a similar service operation once the runner will be put back in operation.

LITOSTROJ HYDRO

Assessment report

- Given the quantity, size and location of defects, it is recommended to perform weld repair without post weld head treatment (PWHT), to avoid deformation on machined surfaces. The recommendation is based on limited depth of repair, described below. Should defects' grinding within depth limitation be insufficient to completely remove a defect, a new assessment would be required from LHI engineering, which could recommend PWHT for sound repair of the damage, as the quantity of filler material required will significantly increase, resulting in difficulty to control cooling after welding. Welding repairs on martensitic stainless steel, even performed while controlling cooling rate, can result in locally less ductile zones which can reduce fatigue life of the runner, especially in a Pelton runner. Given the location of the identified defects, the risk is considered low but cannot be entirely discounted.
- Site inspection was performed on the runner which has paint on some of its surfaces. It is recommended, prior to repairs, that the paint be removed and that the inspection (769-U1-000-WI-01, section 4.3) be carried on zones previously covered by paint. Paint abatement can be done on site using paint stripper or in shop by sand blasting. The paint can hide important defects and indications, especially in high-stresses zones. Additional findings may be reported in a separate inspection report and submitted for review. An update to the engineering disposition would be given afterward.

High-level description of the recommended repairs:

1. On typical cavitation defects:
    - Applicability:
        - Typical cavitation defects on all buckets, primarily affecting zones I and II of the buckets. (ref Attachment no.1, pages 2-4)
    - Repairs:
        - Excavate locally to a maximum depth of 1/3 the local thickness, or up to ¼" (6.35 mm) deep, until inspection by magnetic particles (MT 70-4 class 1) or liquid penetrant (PT 70-4 class 1) in the excavated area has passed acceptance criteria. If a defect remains after excavation depth limitations are reached, provide a mapping of remaining defect, including size of excavated area, to LHI engineering for review and wait of additional instructions before proceeding any further.
        - Proceed with weld repair* in the excavated zone.
        - Grind welded zone to smooth surface and restore original profile. The target surface finish is given by the OEM drawing (M-1602-150-067 – Runner). Waviness must be lower than 0.5 mm (0.020") in the vicinity of the repaired zone. Control of the geometry would be done using a template made from the 3D scan of the buckets.
        - Perform NDT inspection of the repaired zone and the surrounding area using the same instructions as initial NDT inspection (769-U1-000-WI-01, section 4.3).
2. On major defects exhibiting significant loss of material or cracks:
    - Applicability:
        A. Loss of material (1.25" x 1") and adjacent crack in zone I of bucket #1. (Ref. Indication #1 in Attachment no.1, page 27).
        B. Crack (0.25") in zone I of bucket #10. (Ref. Indication #1 in Attachment no.1, page 31)
    - Repairs:
        - If significant loss of material is observed (A), mechanical work on the contour of the defect is needed for complete joint penetration weld preparation.
        - If a crack is observed (A and B), it is recommended to remove material surrounding the crack completely and perform mechanical work on the contour for complete joint penetration weld preparation.

LITOSTROJ HYDRO

Assessment report

- Proceed with weld repair* in the zone prepared for CJP welding.
- Grind welded zone to smooth surface and restore original profile. The target surface finish is given by the OEM drawing (M-1602-150-067 – Runner). Waviness must be lower than 0.5 mm (0.020") in the vicinity of the repaired zone. Control of the geometry would be done using a template made from the 3D scan of the buckets.
- Perform NDT inspection of the repaired zone and the surrounding area using the same instructions as initial NDT inspection (ref doc…).

3. On rounded and linear indications found by liquid penetrant inspection (PT 70-4):
   - Applicability:
     - All indications not meeting acceptance criteria for their respective class of PT 70-4, only for the ones present in zones I to V (inside of the bucket in direct contact with water jets). (Ref. Attachment no.1, pages 23-24)
   - Repairs:
     - Excavate locally to a maximum depth of 1/3 the local thickness, or up to ¼" (6.35 mm) deep, until inspection by magnetic particles (MT 70-4 class 1) or liquid penetrant (PT 70-4 class 1) in the excavated area has passed acceptance criteria. If a defect remains after excavation depth limitations are reached, provide a mapping of remaining defect, including size of excavated area, to LHI engineering for review and wait of additional instructions before proceeding any further.
     - Proceed with weld repair* in the excavated zone.
     - Grind welded zone to smooth surface and restore original profile. The target surface finish is given by the OEM drawing (M-1602-150-067 – Runner). Waviness must be lower than 0.5 mm (0.020") in the vicinity of the repaired zone. Control of the geometry would be done using a template made from the 3D scan of the buckets.
     - Perform NDT inspection of the repaired zone and the surrounding area using the same instructions as initial NDT inspection (ref doc…).
4. All surfaces: mechanical wear marks such as tool marks, light scratches, weld splatters, weld arc marks, and other defects not categorized as cracks or cavitation defects, and wear marks on the contact surfaces and those surrounding the bolt holes out of the high-stressed zones:
   - Grinding and polishing to break sharp edges and restore surface finish, as required.
5. Long-term surface protection:
   - Since paint has proven non-lasting on some of the accessible surfaces, LHI believes it is not necessary to repaint the runner. Some surfaces are difficult to access and prepare properly, which can lead to poor results.
   - Instead, the runner can be passivated to protect surfaces exposed to air against corrosion.
   - Alternatively, surfaces exposed to air during storage can be coated using a rust inhibitor made for long term storage that can be removed before return to service.

* Weld repairs: a qualified welding procedure (s) per ASME *Boiler and Pressure Vessel Code* Section IX must be approved before execution of the repairs. The runner is made of ASTM A743 CA6-NM, which is martensitic cast stainless steel. The preferred material to be used, especially for structural repairs (section 2.0), is 410NiMo because it has a composition similar to the base material. For minor repairs, the use of 308L/309L (dissimilar composition) is acceptable. Given that the defects are small and in low stressed zones, it is acceptable not to included post weld heat treatment (PWHT) after welding in the procedure. Required pre- and post-heating shall be discussed with the supplier to limit hardness in the heat-affected zones.

Describe supplemental inspection to be added to ITP (W or H point, before, during or after disposition)

n/a

Attachment no.	Attachments title

LITOSTROJ HYDRO

Assessment report

n/a	n/a

Firm	Printed name	Initial	Date
LDV	Hugo L.-Carrière	HLC	2025-09-22 (rev 0) 2025-10-24 (rev 1)

3- Customer / client: decision and comments ☐ Satisfactory ☐ Not-satisfactory

Firm	Printed name	Initial	Date

4- Verification that work is complete (LHI quality representative): ☐ Satisfactory ☐ Not-satisfactory

Firm	Printed name	Initial	Date

LITOSTROJ HYDRO

Assessment report

Attachment #1

NDT report

36 pages, including this one.

MISTRAS
Division Québec

Rapport / Report	Q25- 39060A-001			
		1	de/of	33

Visuel / VISUAL

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
CAT Arm generating station, runner U1	Description Visual inspection on runner	

Doc. de référence / Reference Doc.				Technique / Method
Norme / Code	CCH 70-4	Année / Year	2014	200-VT-004
Section	VT 70-4	Critères/ Criteria	4.3.2	Rev.4

Détails de l'inspection / Inspection details

Visual inspection performed at 100% of runner on accessibles area.

Results ; Cavitation were found on each bucket.

Weld spatter, arc stricke, scracthes were found on runner, see table next pages.

Technicien / Technician :	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
Manuel Audet	2025-08-27	*Manuel Audet*	CSA W178.2	2	LC

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Rapport / Report	Q25- 39060A-001			
	Page	2	*de/of*	33

Visuel / VISUAL

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generating station, runner U1	Visual inspection on runner	

Détails de l'inspection / Inspection details

Indications visually found on the buckets #1 to #8

Visual bucket inspection indications

Bucket #1			Bucket #2		
# Indication	Measurements	Comments	# Indication	Measurements	Comments
#1	1,25"x1"	Crack in bucket (chip removed)	#1	3"x2,75"	Cavitation
#2	1,75"x1,25"	Cavitation	#2	2,5"x1,5"&1,5"x0,75"	Cavitation
#3	1,5"x1"	Cavitation	#3	10"x1,375"	Cavitation
#4	10,5"x0,5"	Cavitation	#4	1,25"x0,375"	Cavitation
#5	0,75"x0,25"	Cavitation	#5	2,5"x0,75"	Cavitation
#6	3,5"x0,5"	Cavitation	#6	5"x0,5"	Cavitation
#7	3,5"x1"	Cavitation	#7	0,125"	Indication in casting
#8	0,5"x0,25"	Indication in casting			
Bucket #3			Bucket #4		
# Indication	Measurements	Comments	# Indication	Measurements	Comments
#1	3"x2"	Cavitation	#1	3,25"x2"	Cavitation
#2	2,25"x2,75"	Cavitation	#2	3,5"x3"	Cavitation
#3	16"x1,5"	Cavitation	#3	15"x1,875"	Cavitation
#4	3"x1,5"	Cavitation	#4	0,75"x0,25"	Cavitation
#5	0,75"x0,25"	Cavitation	#5	3,5"x1,5"	Cavitation
#6	0,75"x0,75"	Cavitation	#6	2,75"x0,75"	Cavitation
			#7	-	Welding spatters
			#8	-	Welding spatters
Bucket #5			Bucket #6		
# Indication	Measurements	Comments	# Indication	Measurements	Comments
#1	3,25"x2,25"	Cavitation	#1	2,5"x3,25"	Cavitation
#2	2,25"x2,5"	Cavitation	#2	2"x2"	Cavitation
#3	11,5"x2"	Cavitation	#3	10"x1,75"	Cavitation
#4	1,75"x0,5"	Cavitation	#4	1"x0,25"	Cavitation
#5	4"x1"	Cavitation	#5	3,5"x0,5"	Cavitation
#6	3"x1"	Cavitation	#6	2,5"x1"	Cavitation
Bucket #7			Bucket #8		
# Indication	Measurements	Comments	# Indication	Measurements	Comments
#1	4"x2"	Cavitation	#1	3"x2,75"	Cavitation
#2	3,75"x2"	Cavitation	#2	3,25"x2,5"	Cavitation
#3	10"x2"	Cavitation	#3	14"x2"	Cavitation
#4	0,75"x1,25"	Cavitation	#4	1,25"x0,25"	Cavitation
#5	3"x0,5"	Cavitation	#5	5"x0,5"	Cavitation
#6	4"x0,5"	Cavitation	#6	4"x0,5"	Cavitation
			#7	Ind. 0,125"	Damaged area
			#8	Ind. 0,125"	Damaged area
			#8A	-	Welding spatters

Technicien / Technician :	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
Manuel Audet	2025-08-27	*Manuel Audet*	CSA W178.2	2	LC

MISTRAS
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Rapport / Report	Q25- 39060A-001			
	Page	3	*de/of*	33

Visuel VISUAL

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generating station, runner U1	Visual inspection on runner	

Détails de l'inspection / Inspection details

Indications visually found on the buckets #9 to #16

Visual bucket inspection indications

Bucket #9			Bucket #10		
# Indication	Measurements	Comments	# Indication	Measurements	Comments
#1	4"x2"	Cavitation	#1	2,5"x2"	Cavitation
#2	3"x2,5"	Cavitation	#2	2,5"x2,25"	Cavitation
#3	15"x1,875"	Cavitation	#3	14"x1,875"	Cavitation
#4	1"x0,25"	Cavitation	#4	1,375"x0,5"	Cavitation
#5	4"x0,75"	Cavitation	#5	3,5"x0,5"	Cavitation
#6	4,5"x,5"	Cavitation	#6	4"x0,5"	Cavitation
			#7	-	Arc strike
			#8	4,75"	Edge of bucket damaged
Bucket #11			Bucket #12		
# Indication	Measurements	Comments	# Indication	Measurements	Comments
#1	2,5"x2,5"	Cavitation	#1	3,25"x2"	Cavitation
#2	3"x2"	Cavitation	#2	3"x1,5"	Cavitation
#3	15"x1,875"	Cavitation	#3	15"x1,875"	Cavitation
#4	1,75"x0,375"	Cavitation	#4	1,5"x0,25"	Cavitation
#5	4"x0,75"	Cavitation	#5	4,5"x0,5"	Cavitation
#6	3,5"x0,75"	Cavitation	#6	2,75"x0,5"	Cavitation
#7	-	Welding spatters			
#8	-	Welding spatters			
#9	-	Scratch			
Bucket #13			Bucket #14		
# Indication	Measurements	Comments	# Indication	Measurements	Comments
#1	3"x2,5"	Cavitation	#1	3"x1,5"	Cavitation
#2	3"x2"	Cavitation	#2	3"x2,25"	Cavitation
#3	13"x1,75"	Cavitation	#3	14"x1,875"	Cavitation
#4	1"x0,25"	Cavitation	#4	1,25"x0,375"	Cavitation
#5	4"x0,5"	Cavitation	#5	2,75"x0,75"	Cavitation
#6	4"x0,5"	Cavitation	#6	3,75"x0,5"	Cavitation
Bucket #15			Bucket #16		
# Indication	Measurements	Comments	# Indication	Measurements	Comments
#1	3"x2,5"	Cavitation	#1	3,5"x2"	Cavitation
#2	3,5"x2"	Cavitation	#2	3"x2"	Cavitation
#3	14"x1,375"	Cavitation	#3	13,5"x1,5"	Cavitation
#4	6"x0,75"	Cavitation	#4	0,75"x0,25"	Cavitation
#5	3,75"x1"	Cavitation	#5	4"x0,75"	Cavitation
#6	-	Scratch	#6	3,5"x0,5"	Cavitation

Technicien / Technician :	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
Manuel Audet	2025-08-27	*Manuel Audet*	CSA W178.2	2	LC

MISTRAS
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Rapport / Report	Q25- 39060A-001			
	Page	4	*de/of*	33

Visuel VISUAL

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generating station, runner U1	Visual inspection on runner	

Détails de l'inspection / Inspection details

Indications visually found on the buckets #17 to #21

Visual bucket inspection indications

Bucket #17			Bucket #18		
# Indication	Measurements	Comments	# Indication	Measurements	Comments
#1	3"x2,5"	Cavitation	#1	2,5"x2"	Cavitation
#2	3"x2,5"	Cavitation	#2	3"x2"	Cavitation
#3	15"x1,75"	Cavitation	#3	14"x0,5"	Cavitation
#4	0,75"x0,25"	Cavitation	#4	1"x0,375"	Cavitation
#5	4,5"x0,5"	Cavitation	#5	2,5"x0,5"	Cavitation
#6	3"x0,5"	Cavitation	#6	4"x0,625"	Cavitation
#7	-	Tool mark			

Bucket #19			Bucket #20		
# Indication	Measurements	Comments	# Indication	Measurements	Comments
#1	2,5"x2"	Cavitation	#1	2,5"x2"	Cavitation
#2	3"x1,5"	Cavitation	#2	2,5"x2"	Cavitation
#3	13"x1,75"	Cavitation	#3	14"x1,5"	Cavitation
#4	1,5"x0,375"	Cavitation	#4	1,25"x0,25"	Cavitation
#5	4"x0,625"	Cavitation	#5	4"x0,5"	Cavitation
#6	3"x0,5"	Cavitation	#6	4"x0,5"	Cavitation

Bucket #21		
# Indication	Measurements	Comments
#1	3"x1,75"	Cavitation
#2	2,5"x1,25"	Cavitation
#3	13"x1,5"	Cavitation
#4	4,5"x0,875"	Cavitation
#5	6"x0,625"	Cavitation

Technicien / Technician :	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
Manuel Audet	2025-08-27	*Manuel Audet*	CSA W178.2	2	LC

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Rapport / Report	Q25- 39060A-001			
	Page	5	*de/of*	33

Visuel / VISUAL

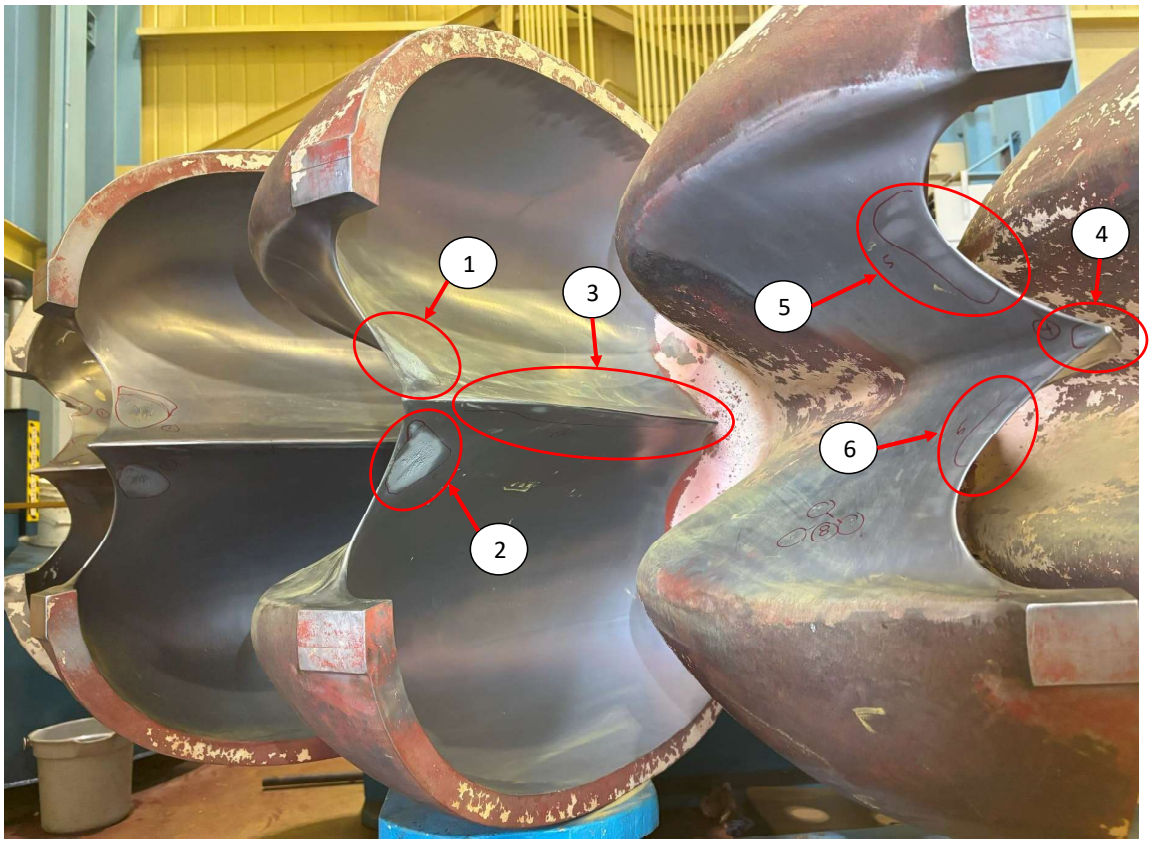
Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generating station, runner U1	Visual inspection on runner	

Détails de l'inspection / Inspection details

Pictures on indications founds ; Cavitation found on each bucket, listed indication #1 to #6.

See the images of cavitation observed on the buckets. We have included some photos.

Cavitation found at same places on each bucket



Technicien / Technician :	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
Manuel Audet	2025-08-27	*Manuel Audet*	CSA W178.2	2	LC

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Rapport / Report	Q25- 39060A-001			
	Page	6	de/of	33

Visuel / VISUAL

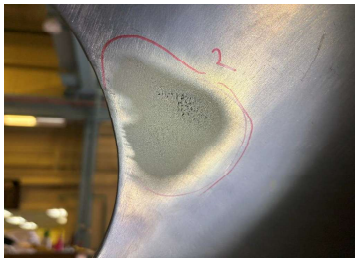
Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generating station, runner U1	Visual inspection on runner	

Détails de l'inspection / Inspection details

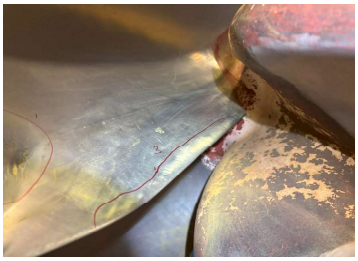
Pictures of bucket #10

Cavitation area #1

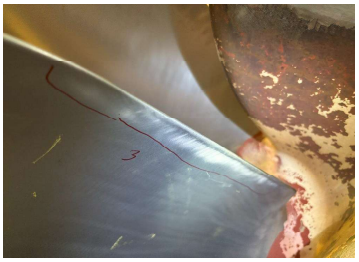
Cavitation area #2



Cavitation area #3



Cavitation area #3



Technicien / Technician :	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
Manuel Audet	2025-08-27	Manuel Audet	CSA W178.2	2	LC

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Rapport / Report	Q25- 39060A-001			
	Page	7	*de/of*	33

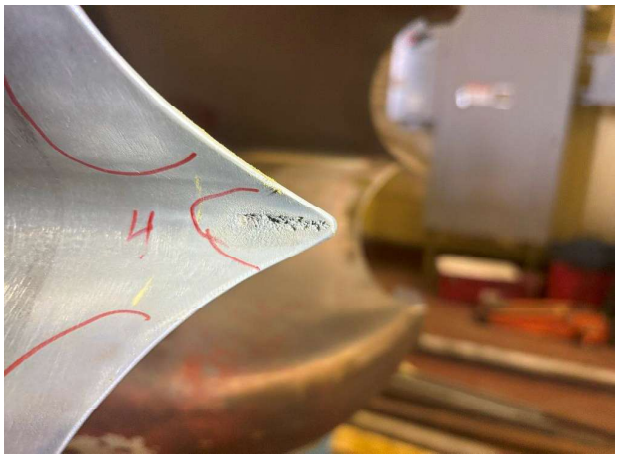
Visuel / VISUAL

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generating station, runner U1	Visual inspection on runner	

Détails de l'inspection / Inspection details

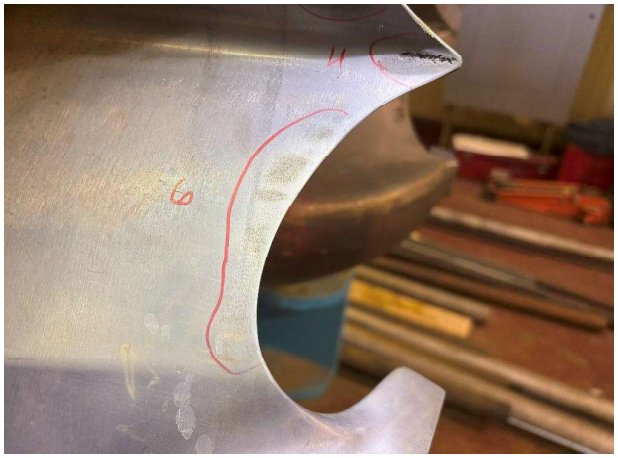
Pictures of bucket #10

Cavitation area #4



Cavitation area #5

Cavitation area #6



Technicien / Technician :	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
Manuel Audet	2025-08-27	*Manuel Audet*	CSA W178.2	2	LC

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Rapport / Report	Q25- 39060A-001			
	Page	8	*de/of*	33

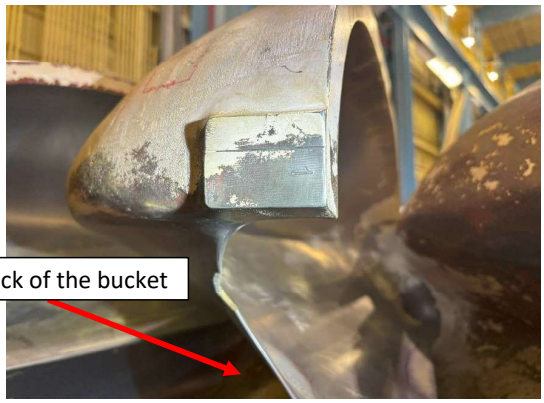
Visuel / VISUAL

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generating station, runner U1	Visual inspection on runner	

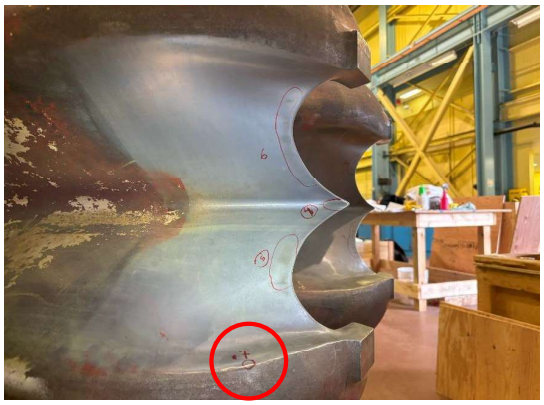
Détails de l'inspection / Inspection details

Pictures of indications found other than cavitation ;

Bucket #1 ; Indication #8 in casting located in zone VII.



Bucket #2 ; Indication #7 in casting located in zone VI.



Lenght 1/8"

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Rapport / Report	Q25- 39060A-001			
	Page	9	*de/of*	33

Visuel / VISUAL

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Litostroj	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generating station, runner U1	Visual inspection on runner	

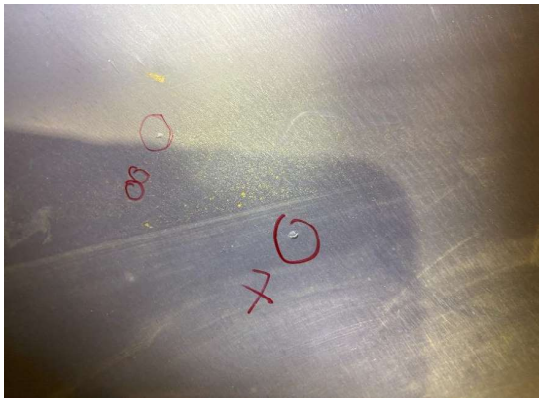
Détails de l'inspection / Inspection details

Bucket #4 ; Indications #7 and #8, welding spatters



Bucket #8 ; Indication #7, #8; damaged area on machined surface inside bucket.

Indication #8A; welding spatters.




Technicien / Technician :	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
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Rapport / Report	Q25- 39060A-001			
	Page	10	*de/of*	33

Visuel / VISUAL

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Litostroj	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generating station, runner U1	Visual inspection on runner	

Détails de l'inspection / Inspection details

Bucket #10 ; Indication #7 ; arc strike

Indication #8 ; Edge of the bucket damaged.

Technicien / Technician :	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
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Rapport / Report	Q25- 39060A-001			
	Page	11	*de/of*	33

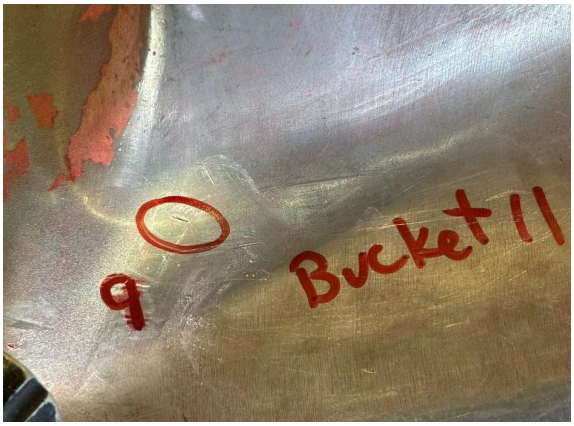
Visuel / VISUAL

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generating station, runner U1	Visual inspection on runner	

Détails de l'inspection / Inspection details

Bucket #11 ; Indication #7 and #8 ; welding spatters, no pictures.

Indication #9 ; scratch



Bucket #15 ; Indication #6 ; scratch

Technicien / Technician :	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
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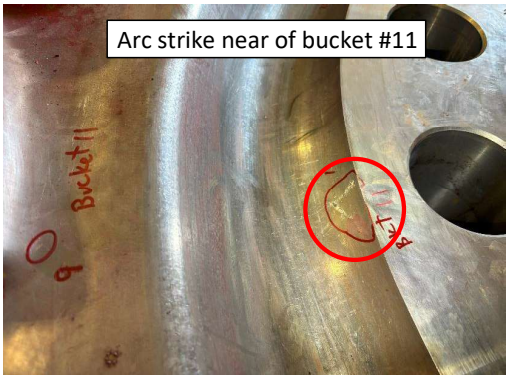
Rapport / Report	Q25- 39060A-001			
	Page	12	*de/of*	33

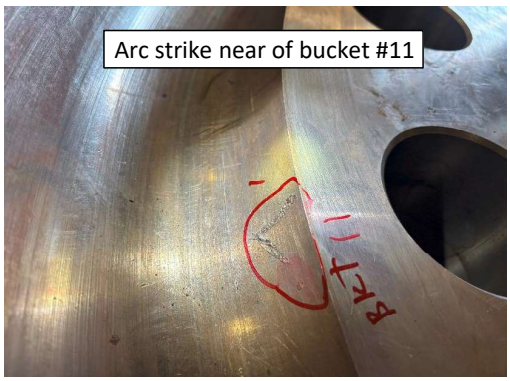
Visuel / VISUAL

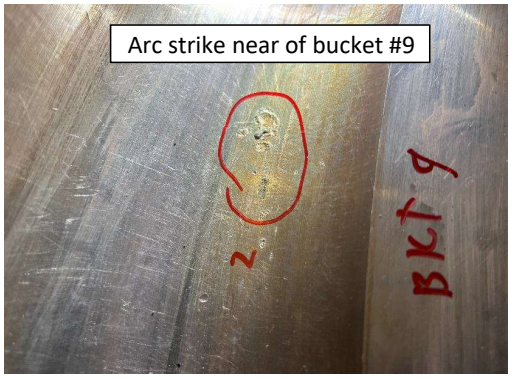
Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generating station, runner U1	Visual inspection on runner	

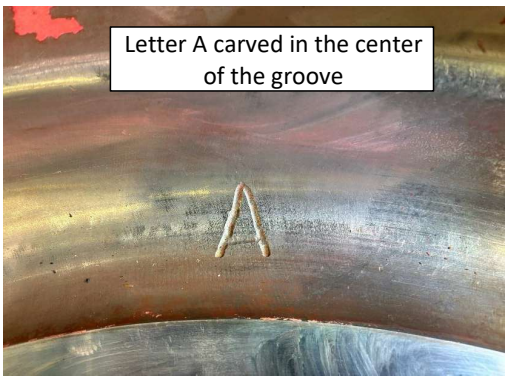
Détails de l'inspection / Inspection details

Visual inspection on center of runner (top) ; No crack found visually or by magnetic particle inspection.









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Rapport / Report	Q25- 39060A-001			
	Page	13	*de/of*	33

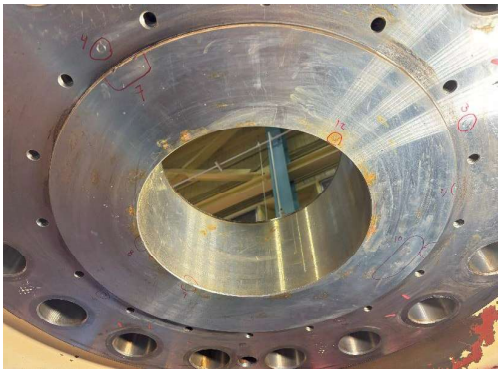
Visuel / VISUAL

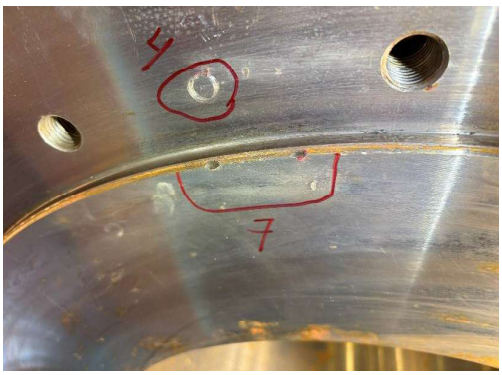
Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generating station, runner U1	Visual inspection on runner	

Détails de l'inspection / Inspection details

Visual inspection on center of runner (top) ; We found several tool marks and scratches under the runner.

Indications #3 to #19. See pictures below and next pages.





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Manuel Audet	2025-08-27	*Manuel Audet*	CSA W178.2	2	LC

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Rapport / Report	Q25- 39060A-001			
	Page	14	*de/of*	33

Visuel / VISUAL

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generating station, runner U1	Visual inspection on runner	

Détails de l'inspection / Inspection details

Pictures of indications found under the runner.

Technicien / Technician :	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
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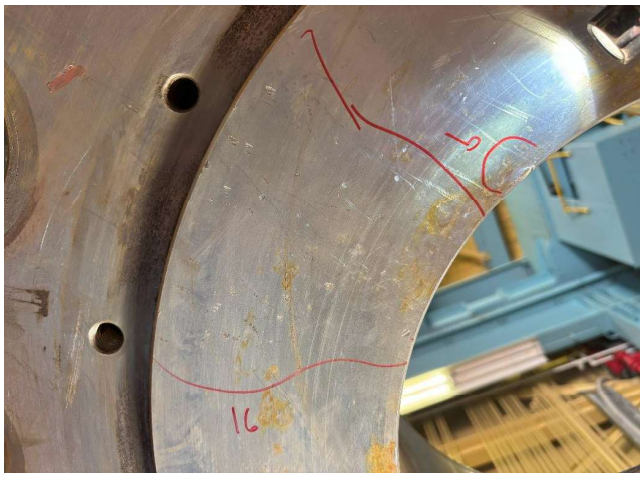
Rapport / Report	Q25- 39060A-001			
	Page	15	*de/of*	33

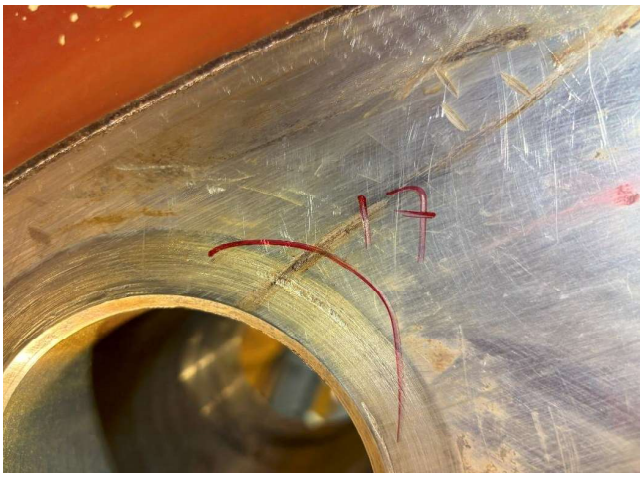
Visuel / VISUAL

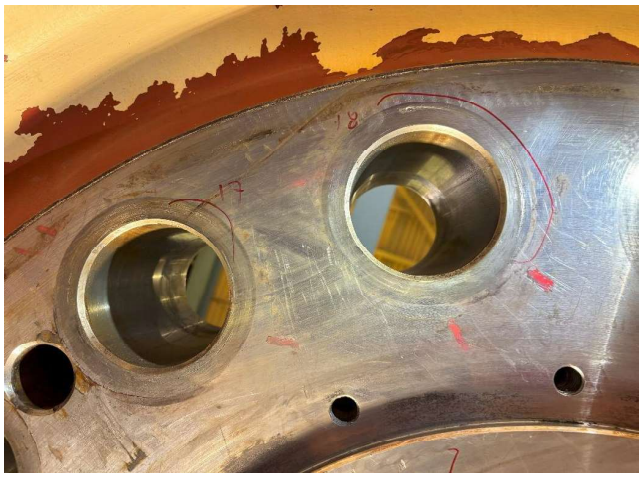
Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generating station, runner U1	Visual inspection on runner	

Détails de l'inspection / Inspection details

Pictures of indications found under the runner.







Technicien / Technician :	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
Manuel Audet	2025-08-27	*Manuel Audet*	CSA W178.2	2	LC

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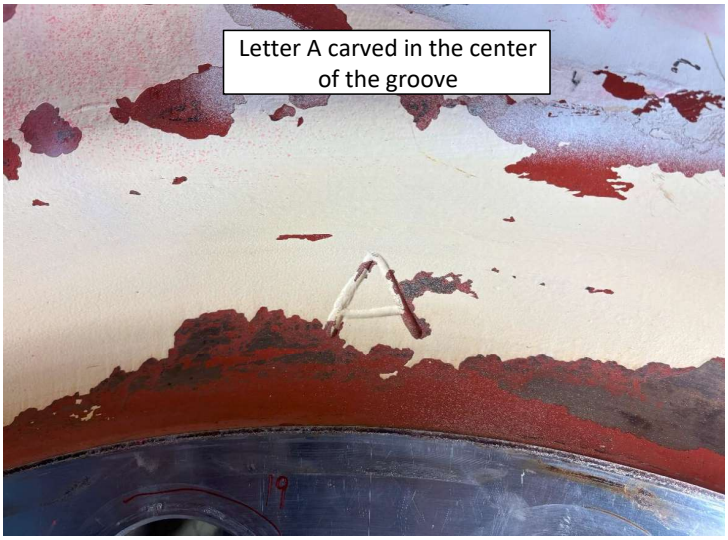
Rapport / Report	Q25- 39060A-001			
	Page	16	*de/of*	33

Visuel / VISUAL

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generating station, runner U1	Visual inspection on runner	

Détails de l'inspection / Inspection details

Pictures of indications found under the runner.



Technicien / Technician :	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
Manuel Audet	2025-08-27	*Manuel Audet*	CSA W178.2	2	LC

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Rapport / Report	Q25- 39060A-001		
	Page 17	de/of	33

Magnétoscopie / Magnetic Particle

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj Hydro	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project: CAT Arm generation station, runner U1	Description: Magnetic particle inspection on runner	

Technique	Courant / Current		Matériau / Material
☑ Poudre sèche / Dry Powder	☑ AC	6 amperes	carbon steel alloy
☐ Fluorescent (humide / wet)	☐ DC	Intensité / Intensity	**Méthode / Method**
☐ Noir et blanc / Black & Whit (humide / wet)	**Magnétisation / Magnetization**		☑ Continuelle / Continuous
	☑ Longi. ☐ Circ.		☐ Résiduelle / Residual

Doc. de référence / Reference Doc.		
Norme / Code:	CCH 70-4	
Section:	MT 70-4	
Année / Year:	2014	
Critères / Criteria:	article 6	
Technique / Method	200-MT-001	Rev.13.2

Magnétoscope / Magnetoscope

☐ Aimant / Permanent magnet ☐ Électrodes d'amenée / Prods ☐ Tête magnétisante / Head shot
☑ Culasse / yoke ☐ Serpentin / Coil ☐ Conducteur central /Central conductor

Marque / Mark	Modèle / Model	# Série / Serial #
Magnaflux	Y-1	4763
Levage / Lift test	Poids / Weight	Espacement / Prode spacing
#6	10 lbs	6 inch

Consommable / Consumable

Marque:	Magnaflux
# Lot / Batch	24G070
Couleur / Color	2 yellow

Medium: ☐ Huile/Oil ☐ Eau/Water

Lampe noire / Blacklight

Marque / Mark	Modèle / Model	# Série / Serial #	Intensité / Intensity
N/A	N/A	N/A	N/A

Source lumineuse / Light source

Marque / Mark	Modèle / Model	# Série / Serial #	Intensité / Intensity
Lampe incorporée	Magnaflux	Y-1	4763

Photomètre UV / UV Light Meter

Marque / Mark	Modèle / Model	# Série / Serial #	Cal due
N/A	N/A	N/A	N/A

État de surface / Surface condition

☐ La surface inspectée rencontrait les exigences de la norme ASTM E709 / In accordance with ASTM E709

☑ La surface inspectée ne rencontrait pas les exigences de la norme ASTM E709 / Not in accordance with ASTM E709

☐ Eau / Water ☐ Rouille / Rust
☐ Saleté / Dirt ☑ Peinture / Paint

Magnetic particle inspection was carried out on 100% of the surface of runner in accessible area.

Paint present in certain places which may hide indications.

Results : 1 crack were found on bucket #1.

Pictures : See next pages

Technicien / Technician	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
Manuel Audet	2025-08-27	*Manuel Audet*	ONGC / CGSB	2	LC

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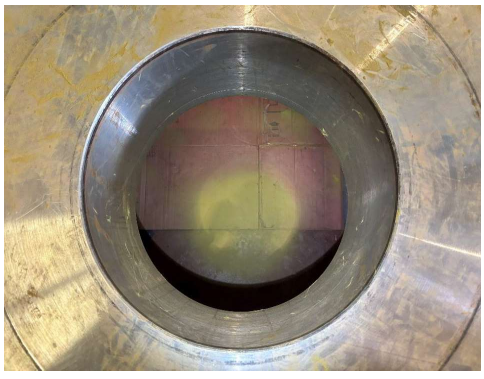
Rapport / Report	Q25- 39060A-001			
	Page	18	*de/of*	33

MT

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj Hydro	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generation station, runner U1	Magnetic particle inspection on runner	

Pictures of areas inspected ;



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Manuel Audet	2025-08-27	Manuel Audet	ONGC / CGSB	2	LC

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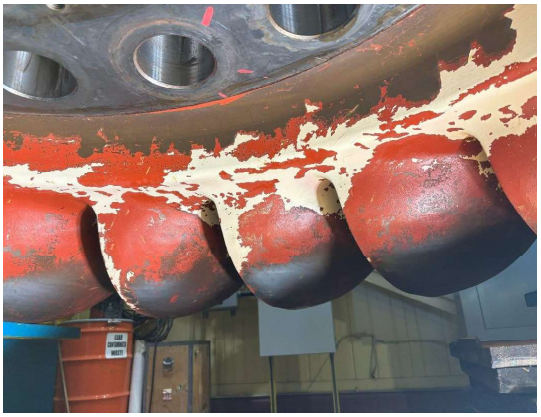
Rapport / Report	Q25- 39060A-001			
	Page	19	*de/of*	33

MT

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj Hydro	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generation station, runner U1	Magnetic particle inspection on runner	

Pictures of areas inspected ; Paint present on surfaces on the bucket. Paint can hide indications.



Technicien / Technician	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
Manuel Audet	2025-08-27	*Manuel Audet*	ONGC / CGSB	2	LC

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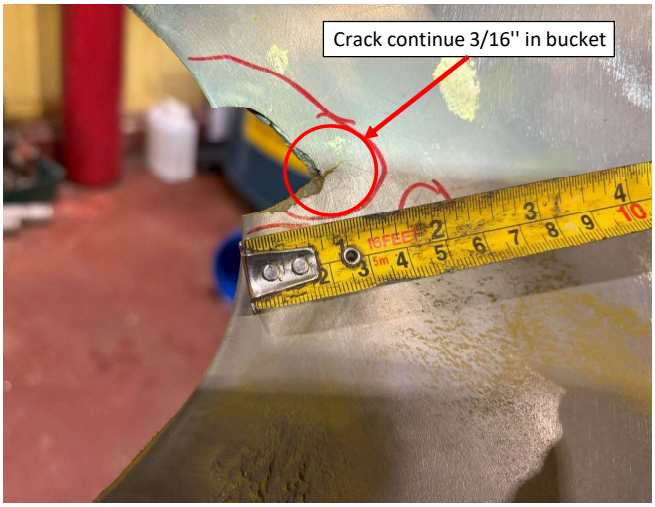
Rapport / Report	Q25- 39060A-001			
	Page	20	*de/of*	33

MT

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj Hydro	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generation station, runner U1	Magnetic particle inspection on runner	

Pictures of defect found ; Crack into bucket #1, zone #1 ; 1.25"x1"



Technicien / Technician	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
Manuel Audet	2025-08-27	*Manuel Audet*	ONGC / CGSB	2	LC

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Division Québec

Rapport / Report	Q25- 39060A-001			
	Page	21	*de/of*	33

Ressuage
LIQUID PENETRANT

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj Hydro	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generation station, runner U1	Liquid penetrant inspection on surfaces of the buckets	

Technique		Matériau / Material	Doc. de référence / Reference Doc.	
☑ Coloré / Visible	☑ Lavable à l'eau / Water-washable	carbon steel alloy		
☐ Fluorescent	☐ Post-émulsifiant / Post-emulsifier	**Technique / Method**	Norme / Code:	CCH 70-4
☐ Solvant / Solvent	☐ Base d'eau / Water base	200-PT-001	Section:	PT 70-4
	☐ Base d'huile / Oil base		Année / Year:	2014
			Critères/ Criteria:	article 4.3

Produits / Products	Penetrant	Emulsifiant / Emulsifier	Révélateur / Developer	Nettoyeur / Cleaner
Marque/Mark	Magnaflux SKL-WP2	-	Magnaflux SKD-S2	water
#Lot/Batch	23D16C	-	24J14C	-

Temps d'examen / Examination time	Pénétration / Penetration :	Emulsification :	Développement / Development :
	20 minutes	-	10 minutes

État de la surface / Surface conditionning

☐ La surface inspectée rencontrait les exigences de la norme ASTM E165. According to ASTM E165.

☑ La surface inspectée ne rencontrait pas les exigences de la norme ASTM E165. Not in accordance with ASTM E165.
☐ Saleté/Dirt ☐ Rouille/Rust ☐ Graisse/Grease ☑ Peinture/Paint ☐

Résultats / Results

Liquid penetrant inspection was carried out on 100% of the surface of the all buckets on accessibles areas.

Paint present in certains places, inspection not completed in theses areas.

Resultats ; Rejectable indications were found, see table and pictures next pages.

LÉGENDE

Surf. : Surface / Surface	L.O.P. : Manque de pénétration / Lack of Penetration	B.T. ; Traversée / Burn Through
C. : Concavité / Concavity	L.O.F. : Manque de Fusion / Lack of Fusion	H.L. : Alignement défecteux / Misalignment
C.K. : Fissure / Crack	I.U.C. : Caniveau intérieur / Inside Undercut	S.I. : Inclusion de Laitier / Slag Inclusion
P. : Porosité / Porosity	O.U.C. : Caniveau Extérieur / Outside Undercut	F/A. : Défaut du film / Film Artefact

Technicien / Technician	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
Manuel Audet	2025-08-27	*Manuel Audet*	ONGC / CGSB	2	LC

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Division Québec

Rapport / Report	Q25- 39060A-001			
	Page	22	*de/of*	33

Ressuage LIQUID PENETRANT

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj Hydro	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generation station, runner U1	Liquid penetrant inspection on surfaces of the buckets	

Résultats / Results

Results of liquid penetrant inspection

We used the standard CH70-4 (PT 70-4) and the procedure 769-U1-100-WI-01 article 4.3.4 to evaluate the indications.

# Bucket	Result	Comments
1	Rejected	4 rejectables indications
2	Rejected	7 rejectables indications
3	Rejected	1 rejectable indication
4	Rejected	2 rejectable indications
5	Rejected	3 rejectable indications
6	Rejected	6 rejectable indications
7	Rejected	3 rejectable indications
8	Rejected	8 rejectable indications
9	Rejected	1 rejectable indication
10	Rejected	2 rejectable indications
11	Accepted	-
12	Rejected	1 rejectable indication
13	Accepted	-
14	Rejected	3 rejectable indications
15	Rejected	1 rejectable indication
16	Accepted	-
17	Rejected	1 rejectable indication
18	Accepted	-
19	Rejected	1 rejectable indication
20	Accepted	-
21	Accepted	-

LÉGENDE

Surf. : Surface / Surface	L.O.P. : Manque de pénétration / Lack of Penetration	B.T. ; Traversée / Burn Through
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Technicien / Technician	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
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Rapport / Report	Q25- 39060A-001			
	Page	23	*de/of*	33

Ressuage LIQUID PENETRANT

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Litostroj Hydro	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generation station, runner U1	Liquid penetrant inspection on surfaces of the buckets	

Résultats / Results

Localisation of indications

Bucket #1		
# indication	Localisation	Comments
1	Zone I	crack
2	Zone IX	3 rounded indications, pitting
3	Zone IX	1 rounded indication, pitting

Bucket #2		
# indication	Localisation	Comments
1	IX	Rounded indication
2	IX	Rounded indication
3	IX	Rounded indication
4	I	Rounded indication
5	I	Rounded indication
6	I	Rounded indication
7	I	Linear indication

Bucket #3		
# indication	Localisation	Comments
1	Zone IX	Rounded indication

Bucket #4		
# indication	Localisation	Comments
1	Zone IX	Rounded indication
2	Zone I	Rounded indication

Bucket #5		
# indication	Localisation	Comments
1	IX	Rounded indication, no picture
2	I	Rounded indication
3	I	Rounded indication

Bucket #6		
# indication	Localisation	Comments
1	Zone IX	Rounded indication
2	Zone IX	Rounded indication
3	Zone IX	Rounded indication
4	Zone VII	Rounded indication
5	Zone II	Linear indication
6	Zone V	Linear indication

Bucket #7		
# indication	Localisation	Comments
1	Zone IX	Rounded indication
2	Zone I	Rounded indication
3	Zone I	Rounded indication

Bucket #8		
# indication	Localisation	Comments
1	Zone I	Rounded indication
2	Zone VII	Rounded indication, pittiing
3	Zone VII	Rounded indication
4	Zone V	Rounded indication
5	Zone VII	Pitting founded visually noted in the paint
6	Zone VII	Pitting founded visually noted in the paint
7	Zone VII	Pitting founded visually noted in the paint
8	Zone VII	Pitting founded visually noted in the paint
9	Zone IX	Rounded indication
10	Zone XI	Rounded indication

Bucket #9		
# indication	Localisation	Comments
1	Zone IX	Rounded indication

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Technicien / Technician	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
Manuel Audet	2025-08-27	*Manuel Audet*	ONGC / CGSB	2	LC

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Rapport / Report	Q25- 39060A-001			
	Page	24	*de/of*	33

Ressuage LIQUID PENETRANT

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj Hydro	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generation station, runner U1	Liquid penetrant inspection on surfaces of the buckets	

Résultats / Results

Localisation of indications

Bucket #10		
# indication	Localisation	Comments
1	Zone I	Crack lenght 1/4''
2	Zone IX	Rounded indication
3	Zone IX	2 casting defects visually founded. No bleeding, indications noted in report.

Bucket #12		
# indication	Localisation	Comments
1	Zone VII	Rounde indication, pitting

Bucket #14		
# indication	Localisation	Comments
1	Zone VIII	Rounded indication, pitting
2	Zone VIII	Rounded indication, pitting
3	Zone VIII	Rounded indication, pitting

Bucket #15		
# indication	Localisation	Comments
1	Zone VIII	3 Rounded indications, pitting

Bucket #17		
# indication	Localisation	Comments
1	Zone VIII	Rounded indications, pitting

Bucket #19		
# indication	Localisation	Comments
1	Zone VIII	3 Rounded indications

LÉGENDE

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MISTRAS
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Rapport / Report	Q25- 39060A-001			
	Page	25	*de/of*	33

Ressuage LIQUID PENETRANT

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Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generation station, runner U1	Liquid penetrant inspection on surfaces of the buckets	

Résultats / Results

We used this drawing to evaluate indications.

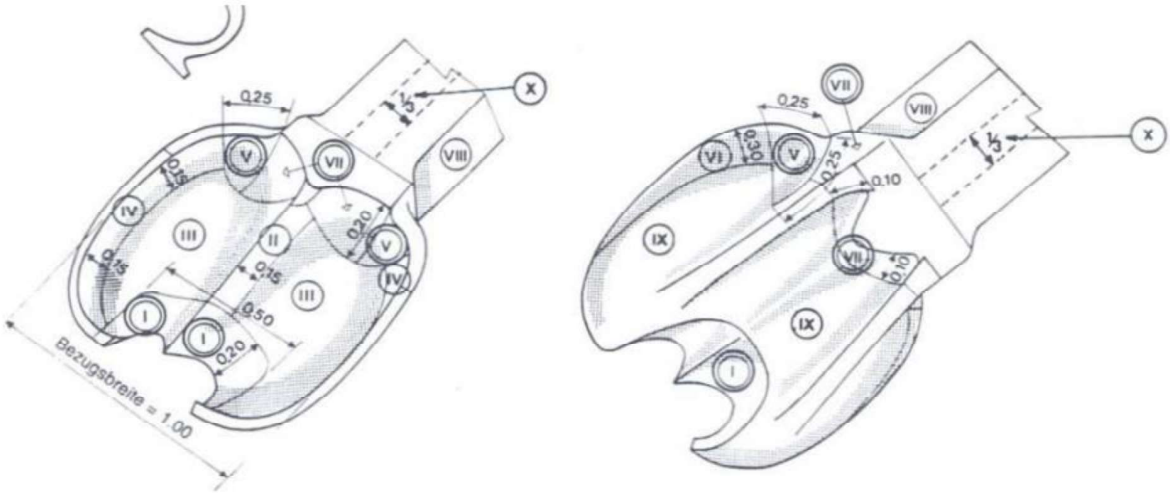

Figure 1 - Inspection zones indication

LÉGENDE

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Rapport / Report	Q25- 39060A-001			
	Page	26	de/of	33

Ressuage
LIQUID PENETRANT

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
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Projet / Project	Description	
CAT Arm generation station, runner U1	Liquid penetrant inspection on surfaces of the buckets	

Résultats / Results

Liquid penetratant performed at 100% on the surfaces of the bucket on accessible areas.

Paint present in certain places, inspection cannot be carried out in these places.

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MISTRAS
Division Québec

Rapport / Report	Q25- 39060A-001			
	Page	27	de/of	33

Ressuage LIQUID PENETRANT

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Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generation station, runner U1	Liquid penetrant inspection on surfaces of the buckets	

Résultats / Results

Pictures of indications founded ;

Refer to figure 1 of procedure 769-U1-100-WI-01 to localise indications.

*** All indications are noted in red on buckets ***

Bucket #1

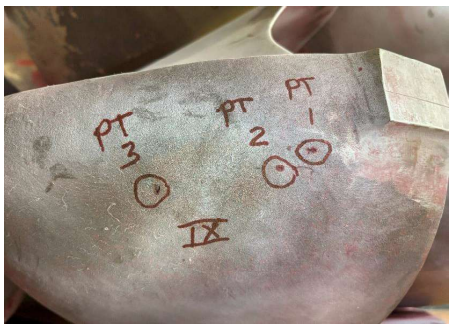
Indication #1 crack 1.25"x1"

Indication #2

Indication #3

Bucket #2

Indication #1- #2 - #3



Indication #4- #5 - #6

Indication #7

LÉGENDE

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Rapport / Report	Q25- 39060A-001			
	Page	28	de/of	33

Ressuage LIQUID PENETRANT

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj Hydro	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generation station, runner U1	Liquid penetrant inspection on surfaces of the buckets	

Résultats / Results

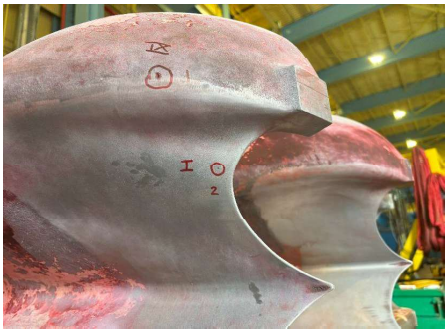
Pictures of indications founded ;

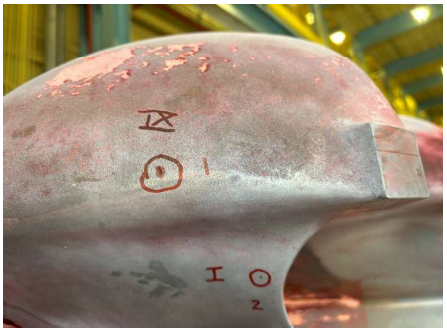
Bucket #3

Indication #1

Bucket #4

Indication #1





Indication #2

LÉGENDE

Surf. : Surface / Surface	L.O.P. : Manque de pénétration / Lack of Penetration	B.T. ; Traversée / Burn Through
C. : Concavité / Concavity	L.O.F. : Manque de Fusion / Lack of Fusion	H.L. : Alignement défecteux / Misalignment
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Rapport / Report	Q25- 39060A-001			
	Page	29	*de/of*	33

Ressuage LIQUID PENETRANT

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj Hydro	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generation station, runner U1	Liquid penetrant inspection on surfaces of the buckets	

Résultats / Results

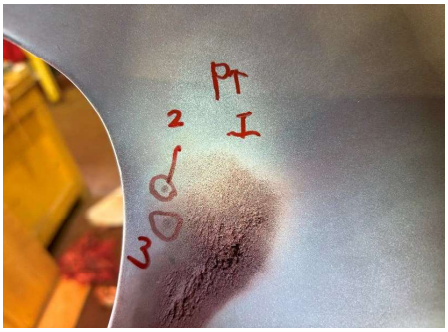
Pictures of indications founded ;

Bucket #5

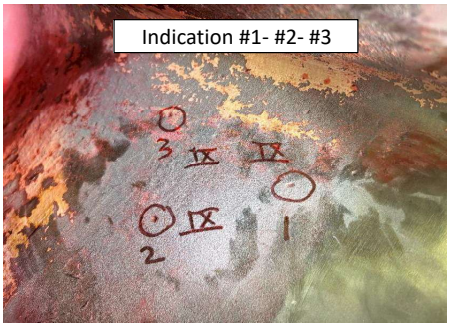
Indication #1

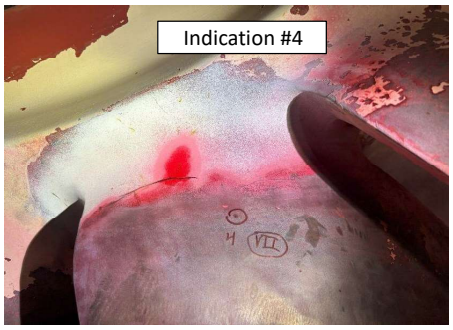
No picture

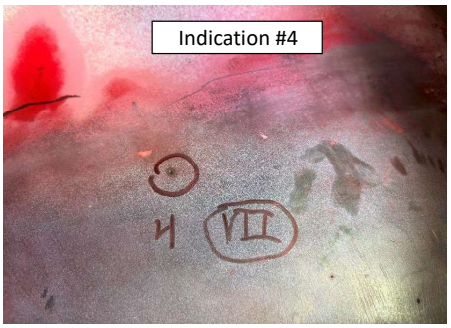
Indication #2 - #3

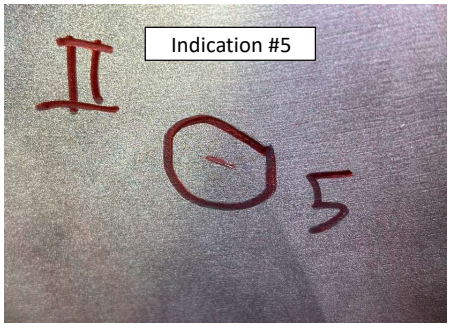


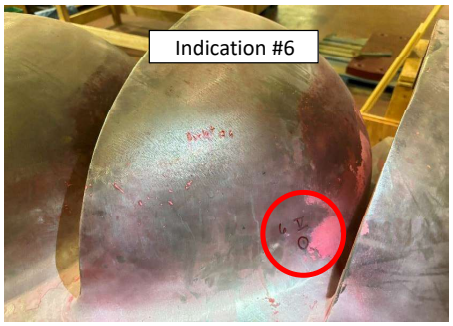
Bucket #6

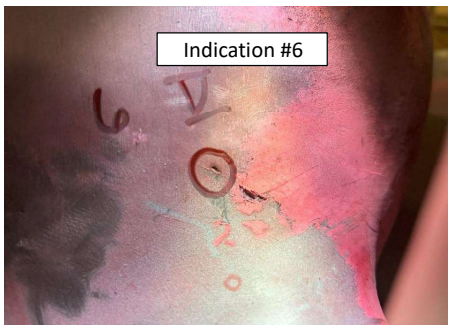












LÉGENDE

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C. : Concavité / Concavity	L.O.F. : Manque de Fusion / Lack of Fusion	H.L. : Alignement défecteux / Misalignment
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Technicien / Technician	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
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Rapport / Report	Q25- 39060A-001			
	Page	30	*de/of*	33

Ressuage LIQUID PENETRANT

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj Hydro	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generation station, runner U1	Liquid penetrant inspection on surfaces of the buckets	

Résultats / Results

Pictures of indications founded ;

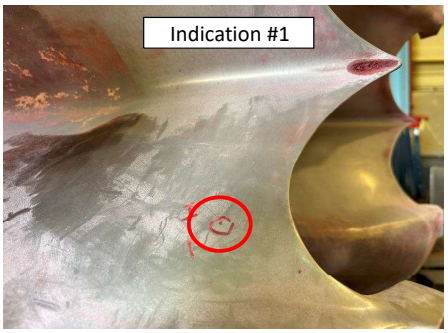
Bucket #7

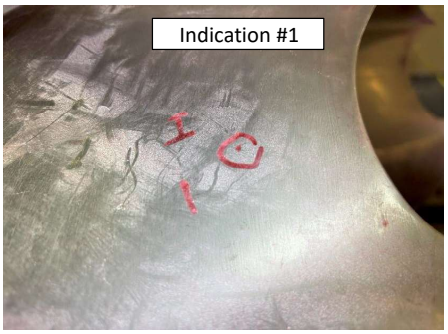
Indication #1

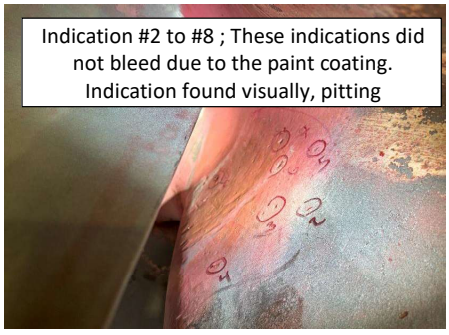
Indication #2 - #3

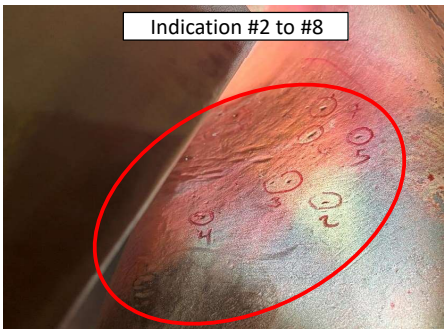
Indication #2 - #3

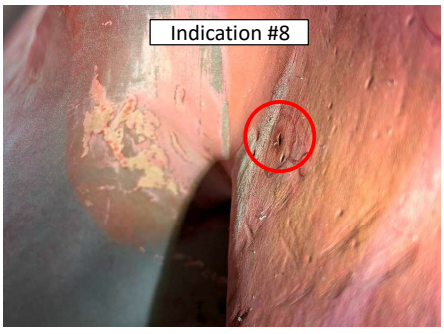
Bucket #8











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Rapport / Report	Q25- 39060A-001			
	Page	31	*de/of*	33

Ressuage LIQUID PENETRANT

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Projet / Project	Description	
CAT Arm generation station, runner U1	Liquid penetrant inspection on surfaces of the buckets	

Résultats / Results

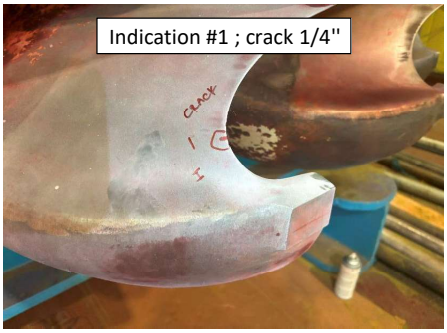
Pictures of indications founded ;

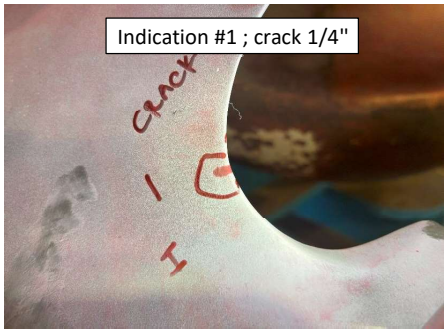
Bucket #9

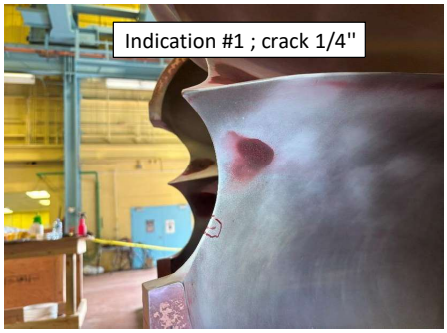
Indication #1

Indication #1

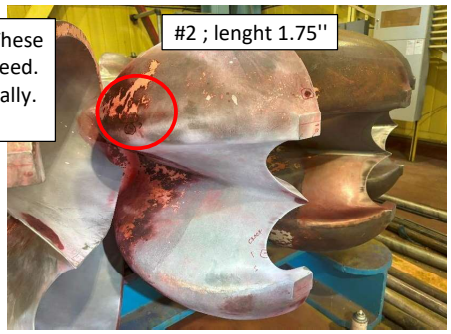
Bucket #10

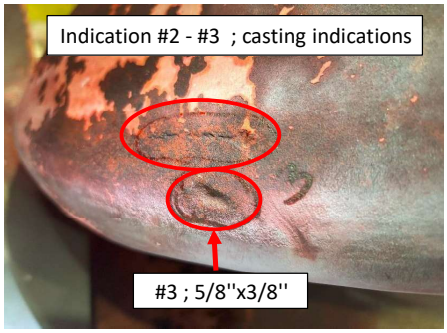






Indication #2 to #3 ; These indications did not bleed. Indication found visually. Noted in report





LÉGENDE

Surf. : Surface / Surface	L.O.P. : Manque de pénétration / Lack of Penetration	B.T. ; Traversée / Burn Through
C. : Concavité / Concavity	L.O.F. : Manque de Fusion / Lack of Fusion	H.L. : Alignement défecteux / Misalignment
C.K. : Fissure / Crack	I.U.C. : Caniveau intérieur / Inside Undercut	S.I. : Inclusion de Laitier / Slag Inclusion
P. : Porosité / Porosity	O.U.C. : Caniveau Extérieur / Outside Undercut	F/A. : Défaut du film / Film Artefact

Technicien / Technician	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
Manuel Audet	2025-08-27	*Manuel Audet*	ONGC / CGSB	2	LC

MISTRAS
Division Québec

Rapport / Report	Q25- 39060A-001			
	Page	32	*de/of*	33

Ressuage LIQUID PENETRANT

Client / Customer	Fabricant / Manufacturer	Commande no / P.O. Number
Litostroj Hydro	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generation station, runner U1	Liquid penetrant inspection on surfaces of the buckets	

Résultats / Results

Pictures of indications founded ;

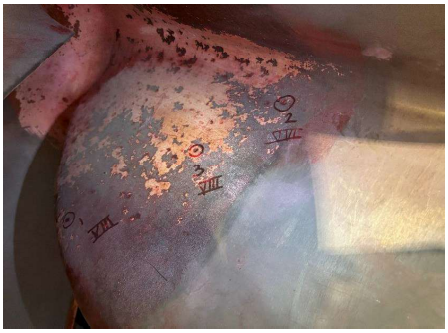
Bucket #12

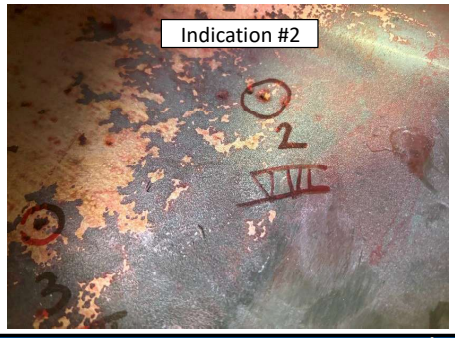
Indication #1

Indication #1

Indication #1

Bucket #14





LÉGENDE

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Technicien / Technician	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
Manuel Audet	2025-08-27	*Manuel Audet*	ONGC / CGSB	2	LC

MISTRAS
Division Québec

Rapport / Report	Q25- 39060A-001			
	Page	33	*de/of*	33

Ressuage LIQUID PENETRANT

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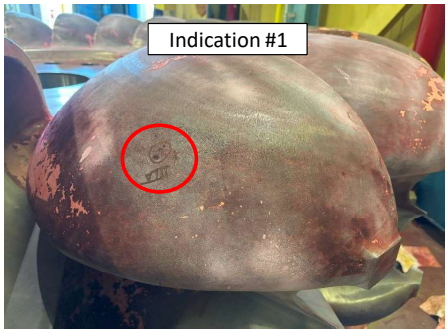
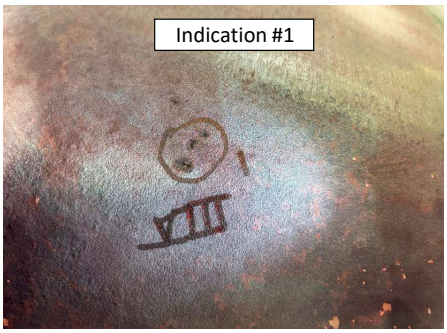
Litostroj Hydro	N/A	000227
Vincent Lapointe Responsable / Responsible	N/A Responsable / Responsible	N/A No d'ouvrage / Job no
Projet / Project	Description	
CAT Arm generation station, runner U1	Liquid penetrant inspection on surfaces of the buckets	

Résultats / Results

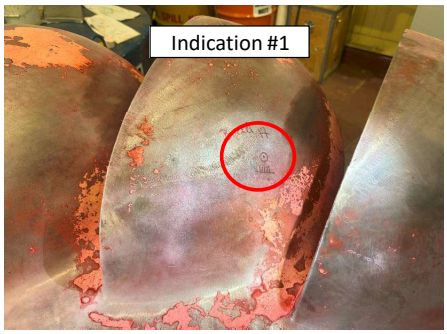
Pictures of indications founded ;

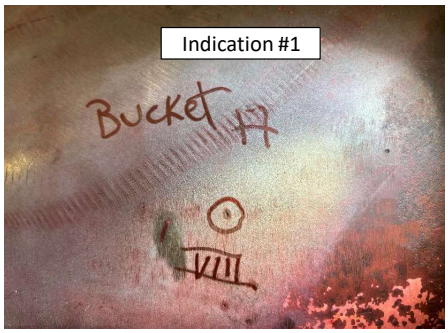
Bucket #12



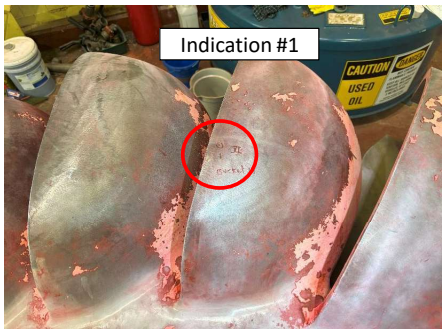


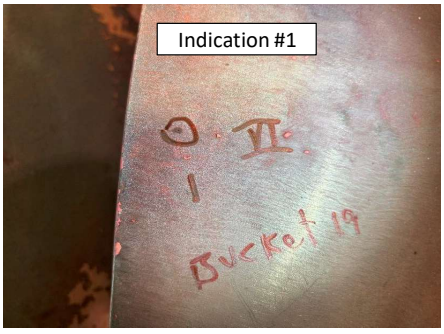
Bucket #17





Bucket #19





LÉGENDE

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Technicien / Technician	Date	Approuvé par / Approved by	Niveau / Level		Vérifié par / Verified by
Manuel Audet	2025-08-27	*Manuel Audet*	ONGC / CGSB	2	LC

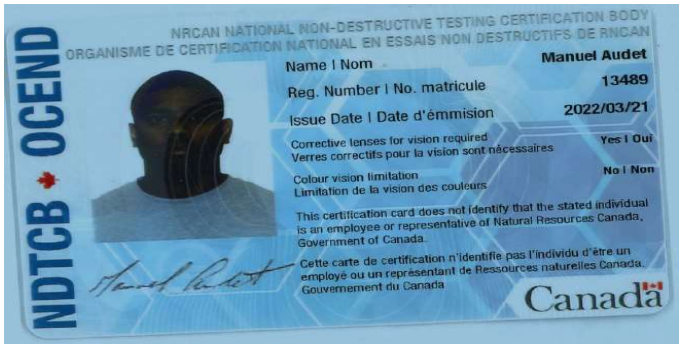
MISTRAS

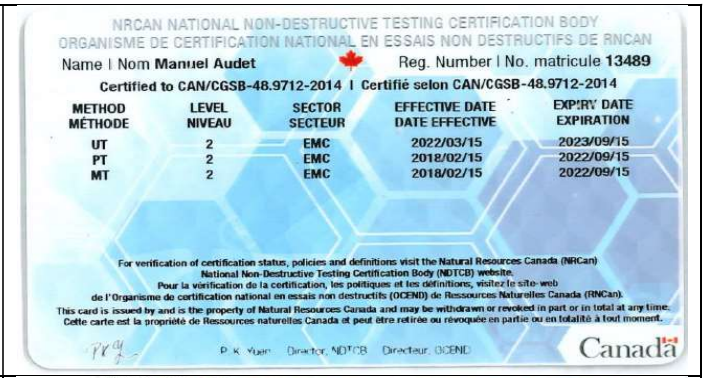
ISO 9001 : 2015 CWB enregistrementcwb ENREGISTRÉ

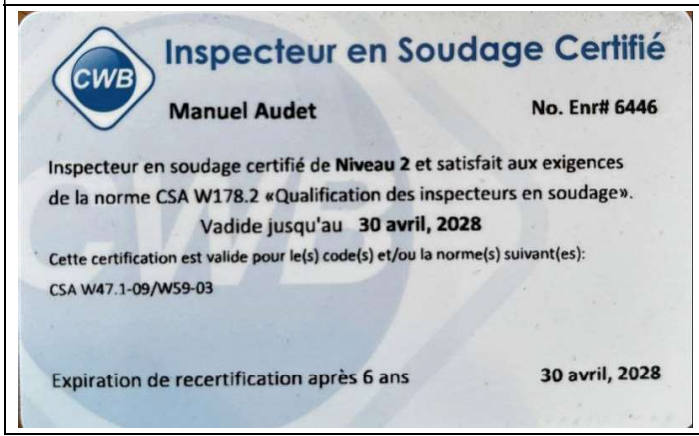
Résumé des certifications END / NDT certifications summary

Nom de l'employé/ Employee's name	Acuité Visuelle / Visual Acuity	#Laboratoire / lab #	Localisation/ Location :
Audet, Manuel	**Expiration: 2025/11/14**	**350**	**Lévis**

Méthode / Method	Niveau / Level :	Organisme/ Agency	Expiration /expire :	Secteur / Sector:	# Matricule / ID #
Magnétoscopie / Magnetic Testing	**II**	**ONGC/CGSB**	**2027/09/15**	**MCI / EMC**	**13489**
Méthode / Method	**Niveau / Level :**	**Organisme/ Agency**	**Expiration /expire :**	**Secteur / Sector:**	**# Matricule / ID #**
Ressuage / Penetrant Testing	**II**	**ONGC/CGSB**	**2027/09/15**	**MCI / EMC**	**13489**
Méthode / Method	**Niveau / Level :**	**Organisme/ Agency**	**Expiration /expire :**	**Secteur / Sector:**	**# Matricule / ID #**
Ultrasons / Ultrasonic Testing	**II**	**ONGC/CGSB**	**2028/09/15**	**MCI / EMC**	**13489**
Méthode / Method	**Niveau / Level :**	**Organisme/ Agency**	**Expiration /expire :**	**Normes / Standards :**	**# Matricule / ID #**
Inspecteur en soudage / Welding inspector	**II**	**BCS / CWB**	**2028/04/30**	**CSA W47.1/W59**	**6446**







Résumé des certifications END / NDT certifications summary (Suite)

Natural Resources Canada | Ressources naturelles Canada
CanmetMATERIALS | CanmetMATÉRIAUX
183 Longwood Road South, Hamilton, Ontario L8P 0A5 | 183, chemin Longwood sud, Hamilton (Ontario) L8P 0A5

le 12 décembre, 2022

Manuel Audet

M. Audet,

Notre bureau a reçu votre demande de renouvellement pour la prolongation de la période de validité de votre certification au **15 septembre 2028** conformément à la norme CAN/CGSB-48.9712-2014 dans la méthode et le secteur d'essai non destructifs (END) suivant:

MATÉRIAUX ET COMPOSANTS INDUSTRIELS Ultrasons Niveau 2

Suite à notre évaluation, nous avons déterminé que vous avez rempli les conditions de renouvellement de certification et la certification ci-dessus a été renouvelée avec succès. La date effective de votre renouvellement est le **15 septembre 2023**. Votre certification(s) est / sont maintenant valable jusqu'au **15 septembre 2028**.

Rappel de recertification : La recertification est le processus qui maintient la validité de votre certification en réussissant un examen spécifique à la méthode, au secteur ou au niveau; ce processus est obligatoire pour les certifications en essais non destructifs en vertu de la norme CAN/CGSB-48.9712-2014. La recertification des certifications en END doit se faire environ tous les dix ans (120 mois) ou moins après la certification initiale / supplémentaire ou la recertification précédente. Veuillez consulter le site Web de l'OCEND de RNCan pour de plus amples renseignements et pour confirmer la/les date(s) d'échéance de votre recertification (disponible dans le Répertoire du personnel certifié).

Les clients sont responsables de la documentation officielle qui leur a été délivrée par l'OCEND de RNCan. Des frais pourraient s'appliquer pour le remplacement de ces documents.

L'OCEND de RNCan est le propriétaire exclusif de toutes les déclarations de réalisation sur papier et de toutes les cartes d'identité avec photo délivrées. Ces documents peuvent faire, en tout temps, l'objet d'une mise à jour ou d'un rappel. Les clients et les titulaires de certificat ne doivent pas posséder des cartes d'identité avec photo en double et/ou plusieurs cartes d'identité avec photo pour la même certification (END, FRX, OAE). Seules les plus récentes cartes d'identité délivrées par l'OCEND de RNCan sont considérées valides. Il appartient aux clients et aux titulaires de certificat de veiller à ce que toutes les cartes délivrées antérieurement soient détruites ou retournées à l'OCEND de RNCan.

Canada

Natural Resources Canada | Ressources naturelles Canada
CanmetMATERIALS | CanmetMATÉRIAUX
183 Longwood Road South, Hamilton, Ontario L8P 0A5 | 183, chemin Longwood sud, Hamilton (Ontario) L8P 0A5

le 29 août, 2022

Manuel Audet

M. Audet,

Notre bureau a reçu votre demande de renouvellement pour la prolongation de la période de validité de votre certification au **15 septembre 2027** conformément à la norme CAN/CGSB-48.9712-2014 dans la méthode et le secteur d'essai non destructifs (END) suivant:

MATÉRIAUX ET COMPOSANTS INDUSTRIELS Magnétoscopie Niveau 2
MATÉRIAUX ET COMPOSANTS INDUSTRIELS Ressuage Niveau 2

Suite à notre évaluation, nous avons déterminé que vous avez rempli les conditions de renouvellement de certification et la certification ci-dessus a été renouvelée avec succès. La date effective de votre renouvellement est le **15 septembre 2022**. Votre certification(s) est / sont maintenant valable jusqu'au **15 septembre 2027**.

Rappel de recertification : La recertification est le processus qui maintient la validité de votre certification en réussissant un examen spécifique à la méthode, au secteur ou au niveau; ce processus est obligatoire pour les certifications en essais non destructifs en vertu de la norme CAN/CGSB-48.9712-2014. La recertification des certifications en END doit se faire environ tous les dix ans (120 mois) ou moins après la certification initiale / supplémentaire ou la recertification précédente. Veuillez consulter le site Web de l'OCEND de RNCan pour de plus amples renseignements et pour confirmer la/les date(s) d'échéance de votre recertification (disponible dans le Répertoire du personnel certifié).

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Canada

LITOSTROJ HYDRO

Assessment report

Attachment #2

Dimensional inspection report

47 pages, including this one.

ALIGNEMENT
BEAUDOIN

ENTREPRENEUR SPÉCIALISÉ

244, rue principale, Saint-Urbain-Premier, Québec J0S 1Y0
Téléphone: 450 427-0999

Licence RBQ: 8259-2080-39

ALIGNEMENT BEAUDOIN

Report number	AB25-0356 REV A
Customer	Newfound Land Hydro
Project	Cat Arm runner wear analysis
Location	Cat Arm Unit #1
Customer contact	Vincent Lapointe
Technicians	Romain Briançon
On site measurments	2025-08-09 & 10
Instruments	Leica AT960 SN752097
	AS1 SNAS1.1-04418-GE / AS1XL00201-FA
Report made by	Romain Briançon
Report date	2025-09-23
Checked by	NA

General notes :

Revision log :

ALIGNEMENT BEAUDOIN

Table of Contents

AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

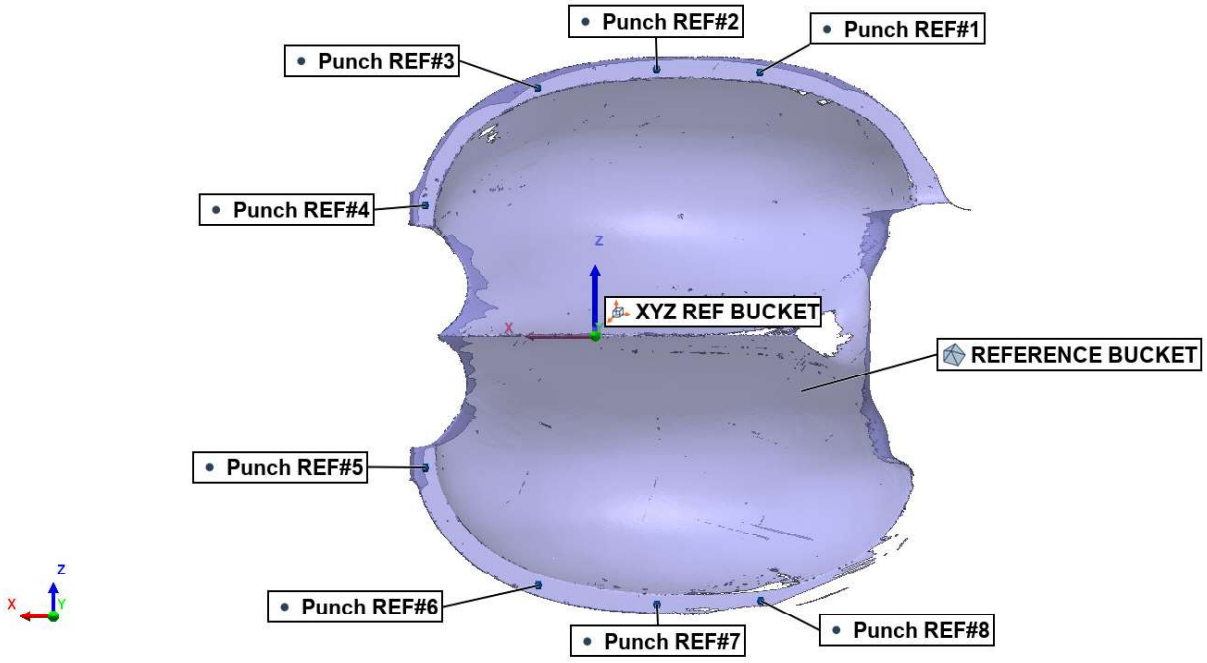
General definitions and context of analysis

The old runner have been scanned once removed from the unit #1 pit. The goal of this analysis is to display the wear of the buckets through 40 years of use. The old runner have been replaced by a spare one which was used as a reference for the comparison.

The main data alignement method is a bestfit with the punch marks located on the front plane of each buckets. The reference pattern for the punch marks is the means positions of each punch marks of the 21 buckets of the spare runner. Only the bucket #18 has a different alignement because the punch marks seem to have an offset (see page 39).

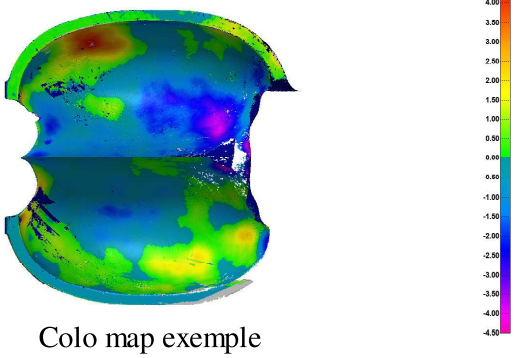
The coordinate system is constructed as follow :

- X axis : Direction of the bucket from the center to the exterior of the runner
- Z axis : From bottom to top
- Origin : Mean point of all the reference punch marks



To read the color maps :

- The range of color is between ±4.5mm
- **Green to red** : Positive deviation which m
  material
- **Blue to purple** : Negative deviation which
  of material



Colo map exemple

AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

ALIGNEMENT BEAUDOIN

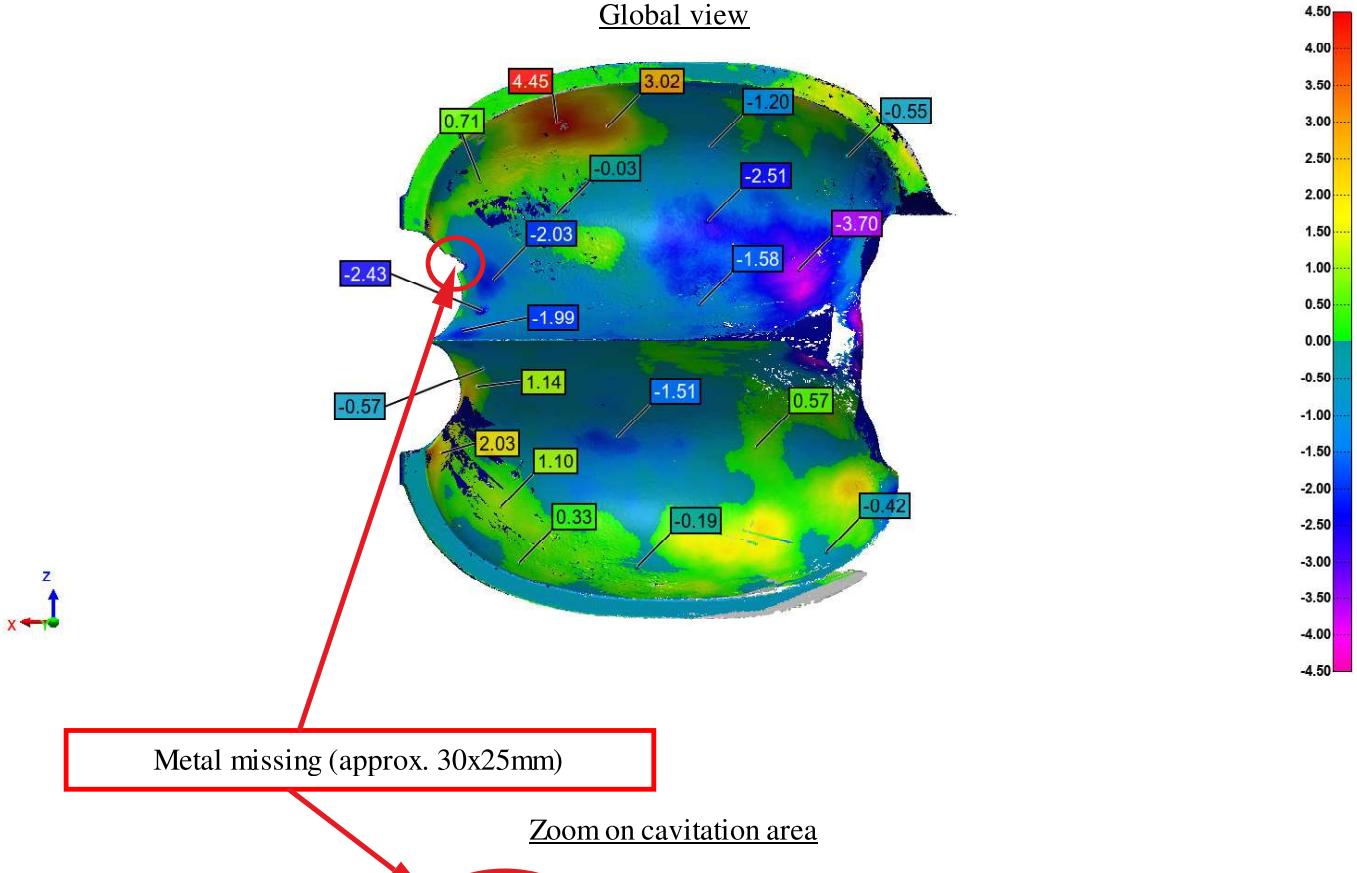
Bucket #1 - Punch marks bestfit results

Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #2.1	X	-220.04	-220.52	±1.00	-0.48	Pass	
	Y	-0.01	-0.04	±1.00	-0.03	Pass	
	Z	353.01	351.61	±1.00	-1.40	Fail	-0.40
• Pt #2.2	X	-82.00	-81.17	±1.00	0.83	Pass	
	Y	-0.01	0.07	±1.00	0.08	Pass	
	Z	357.11	356.62	±1.00	-0.49	Pass	
• Pt #2.3	X	76.47	77.30	±1.00	0.83	Pass	
	Y	0.01	0.00	±1.00	-0.01	Pass	
	Z	331.93	330.26	±1.00	-1.67	Fail	-0.67
• Pt #2.4	X	226.81	226.79	±1.00	-0.02	Pass	
	Y	0.03	-0.04	±1.00	-0.07	Pass	
	Z	175.11	175.76	±1.00	0.65	Pass	
• Pt #2.5	X	226.64	225.44	±1.00	-1.20	Fail	-0.20
	Y	-0.04	-0.01	±1.00	0.03	Pass	
	Z	-175.11	-174.04	±1.00	1.07	Fail	0.07
• Pt #2.6	X	75.87	76.01	±1.00	0.14	Pass	
	Y	0.01	0.03	±1.00	0.02	Pass	
	Z	-332.32	-331.69	±1.00	0.63	Pass	
• Pt #2.7	X	-82.61	-82.73	±1.00	-0.12	Pass	
	Y	0.00	0.01	±1.00	0.01	Pass	
	Z	-357.64	-356.17	±1.00	1.47	Fail	0.47
• Pt #2.8	X	-221.15	-221.12	±1.00	0.03	Pass	
	Y	0.01	-0.02	±1.00	-0.03	Pass	
	Z	-353.01	-353.29	±1.00	-0.28	Pass	

AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

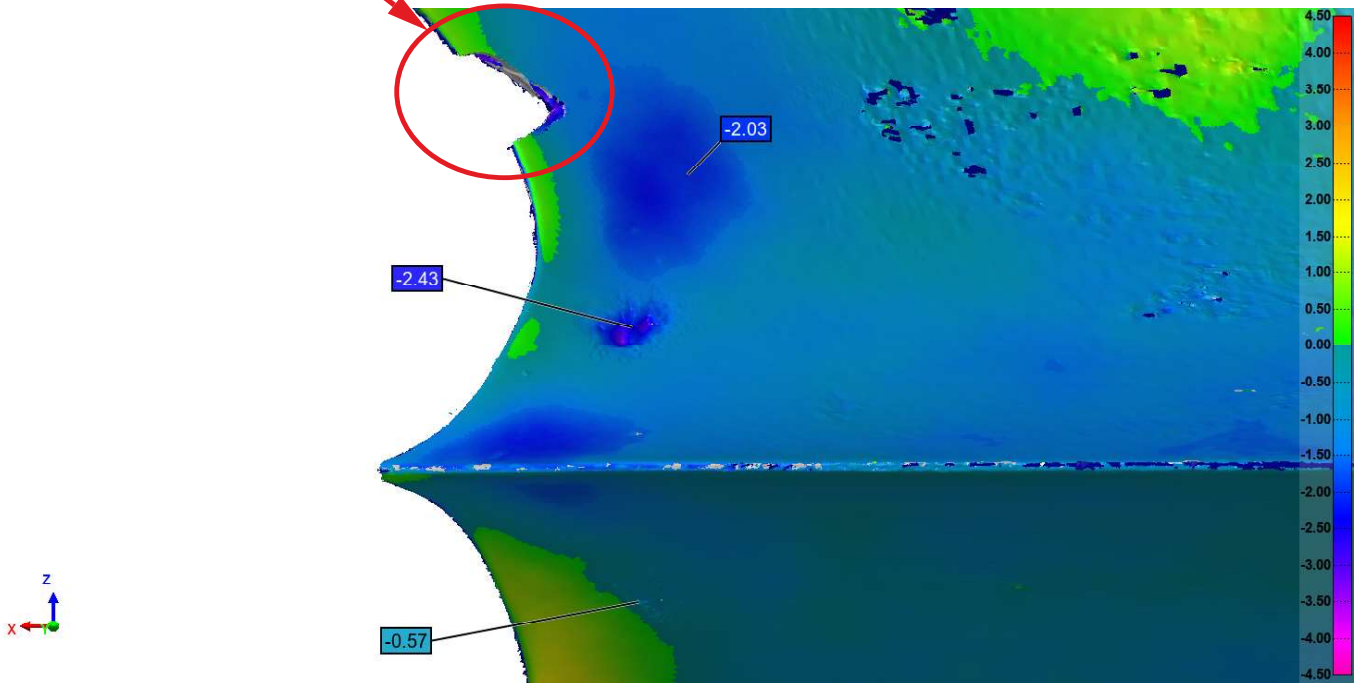
Bucket #1 - Wear colormaps

Global view



Metal missing (approx. 30x25mm)

Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

ALIGNEMENT BEAUDOIN

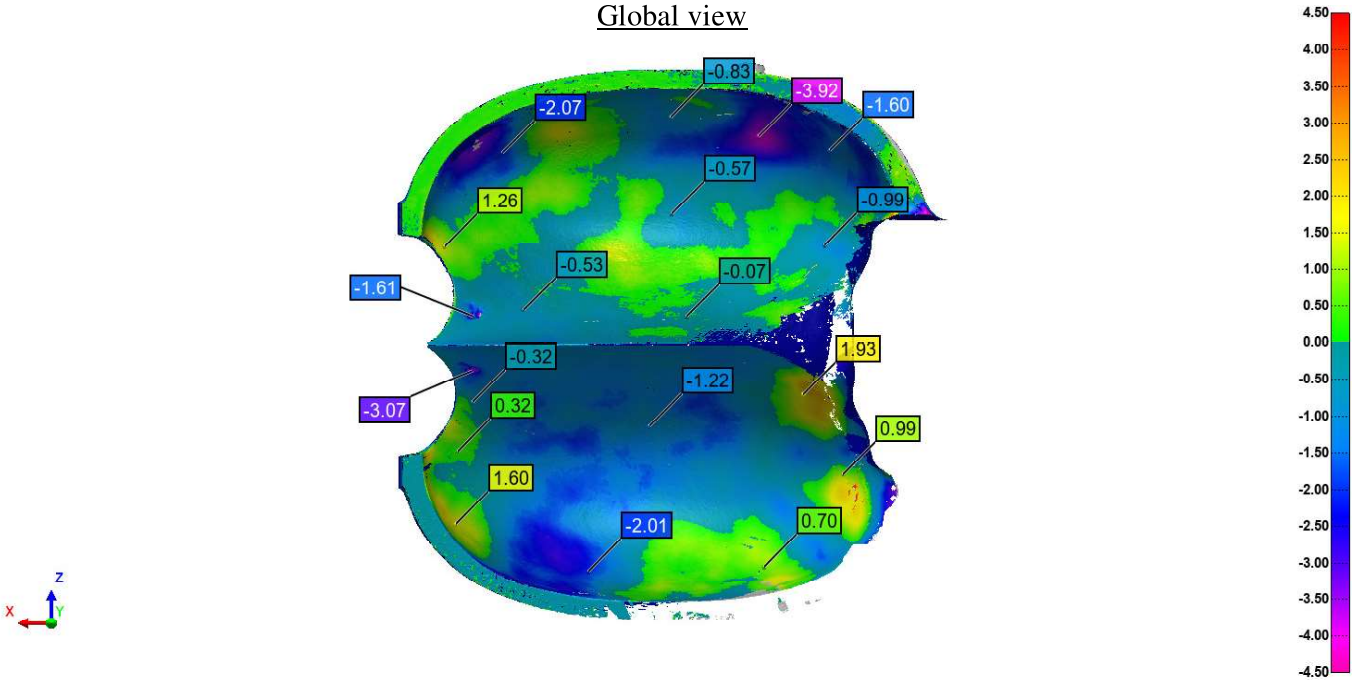
Bucket #2 - Punch marks bestfit results

Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #2.1	X	-220.04	-220.52	±1.00	-0.48	Pass	
	Y	-0.01	-0.04	±1.00	-0.03	Pass	
	Z	353.01	351.61	±1.00	-1.40	Fail	-0.40
• Pt #2.2	X	-82.00	-81.17	±1.00	0.83	Pass	
	Y	-0.01	0.07	±1.00	0.08	Pass	
	Z	357.11	356.62	±1.00	-0.49	Pass	
• Pt #2.3	X	76.47	77.30	±1.00	0.83	Pass	
	Y	0.01	0.00	±1.00	-0.01	Pass	
	Z	331.93	330.26	±1.00	-1.67	Fail	-0.67
• Pt #2.4	X	226.81	226.79	±1.00	-0.02	Pass	
	Y	0.03	-0.04	±1.00	-0.07	Pass	
	Z	175.11	175.76	±1.00	0.65	Pass	
• Pt #2.5	X	226.64	225.44	±1.00	-1.20	Fail	-0.20
	Y	-0.04	-0.01	±1.00	0.03	Pass	
	Z	-175.11	-174.04	±1.00	1.07	Fail	0.07
• Pt #2.6	X	75.87	76.01	±1.00	0.14	Pass	
	Y	0.01	0.03	±1.00	0.02	Pass	
	Z	-332.32	-331.69	±1.00	0.63	Pass	
• Pt #2.7	X	-82.61	-82.73	±1.00	-0.12	Pass	
	Y	0.00	0.01	±1.00	0.01	Pass	
	Z	-357.64	-356.17	±1.00	1.47	Fail	0.47
• Pt #2.8	X	-221.15	-221.12	±1.00	0.03	Pass	
	Y	0.01	-0.02	±1.00	-0.03	Pass	
	Z	-353.01	-353.29	±1.00	-0.28	Pass	

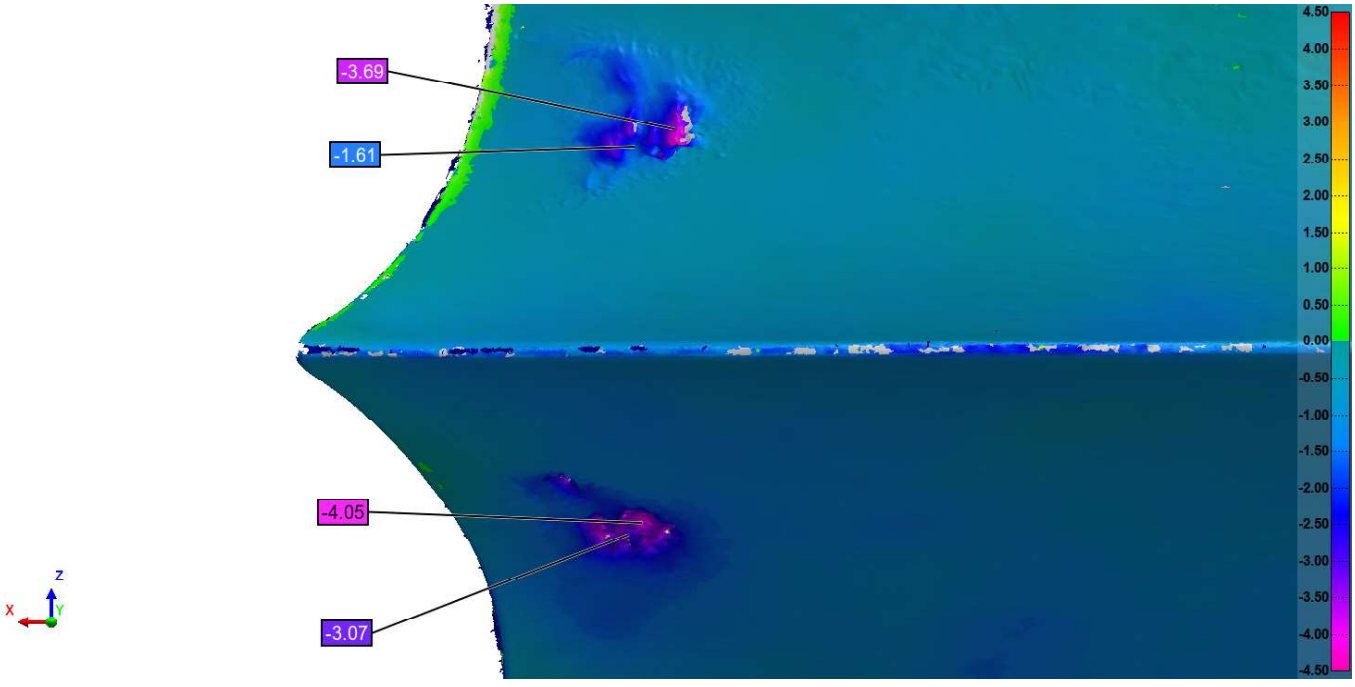
AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

Bucket #2 - Wear colormaps

Global view



Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

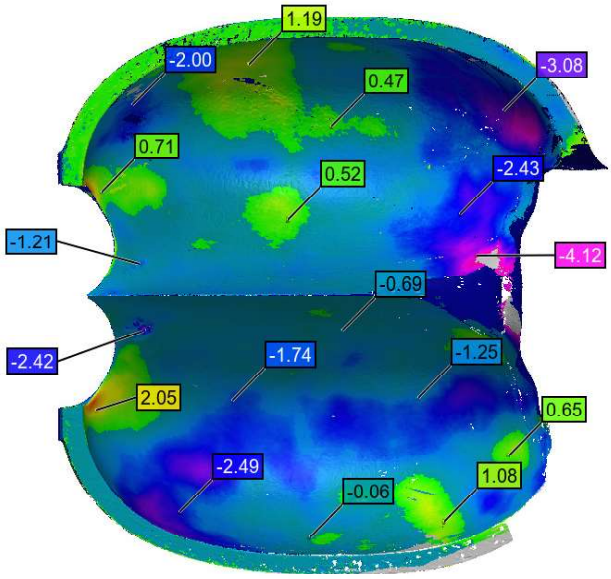
ALIGNEMENT BEAUDOIN

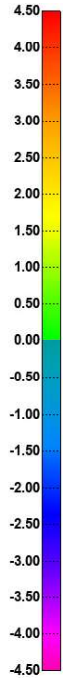
Bucket #3 - Punch marks bestfit results

Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #3.1	X	-220.04	-222.03	±1.00	-1.99	Fail	-0.99
	Y	-0.01	0.00	±1.00	0.01	Pass	
	Z	353.01	352.24	±1.00	-0.77	Pass	
• Pt #3.2	X	-82.00	-80.87	±1.00	1.13	Fail	0.13
	Y	-0.01	0.00	±1.00	0.01	Pass	
	Z	357.11	356.84	±1.00	-0.27	Pass	
• Pt #3.3	X	76.47	77.04	±1.00	0.57	Pass	
	Y	0.01	0.01	±1.00	0.00	Pass	
	Z	331.93	330.80	±1.00	-1.13	Fail	-0.13
• Pt #3.4	X	226.81	227.50	±1.00	0.69	Pass	
	Y	0.03	-0.01	±1.00	-0.04	Pass	
	Z	175.11	175.22	±1.00	0.11	Pass	
• Pt #3.5	X	226.64	225.87	±1.00	-0.77	Pass	
	Y	-0.04	-0.02	±1.00	0.02	Pass	
	Z	-175.11	-174.84	±1.00	0.27	Pass	
• Pt #3.6	X	75.87	76.19	±1.00	0.32	Pass	
	Y	0.01	0.03	±1.00	0.02	Pass	
	Z	-332.32	-331.97	±1.00	0.35	Pass	
• Pt #3.7	X	-82.61	-82.73	±1.00	-0.12	Pass	
	Y	0.00	0.01	±1.00	0.01	Pass	
	Z	-357.64	-356.73	±1.00	0.91	Pass	
• Pt #3.8	X	-221.15	-220.98	±1.00	0.17	Pass	
	Y	0.01	-0.03	±1.00	-0.04	Pass	
	Z	-353.01	-352.49	±1.00	0.52	Pass	

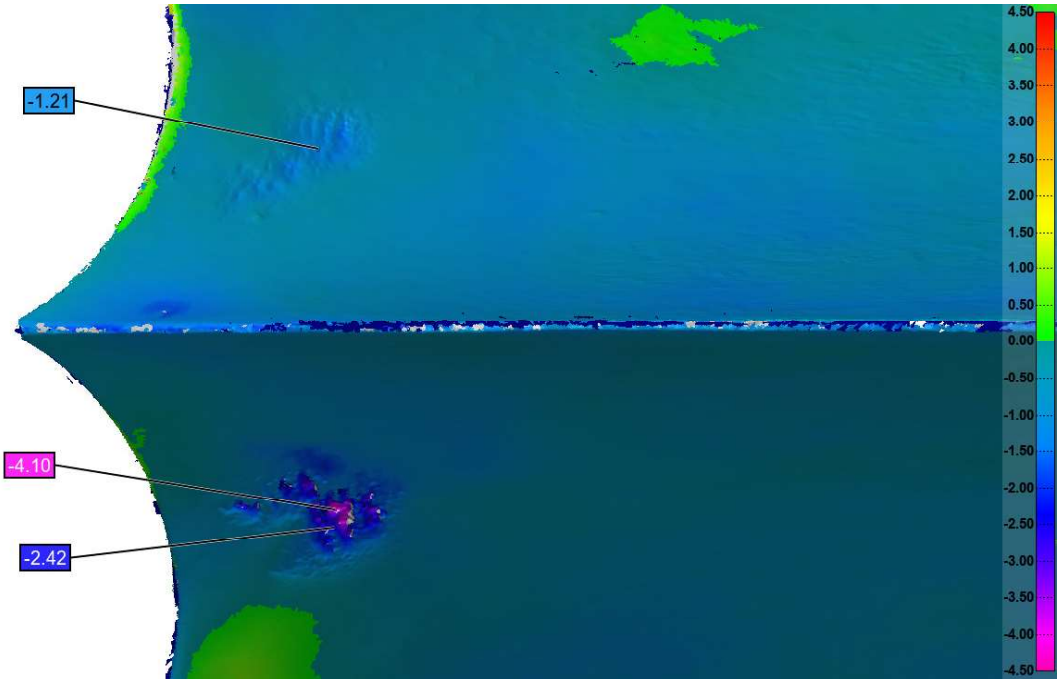
Bucket #3 - Wear colormaps

Global view





Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

ALIGNEMENT BEAUDOIN

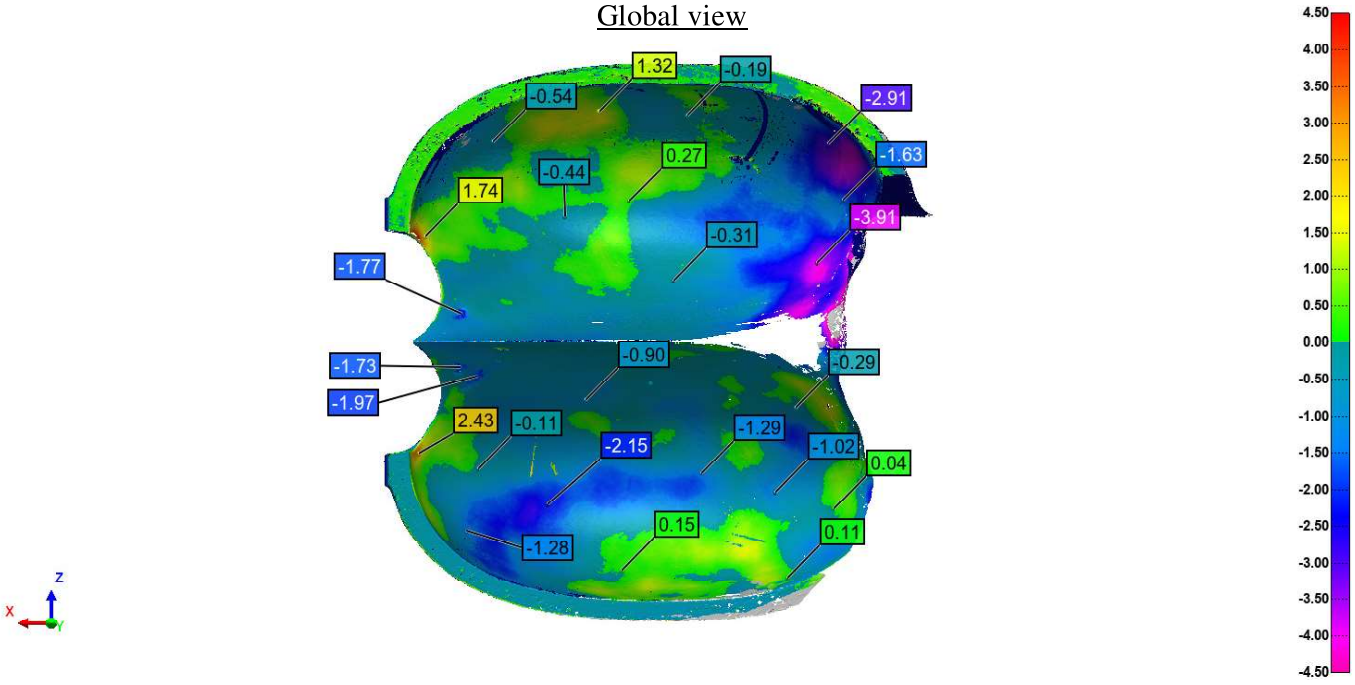
Bucket #4 - Punch marks bestfit results

Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #4.1	X	-220.04	-219.78	±1.00	0.26	Pass	
	Y	-0.01	-0.08	±1.00	-0.07	Pass	
	Z	353.01	354.39	±1.00	1.38	Fail	0.38
• Pt #4.2	X	-82.00	-81.33	±1.00	0.67	Pass	
	Y	-0.01	0.03	±1.00	0.04	Pass	
	Z	357.11	357.17	±1.00	0.06	Pass	
• Pt #4.3	X	76.47	77.27	±1.00	0.80	Pass	
	Y	0.01	0.07	±1.00	0.06	Pass	
	Z	331.93	329.92	±1.00	-2.01	Fail	-1.01
• Pt #4.4	X	226.81	225.01	±1.00	-1.80	Fail	-0.80
	Y	0.03	-0.01	±1.00	-0.04	Pass	
	Z	175.11	175.39	±1.00	0.28	Pass	
• Pt #4.5	X	226.64	224.75	±1.00	-1.89	Fail	-0.89
	Y	-0.04	-0.07	±1.00	-0.03	Pass	
	Z	-175.11	-174.55	±1.00	0.56	Pass	
• Pt #4.6	X	75.87	76.77	±1.00	0.90	Pass	
	Y	0.01	0.04	±1.00	0.03	Pass	
	Z	-332.32	-331.63	±1.00	0.69	Pass	
• Pt #4.7	X	-82.61	-82.24	±1.00	0.37	Pass	
	Y	0.00	-0.01	±1.00	-0.01	Pass	
	Z	-357.64	-358.04	±1.00	-0.40	Pass	
• Pt #4.8	X	-221.15	-220.45	±1.00	0.70	Pass	
	Y	0.01	0.02	±1.00	0.01	Pass	
	Z	-353.01	-353.58	±1.00	-0.57	Pass	

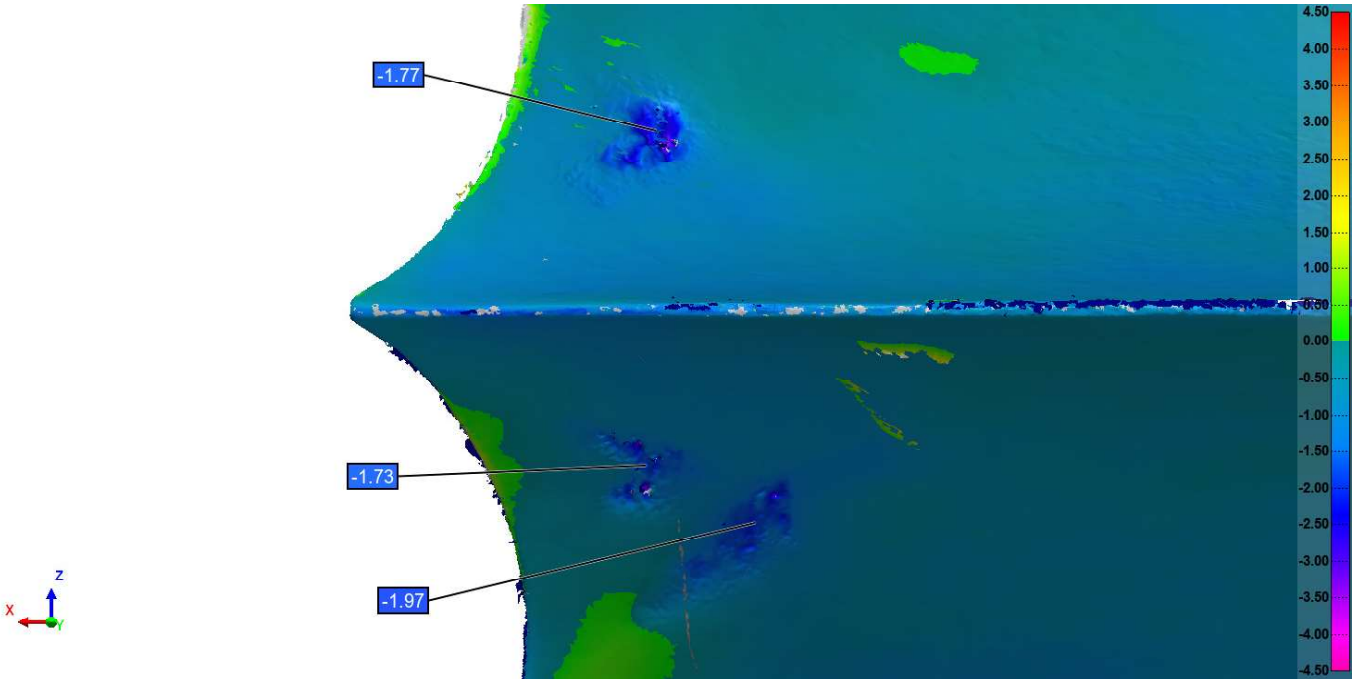
AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

Bucket #4 - Wear colormaps

Global view



Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

ALIGNEMENT BEAUDOIN

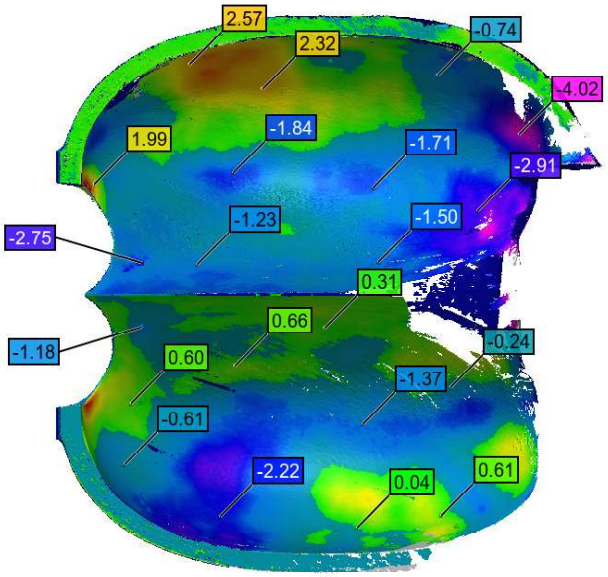
Bucket #5 - Punch marks bestfit results

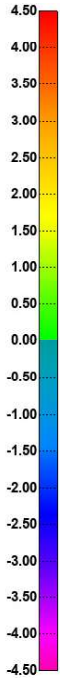
Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #5.1	X	-220.04	-219.08	±1.00	0.96	Pass	
	Y	-0.01	-0.08	±1.00	-0.07	Pass	
	Z	353.01	353.25	±1.00	0.24	Pass	
• Pt #5.2	X	-82.00	-81.48	±1.00	0.52	Pass	
	Y	-0.01	0.03	±1.00	0.04	Pass	
	Z	357.11	355.95	±1.00	-1.16	Fail	-0.16
• Pt #5.3	X	76.47	76.92	±1.00	0.45	Pass	
	Y	0.01	0.06	±1.00	0.05	Pass	
	Z	331.93	332.32	±1.00	0.39	Pass	
• Pt #5.4	X	226.81	224.61	±1.00	-2.20	Fail	-1.20
	Y	0.03	0.02	±1.00	-0.01	Pass	
	Z	175.11	175.07	±1.00	-0.04	Pass	
• Pt #5.5	X	226.64	225.98	±1.00	-0.66	Pass	
	Y	-0.04	-0.09	±1.00	-0.05	Pass	
	Z	-175.11	-174.91	±1.00	0.20	Pass	
• Pt #5.6	X	75.87	76.59	±1.00	0.72	Pass	
	Y	0.01	0.03	±1.00	0.02	Pass	
	Z	-332.32	-332.43	±1.00	-0.11	Pass	
• Pt #5.7	X	-82.61	-81.91	±1.00	0.70	Pass	
	Y	0.00	0.01	±1.00	0.01	Pass	
	Z	-357.64	-356.92	±1.00	0.72	Pass	
• Pt #5.8	X	-221.15	-221.63	±1.00	-0.48	Pass	
	Y	0.01	0.02	±1.00	0.01	Pass	
	Z	-353.01	-353.25	±1.00	-0.24	Pass	

AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

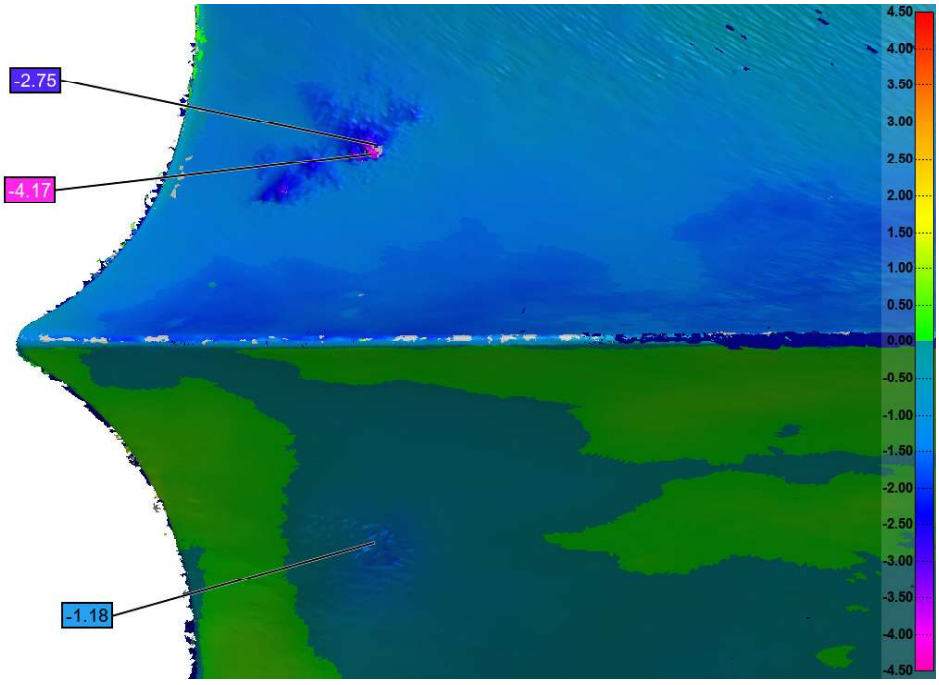
Bucket #5 - Wear colormaps

Global view





Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

ALIGNEMENT BEAUDOIN

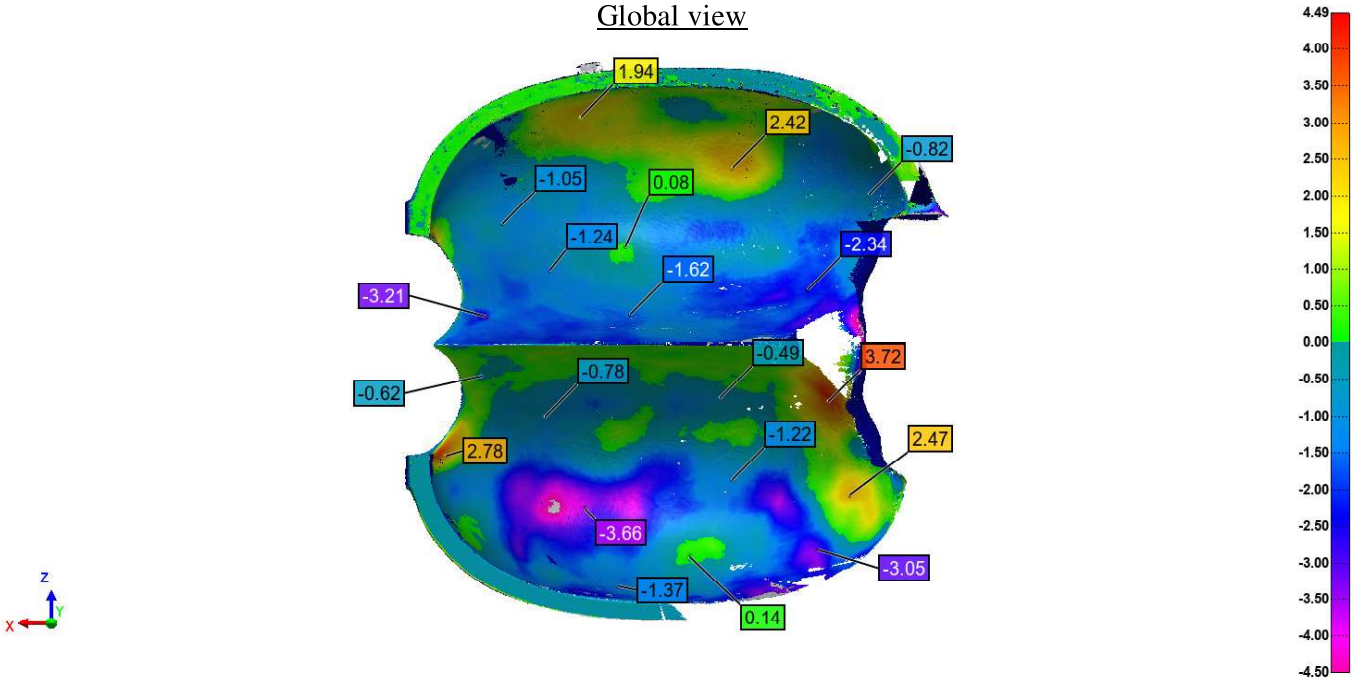
Bucket #6 - Punchs marks bestfit results

Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #6.1	X	-220.04	-220.07	±1.00	-0.03	Pass	
	Y	-0.01	0.01	±1.00	0.02	Pass	
	Z	353.01	353.80	±1.00	0.79	Pass	
• Pt #6.2	X	-82.00	-81.62	±1.00	0.38	Pass	
	Y	-0.01	-0.01	±1.00	0.00	Pass	
	Z	357.11	355.85	±1.00	-1.26	Fail	-0.26
• Pt #6.3	X	76.47	76.83	±1.00	0.36	Pass	
	Y	0.01	0.00	±1.00	-0.01	Pass	
	Z	331.93	331.43	±1.00	-0.50	Pass	
• Pt #6.4	X	226.81	225.75	±1.00	-1.06	Fail	-0.06
	Y	0.03	0.01	±1.00	-0.02	Pass	
	Z	175.11	174.81	±1.00	-0.30	Pass	
• Pt #6.5	X	226.64	225.72	±1.00	-0.92	Pass	
	Y	-0.04	-0.03	±1.00	0.01	Pass	
	Z	-175.11	-175.38	±1.00	-0.27	Pass	
• Pt #6.6	X	75.87	76.42	±1.00	0.55	Pass	
	Y	0.01	0.02	±1.00	0.01	Pass	
	Z	-332.32	-331.13	±1.00	1.19	Fail	0.19
• Pt #6.7	X	-82.61	-82.33	±1.00	0.28	Pass	
	Y	0.00	0.02	±1.00	0.02	Pass	
	Z	-357.64	-357.55	±1.00	0.09	Pass	
• Pt #6.8	X	-221.15	-220.71	±1.00	0.44	Pass	
	Y	0.01	-0.02	±1.00	-0.03	Pass	
	Z	-353.01	-352.75	±1.00	0.26	Pass	

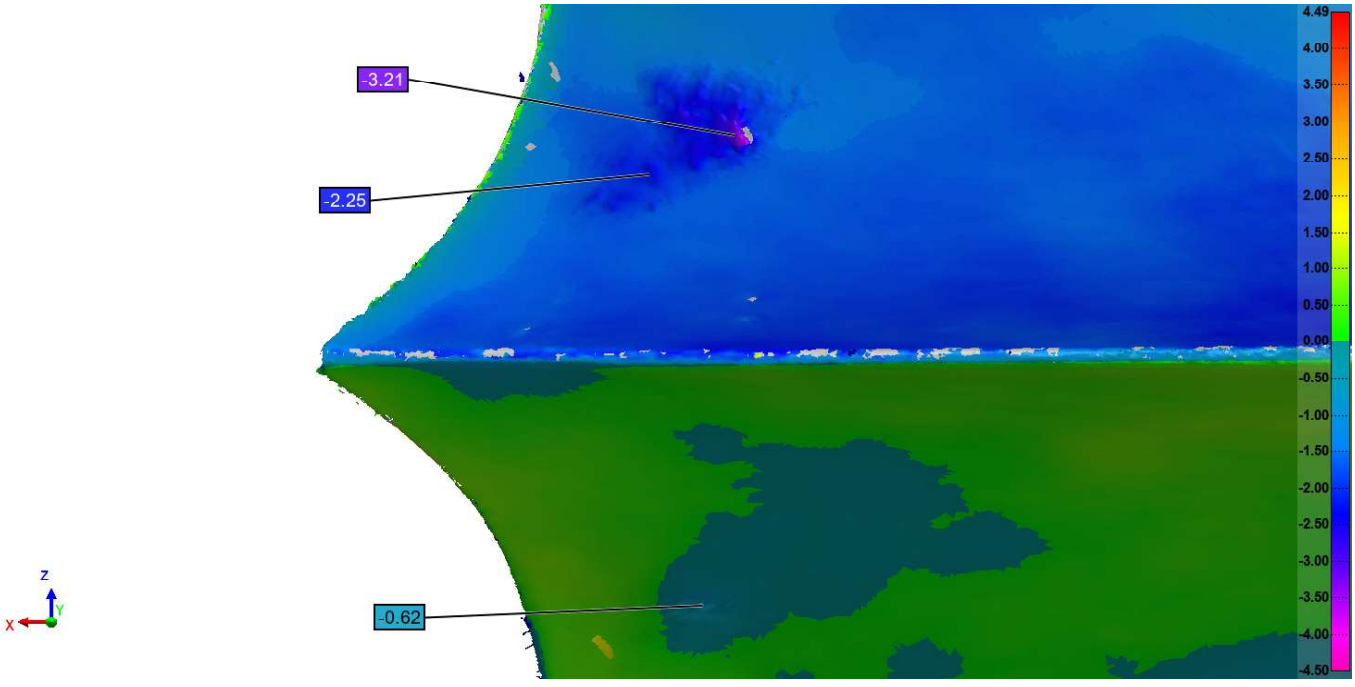
AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

Bucket #6 - Wear colormaps

Global view



Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

ALIGNEMENT BEAUDOIN

Bucket #7 - Punch marks bestfit results

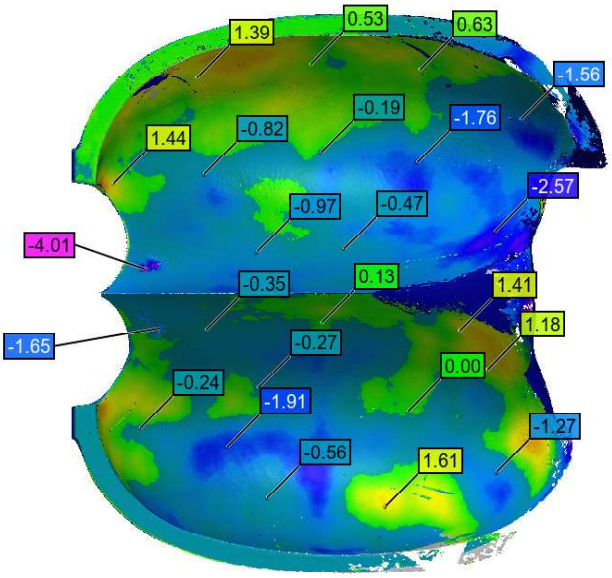
Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #7.1	X	-220.04	-219.71	±1.00	0.33	Pass	
	Y	-0.01	-0.03	±1.00	-0.02	Pass	
	Z	353.01	353.15	±1.00	0.14	Pass	
• Pt #7.2	X	-82.00	-81.75	±1.00	0.25	Pass	
	Y	-0.01	0.04	±1.00	0.05	Pass	
	Z	357.11	356.28	±1.00	-0.83	Pass	
• Pt #7.4	X	226.81	227.34	±1.00	0.53	Pass	
	Y	0.03	-0.02	±1.00	-0.05	Pass	
	Z	175.11	175.30	±1.00	0.19	Pass	
• Pt #7.5	X	226.64	224.64	±1.00	-2.00	Fail	-1.00
	Y	-0.04	-0.02	±1.00	0.02	Pass	
	Z	-175.11	-174.62	±1.00	0.49	Pass	
• Pt #7.6	X	75.87	76.16	±1.00	0.29	Pass	
	Y	0.01	0.03	±1.00	0.02	Pass	
	Z	-332.32	-332.11	±1.00	0.21	Pass	
• Pt #7.7	X	-82.61	-82.36	±1.00	0.25	Pass	
	Y	0.00	0.01	±1.00	0.01	Pass	
	Z	-357.64	-357.06	±1.00	0.58	Pass	
• Pt #7.8	X	-221.15	-220.79	±1.00	0.36	Pass	
	Y	0.01	-0.01	±1.00	-0.02	Pass	
	Z	-353.01	-353.80	±1.00	-0.79	Pass	

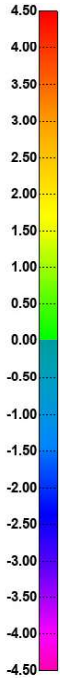
The punch mark **#7.3** was missing on the bucket.

AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

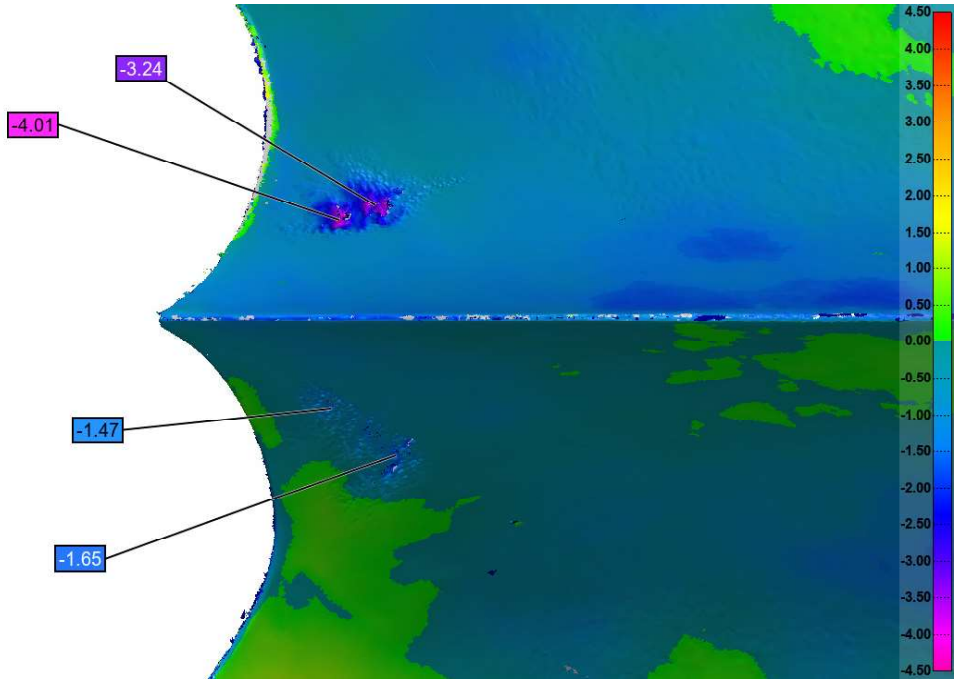
Bucket #7 - Wear colormaps

Global view





Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

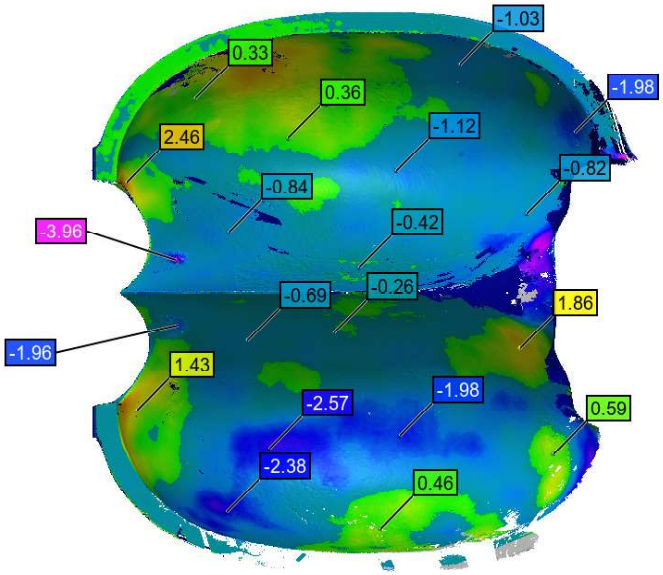
ALIGNEMENT BEAUDOIN

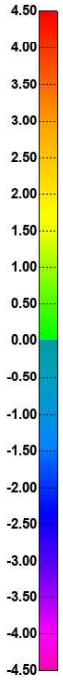
Bucket #8 - Punch marks bestfit results

Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #8.1	X	-220.04	-219.42	±1.00	0.62	Pass	
	Y	-0.01	-0.01	±1.00	0.00	Pass	
	Z	353.01	352.61	±1.00	-0.40	Pass	
• Pt #8.2	X	-82.00	-81.34	±1.00	0.66	Pass	
	Y	-0.01	0.00	±1.00	0.01	Pass	
	Z	357.11	357.16	±1.00	0.05	Pass	
• Pt #8.3	X	76.47	76.64	±1.00	0.17	Pass	
	Y	0.01	0.00	±1.00	-0.01	Pass	
	Z	331.93	330.39	±1.00	-1.54	Fail	-0.54
• Pt #8.4	X	226.81	225.87	±1.00	-0.94	Pass	
	Y	0.03	0.02	±1.00	-0.01	Pass	
	Z	175.11	175.70	±1.00	0.59	Pass	
• Pt #8.5	X	226.64	224.92	±1.00	-1.72	Fail	-0.72
	Y	-0.04	-0.03	±1.00	0.01	Pass	
	Z	-175.11	-174.48	±1.00	0.63	Pass	
• Pt #8.6	X	75.87	76.09	±1.00	0.22	Pass	
	Y	0.01	0.01	±1.00	0.00	Pass	
	Z	-332.32	-331.91	±1.00	0.41	Pass	
• Pt #8.7	X	-82.61	-82.39	±1.00	0.22	Pass	
	Y	0.00	0.01	±1.00	0.01	Pass	
	Z	-357.64	-357.59	±1.00	0.05	Pass	
• Pt #8.8	X	-221.15	-220.37	±1.00	0.78	Pass	
	Y	0.01	-0.01	±1.00	-0.02	Pass	
	Z	-353.01	-352.80	±1.00	0.21	Pass	

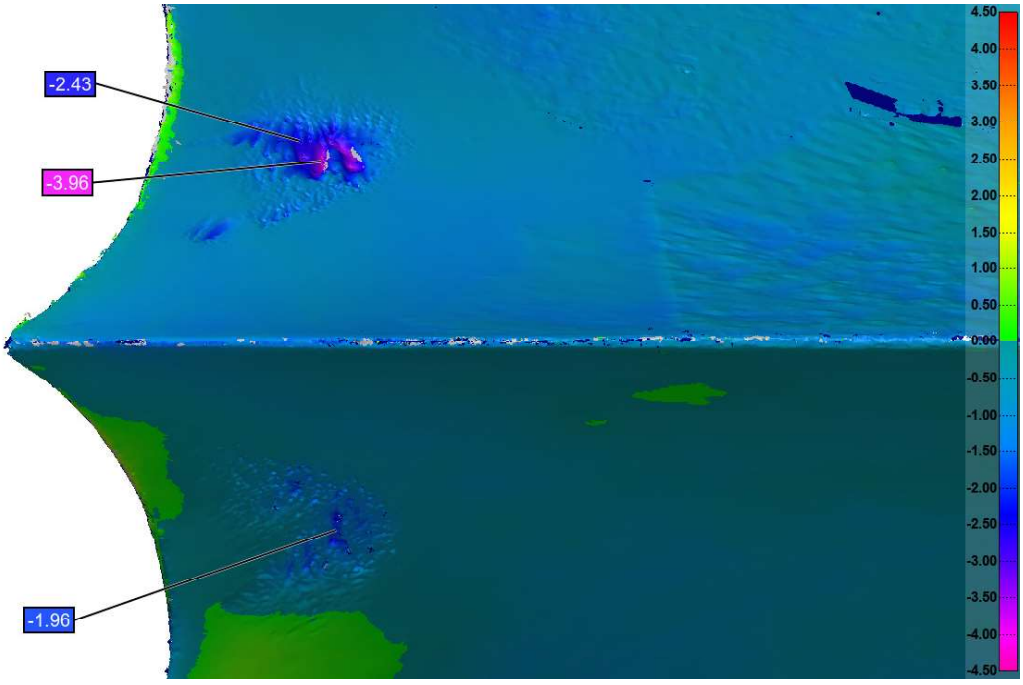
Bucket #8 - Wear colormaps

Global view





Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

ALIGNEMENT BEAUDOIN

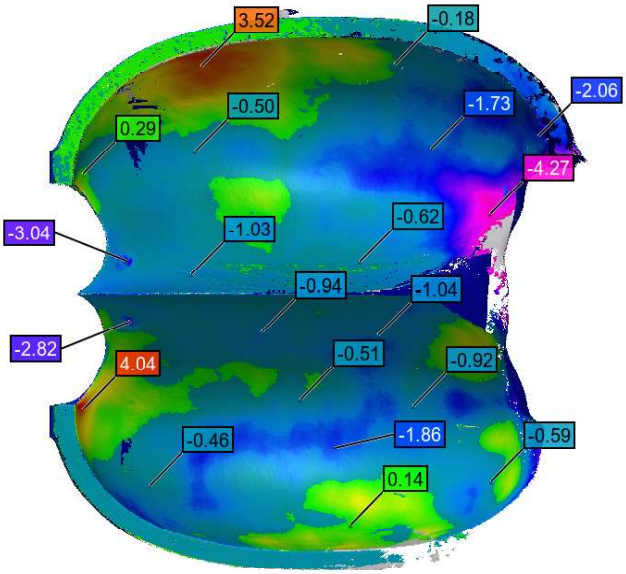
Bucket #9 - Punch marks bestfit results

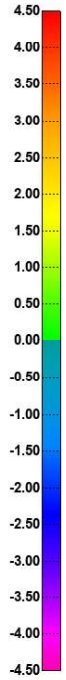
Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #9.1	X	-220.04	-220.24	±1.00	-0.20	Pass	
	Y	-0.01	-0.04	±1.00	-0.03	Pass	
	Z	353.01	352.73	±1.00	-0.28	Pass	
• Pt #9.2	X	-82.00	-81.90	±1.00	0.10	Pass	
	Y	-0.01	0.01	±1.00	0.02	Pass	
	Z	357.11	357.79	±1.00	0.68	Pass	
• Pt #9.3	X	76.47	77.25	±1.00	0.78	Pass	
	Y	0.01	0.06	±1.00	0.05	Pass	
	Z	331.93	329.69	±1.00	-2.24	Fail	-1.24
• Pt #9.4	X	226.81	225.80	±1.00	-1.01	Fail	-0.01
	Y	0.03	0.00	±1.00	-0.03	Pass	
	Z	175.11	175.39	±1.00	0.28	Pass	
• Pt #9.5	X	226.64	224.72	±1.00	-1.92	Fail	-0.92
	Y	-0.04	-0.10	±1.00	-0.06	Pass	
	Z	-175.11	-174.68	±1.00	0.43	Pass	
• Pt #9.6	X	75.87	78.41	±1.00	2.54	Fail	1.54
	Y	0.01	0.09	±1.00	0.08	Pass	
	Z	-332.32	-333.36	±1.00	-1.04	Fail	-0.04
• Pt #9.7	X	-82.61	-82.66	±1.00	-0.05	Pass	
	Y	0.00	0.00	±1.00	0.00	Pass	
	Z	-357.64	-356.14	±1.00	1.50	Fail	0.50
• Pt #9.8	X	-221.15	-221.39	±1.00	-0.24	Pass	
	Y	0.01	-0.01	±1.00	-0.02	Pass	
	Z	-353.01	-352.34	±1.00	0.67	Pass	

AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

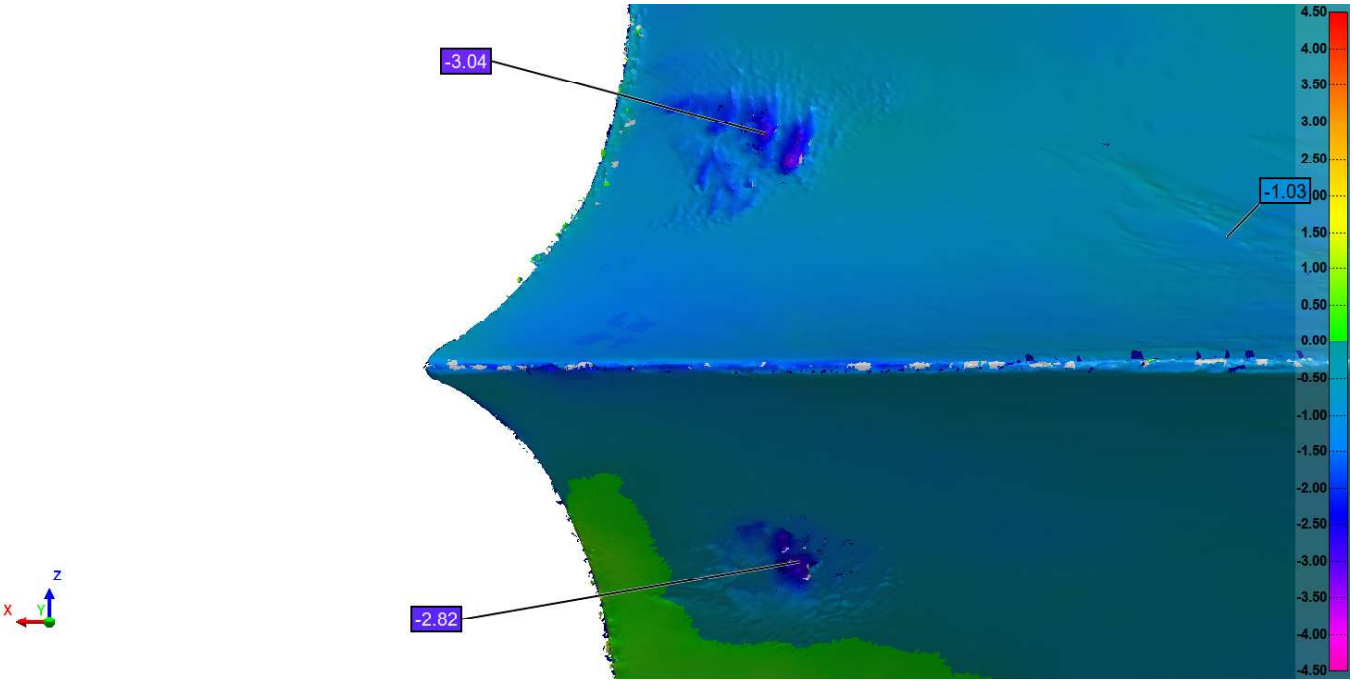
Bucket #9 - Wear colormaps

Global view





Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

ALIGNEMENT BEAUDOIN

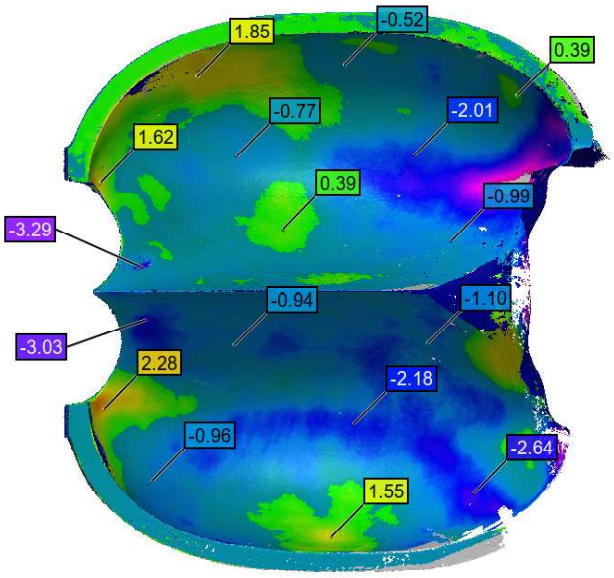
Bucket #10 - Punch marks bestfit results

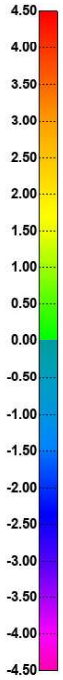
Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #10.1	X	-220.04	-219.50	±1.00	0.54	Pass	
	Y	-0.01	0.03	±1.00	0.04	Pass	
	Z	353.01	353.66	±1.00	0.65	Pass	
• Pt #10.2	X	-82.00	-81.38	±1.00	0.62	Pass	
	Y	-0.01	-0.01	±1.00	0.00	Pass	
	Z	357.11	357.14	±1.00	0.03	Pass	
• Pt #10.3	X	76.47	77.50	±1.00	1.03	Fail	0.03
	Y	0.01	0.02	±1.00	0.01	Pass	
	Z	331.93	332.63	±1.00	0.70	Pass	
• Pt #10.4	X	226.81	224.89	±1.00	-1.92	Fail	-0.92
	Y	0.03	-0.07	±1.00	-0.10	Pass	
	Z	175.11	175.88	±1.00	0.77	Pass	
• Pt #10.5	X	226.64	225.52	±1.00	-1.12	Fail	-0.12
	Y	-0.04	0.05	±1.00	0.09	Pass	
	Z	-175.11	-175.52	±1.00	-0.41	Pass	
• Pt #10.6	X	75.87	75.76	±1.00	-0.11	Pass	
	Y	0.01	0.02	±1.00	0.01	Pass	
	Z	-332.32	-332.15	±1.00	0.17	Pass	
• Pt #10.7	X	-82.61	-81.81	±1.00	0.80	Pass	
	Y	0.00	-0.02	±1.00	-0.02	Pass	
	Z	-357.64	-358.50	±1.00	-0.86	Pass	
• Pt #10.8	X	-221.15	-220.97	±1.00	0.18	Pass	
	Y	0.01	-0.02	±1.00	-0.03	Pass	
	Z	-353.01	-354.06	±1.00	-1.05	Fail	-0.05

AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

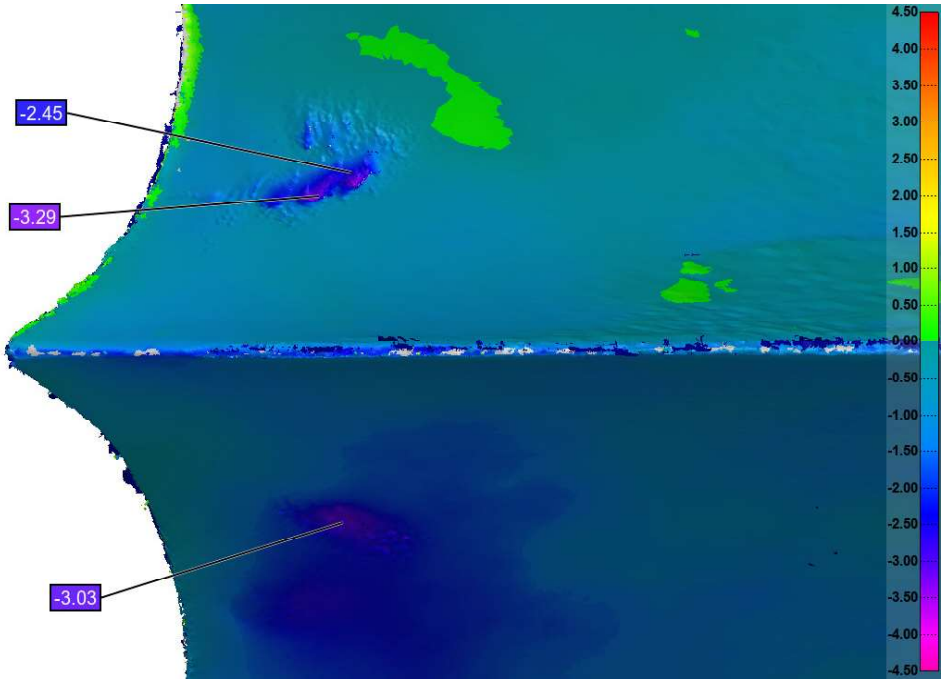
Bucket #10 - Wear colormaps

Global view





Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

ALIGNEMENT BEAUDOIN

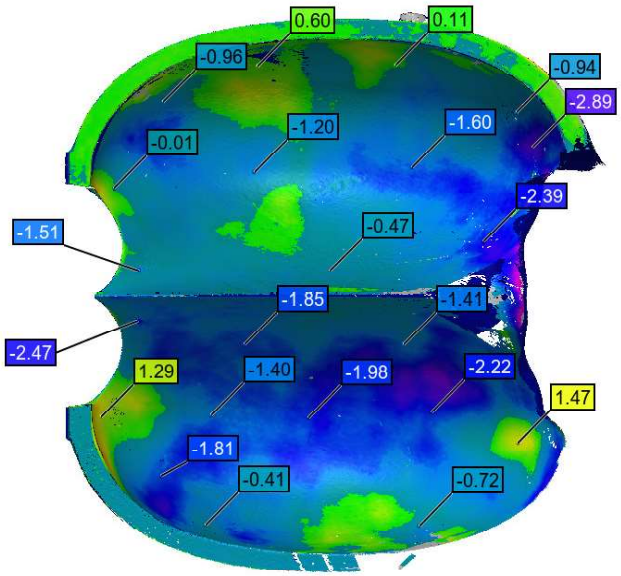
Bucket #11 - Punch marks bestfit results

Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #11.1	X	-220.04	-220.03	±1.00	0.01	Pass	
	Y	-0.01	-0.03	±1.00	-0.02	Pass	
	Z	353.01	353.53	±1.00	0.52	Pass	
• Pt #11.2	X	-82.00	-81.74	±1.00	0.26	Pass	
	Y	-0.01	0.03	±1.00	0.04	Pass	
	Z	357.11	358.81	±1.00	1.70	Fail	0.70
• Pt #11.3	X	76.47	77.15	±1.00	0.68	Pass	
	Y	0.01	0.04	±1.00	0.03	Pass	
	Z	331.93	331.95	±1.00	0.02	Pass	
• Pt #11.4	X	226.81	226.53	±1.00	-0.28	Pass	
	Y	0.03	-0.05	±1.00	-0.08	Pass	
	Z	175.11	176.42	±1.00	1.31	Fail	0.31
• Pt #11.5	X	226.64	225.38	±1.00	-1.26	Fail	-0.26
	Y	-0.04	0.00	±1.00	0.04	Pass	
	Z	-175.11	-175.48	±1.00	-0.37	Pass	
• Pt #11.6	X	75.87	75.80	±1.00	-0.07	Pass	
	Y	0.01	0.01	±1.00	0.00	Pass	
	Z	-332.32	-332.90	±1.00	-0.58	Pass	
• Pt #11.7	X	-82.61	-83.35	±1.00	-0.74	Pass	
	Y	0.00	0.03	±1.00	0.03	Pass	
	Z	-357.64	-359.10	±1.00	-1.46	Fail	-0.46
• Pt #11.8	X	-221.15	-219.74	±1.00	1.41	Fail	0.41
	Y	0.01	-0.03	±1.00	-0.04	Pass	
	Z	-353.01	-354.14	±1.00	-1.13	Fail	-0.13

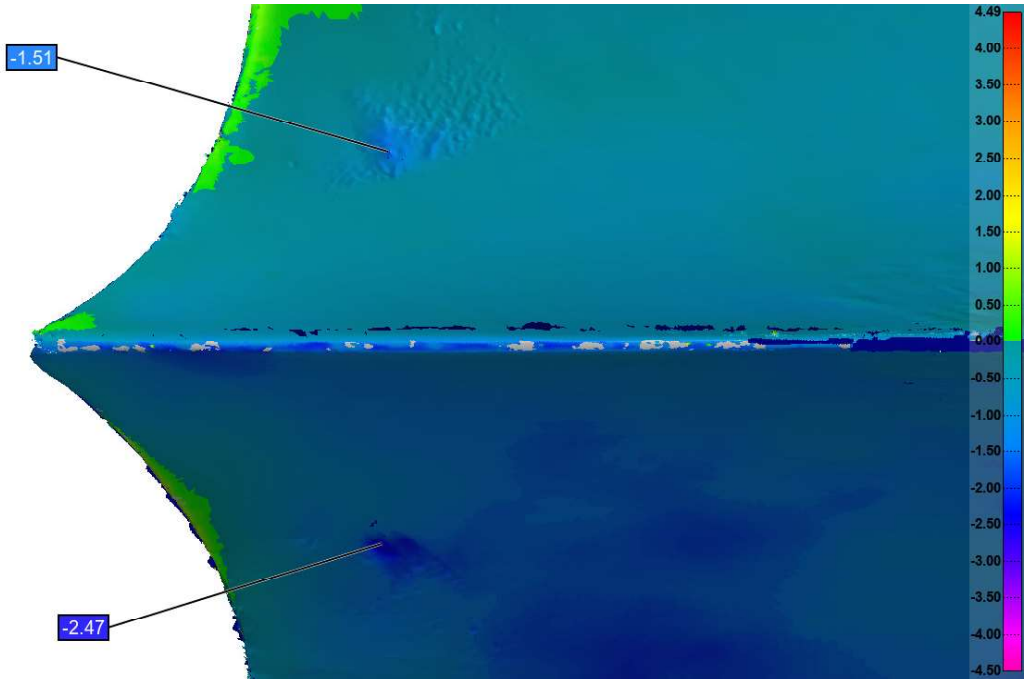
AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

Bucket #11 - Wear colormaps

Global view



Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

ALIGNEMENT BEAUDOIN

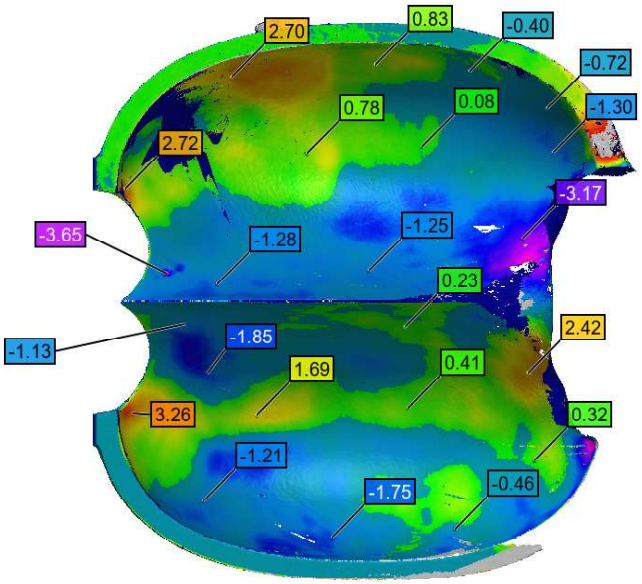
Bucket #12 - Punch marks bestfit results

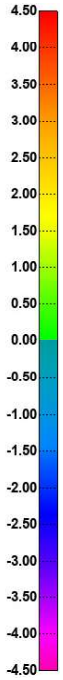
Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #12.1	X	-220.04	-220.31	±1.00	-0.27	Pass	
	Y	-0.01	-0.01	±1.00	0.00	Pass	
	Z	353.01	354.02	±1.00	1.01	Fail	0.01
• Pt #12.2	X	-82.00	-81.97	±1.00	0.03	Pass	
	Y	-0.01	0.01	±1.00	0.02	Pass	
	Z	357.11	357.53	±1.00	0.42	Pass	
• Pt #12.3	X	76.47	76.51	±1.00	0.04	Pass	
	Y	0.01	0.00	±1.00	-0.01	Pass	
	Z	331.93	330.74	±1.00	-1.19	Fail	-0.19
• Pt #12.4	X	226.81	226.22	±1.00	-0.59	Pass	
	Y	0.03	0.02	±1.00	-0.01	Pass	
	Z	175.11	175.20	±1.00	0.09	Pass	
• Pt #12.5	X	226.64	226.32	±1.00	-0.32	Pass	
	Y	-0.04	-0.04	±1.00	0.00	Pass	
	Z	-175.11	-175.47	±1.00	-0.36	Pass	
• Pt #12.6	X	75.87	76.44	±1.00	0.57	Pass	
	Y	0.01	0.02	±1.00	0.01	Pass	
	Z	-332.32	-332.94	±1.00	-0.62	Pass	
• Pt #12.7	X	-82.61	-82.52	±1.00	0.09	Pass	
	Y	0.00	0.03	±1.00	0.03	Pass	
	Z	-357.64	-356.99	±1.00	0.65	Pass	
• Pt #12.8	X	-221.15	-220.68	±1.00	0.47	Pass	
	Y	0.01	-0.03	±1.00	-0.04	Pass	
	Z	-353.01	-353.02	±1.00	-0.01	Pass	

AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

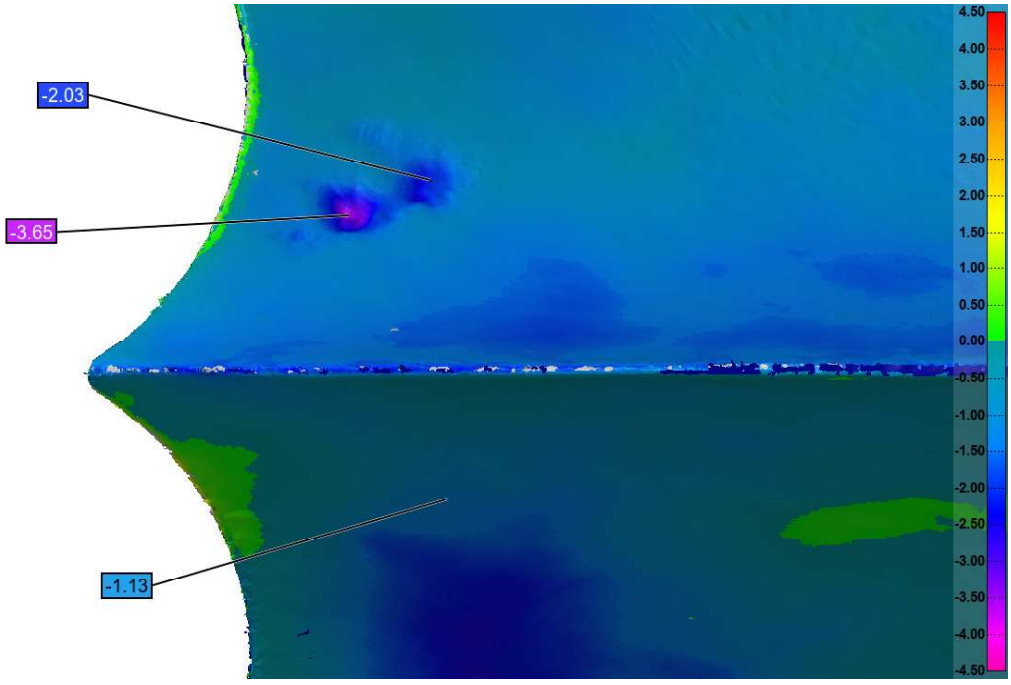
Bucket #12 - Wear colormaps

Global view





Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

ALIGNEMENT BEAUDOIN

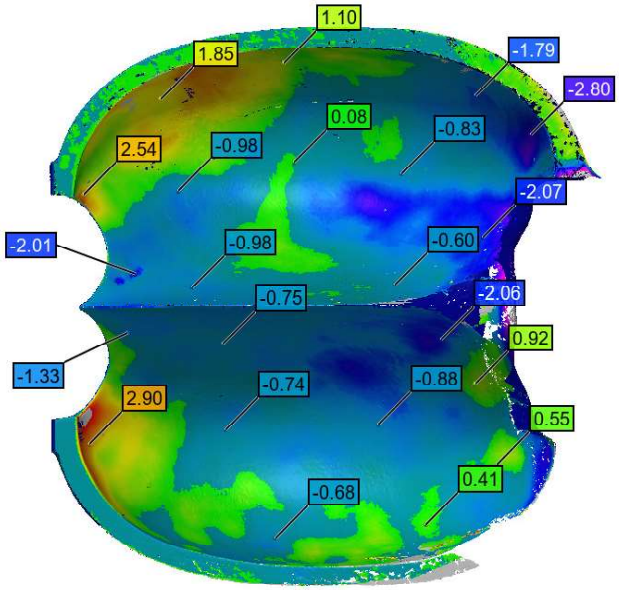
Bucket #13 - Punch marks bestfit results

Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #13.1	X	-220.04	-219.33	±1.00	0.71	Pass	
	Y	-0.01	0.05	±1.00	0.06	Pass	
	Z	353.01	352.75	±1.00	-0.26	Pass	
• Pt #13.2	X	-82.00	-81.34	±1.00	0.66	Pass	
	Y	-0.01	0.03	±1.00	0.04	Pass	
	Z	357.11	355.88	±1.00	-1.23	Fail	-0.23
• Pt #13.3	X	76.47	76.57	±1.00	0.10	Pass	
	Y	0.01	-0.04	±1.00	-0.05	Pass	
	Z	331.93	330.05	±1.00	-1.88	Fail	-0.88
• Pt #13.4	X	226.81	225.37	±1.00	-1.44	Fail	-0.44
	Y	0.03	-0.08	±1.00	-0.11	Pass	
	Z	175.11	175.67	±1.00	0.56	Pass	
• Pt #13.5	X	226.64	224.85	±1.00	-1.79	Fail	-0.79
	Y	-0.04	0.06	±1.00	0.10	Pass	
	Z	-175.11	-174.72	±1.00	0.39	Pass	
• Pt #13.6	X	75.87	74.52	±1.00	-1.35	Fail	-0.35
	Y	0.01	0.19	±1.00	0.18	Pass	
	Z	-332.32	-332.77	±1.00	-0.45	Pass	
• Pt #13.7	X	-82.61	-78.06	±1.00	4.55	Fail	3.55
	Y	0.00	-0.27	±1.00	-0.27	Pass	
	Z	-357.64	-355.15	±1.00	2.49	Fail	1.49
• Pt #13.8	X	-221.15	-222.57	±1.00	-1.42	Fail	-0.42
	Y	0.01	0.07	±1.00	0.06	Pass	
	Z	-353.01	-352.63	±1.00	0.38	Pass	

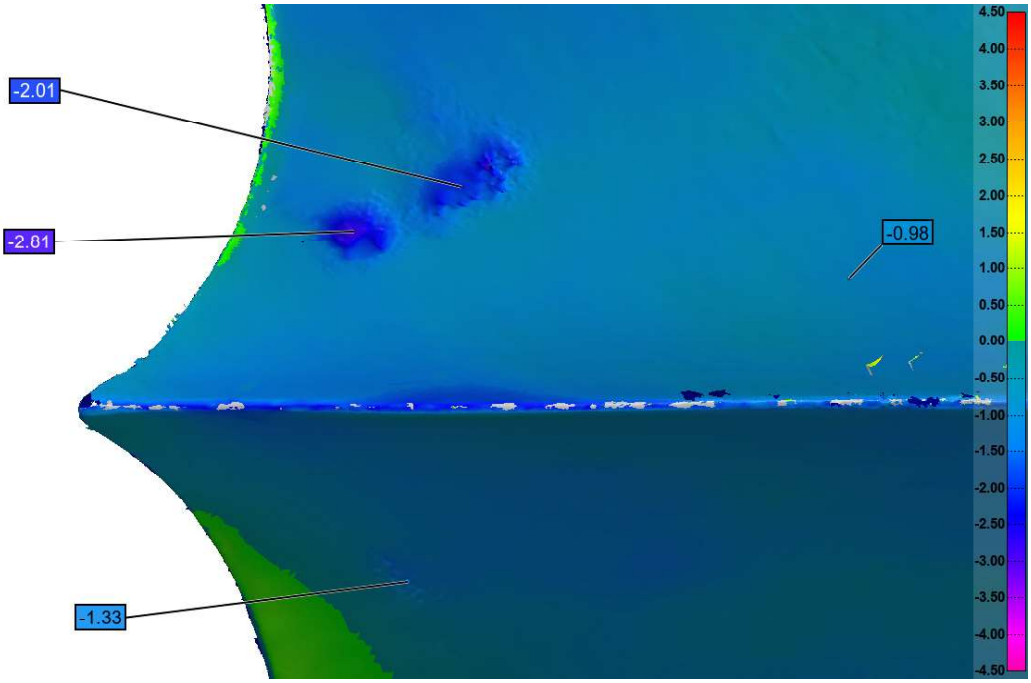
AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

Bucket #13 - Wear colormaps

Global view



Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

ALIGNEMENT BEAUDOIN

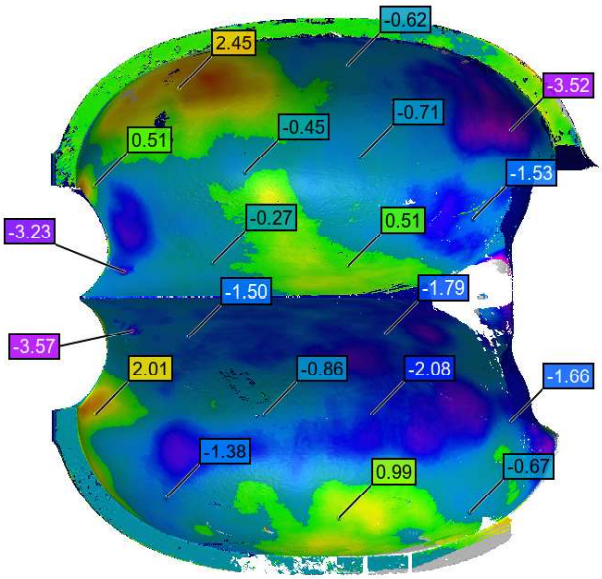
Bucket #14 - Punch marks bestfit results

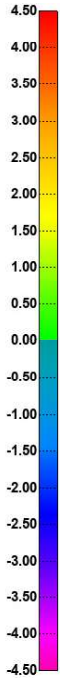
Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #14.1	X	-220.04	-224.37	±1.00	-4.33	Fail	-3.33
	Y	-0.01	-0.25	±1.00	-0.24	Pass	
	Z	353.01	354.15	±1.00	1.14	Fail	0.14
• Pt #14.2	X	-82.00	-79.89	±1.00	2.11	Fail	1.11
	Y	-0.01	0.19	±1.00	0.20	Pass	
	Z	357.11	356.78	±1.00	-0.33	Pass	
• Pt #14.3	X	76.47	78.56	±1.00	2.09	Fail	1.09
	Y	0.01	0.09	±1.00	0.08	Pass	
	Z	331.93	329.92	±1.00	-2.01	Fail	-1.01
• Pt #14.4	X	226.81	227.48	±1.00	0.67	Pass	
	Y	0.03	0.03	±1.00	0.00	Pass	
	Z	175.11	175.41	±1.00	0.30	Pass	
• Pt #14.5	X	226.64	226.51	±1.00	-0.13	Pass	
	Y	-0.04	-0.15	±1.00	-0.11	Pass	
	Z	-175.11	-174.34	±1.00	0.77	Pass	
• Pt #14.6	X	75.87	75.58	±1.00	-0.29	Pass	
	Y	0.01	-0.01	±1.00	-0.02	Pass	
	Z	-332.32	-331.66	±1.00	0.66	Pass	
• Pt #14.7	X	-82.61	-83.32	±1.00	-0.71	Pass	
	Y	0.00	0.03	±1.00	0.03	Pass	
	Z	-357.64	-356.40	±1.00	1.24	Fail	0.24
• Pt #14.8	X	-221.15	-220.56	±1.00	0.59	Pass	
	Y	0.01	0.08	±1.00	0.07	Pass	
	Z	-353.01	-354.79	±1.00	-1.78	Fail	-0.78

AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

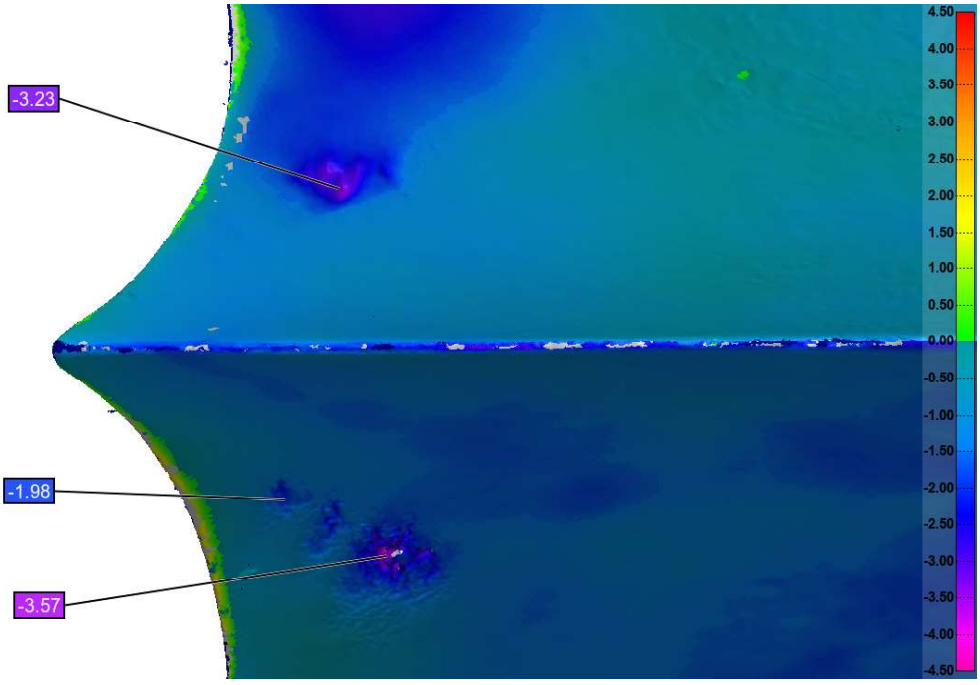
Bucket #14 - Wear colormaps

Global view





Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

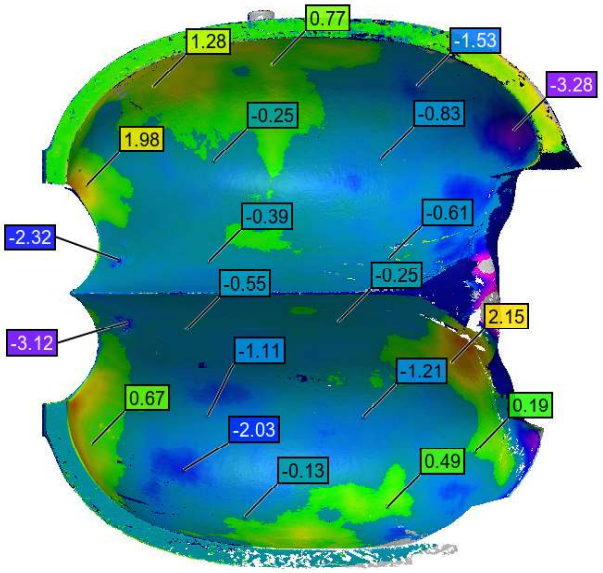
ALIGNEMENT BEAUDOIN

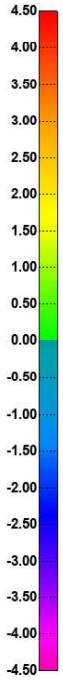
Bucket #15 - Punch marks bestfit results

Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #15.1	X	-220.04	-218.26	±1.00	1.78	Fail	0.78
	Y	-0.01	-0.05	±1.00	-0.04	Pass	
	Z	353.01	353.18	±1.00	0.17	Pass	
• Pt #15.2	X	-82.00	-80.83	±1.00	1.17	Fail	0.17
	Y	-0.01	0.01	±1.00	0.02	Pass	
	Z	357.11	357.48	±1.00	0.37	Pass	
• Pt #15.3	X	76.47	75.78	±1.00	-0.69	Pass	
	Y	0.01	0.04	±1.00	0.03	Pass	
	Z	331.93	330.92	±1.00	-1.01	Fail	-0.01
• Pt #15.4	X	226.81	225.47	±1.00	-1.34	Fail	-0.34
	Y	0.03	0.00	±1.00	-0.03	Pass	
	Z	175.11	175.85	±1.00	0.74	Pass	
• Pt #15.5	X	226.64	225.21	±1.00	-1.43	Fail	-0.43
	Y	-0.04	-0.06	±1.00	-0.02	Pass	
	Z	-175.11	-173.96	±1.00	1.15	Fail	0.15
• Pt #15.6	X	75.87	76.20	±1.00	0.33	Pass	
	Y	0.01	0.03	±1.00	0.02	Pass	
	Z	-332.32	-331.70	±1.00	0.62	Pass	
• Pt #15.7	X	-82.61	-82.90	±1.00	-0.29	Pass	
	Y	0.00	-0.01	±1.00	-0.01	Pass	
	Z	-357.64	-358.52	±1.00	-0.88	Pass	
• Pt #15.8	X	-221.15	-220.67	±1.00	0.48	Pass	
	Y	0.01	0.01	±1.00	0.00	Pass	
	Z	-353.01	-354.17	±1.00	-1.16	Fail	-0.16

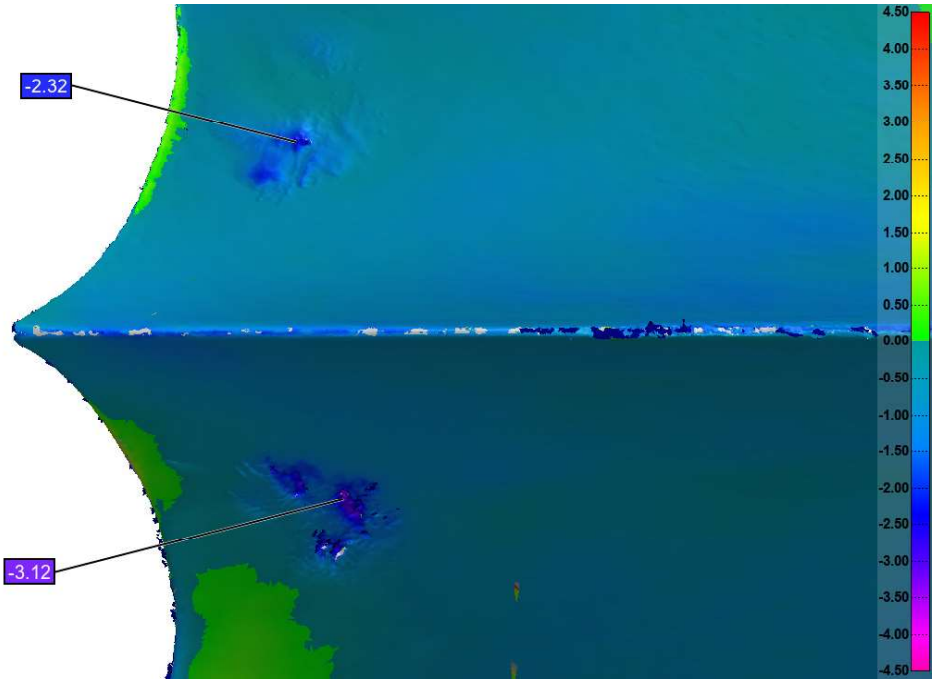
Bucket #15 - Wear colormaps

Global view





Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

ALIGNEMENT BEAUDOIN

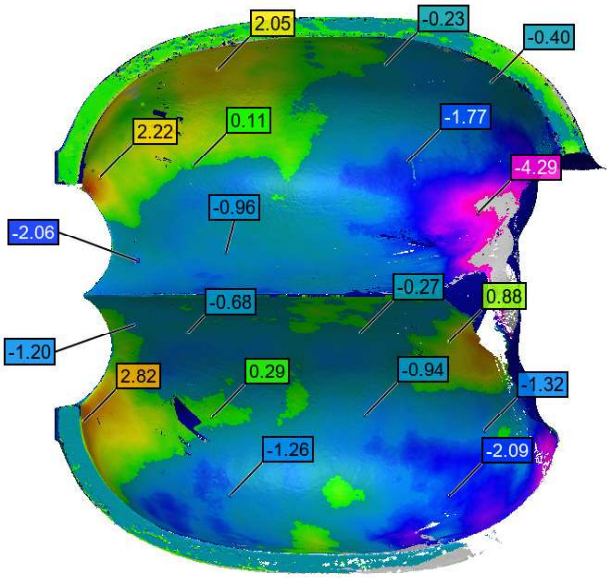
Bucket #16 - Punch marks bestfit results

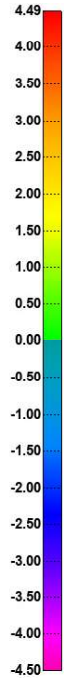
Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #16.1	X	-220.04	-220.00	±1.00	0.04	Pass	
	Y	-0.01	0.00	±1.00	0.01	Pass	
	Z	353.01	354.03	±1.00	1.02	Fail	0.02
• Pt #16.2	X	-82.00	-81.72	±1.00	0.28	Pass	
	Y	-0.01	0.00	±1.00	0.01	Pass	
	Z	357.11	357.16	±1.00	0.05	Pass	
• Pt #16.3	X	76.47	76.89	±1.00	0.42	Pass	
	Y	0.01	0.01	±1.00	0.00	Pass	
	Z	331.93	329.56	±1.00	-2.37	Fail	-1.37
• Pt #16.4	X	226.81	226.02	±1.00	-0.79	Pass	
	Y	0.03	-0.01	±1.00	-0.04	Pass	
	Z	175.11	175.49	±1.00	0.38	Pass	
• Pt #16.5	X	226.64	225.25	±1.00	-1.39	Fail	-0.39
	Y	-0.04	-0.03	±1.00	0.01	Pass	
	Z	-175.11	-174.64	±1.00	0.47	Pass	
• Pt #16.6	X	75.87	77.17	±1.00	1.30	Fail	0.30
	Y	0.01	0.04	±1.00	0.03	Pass	
	Z	-332.32	-332.06	±1.00	0.26	Pass	
• Pt #16.7	X	-82.61	-82.89	±1.00	-0.28	Pass	
	Y	0.00	0.00	±1.00	0.00	Pass	
	Z	-357.64	-356.80	±1.00	0.84	Pass	
• Pt #16.8	X	-221.15	-220.71	±1.00	0.44	Pass	
	Y	0.01	-0.02	±1.00	-0.03	Pass	
	Z	-353.01	-353.65	±1.00	-0.64	Pass	

AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

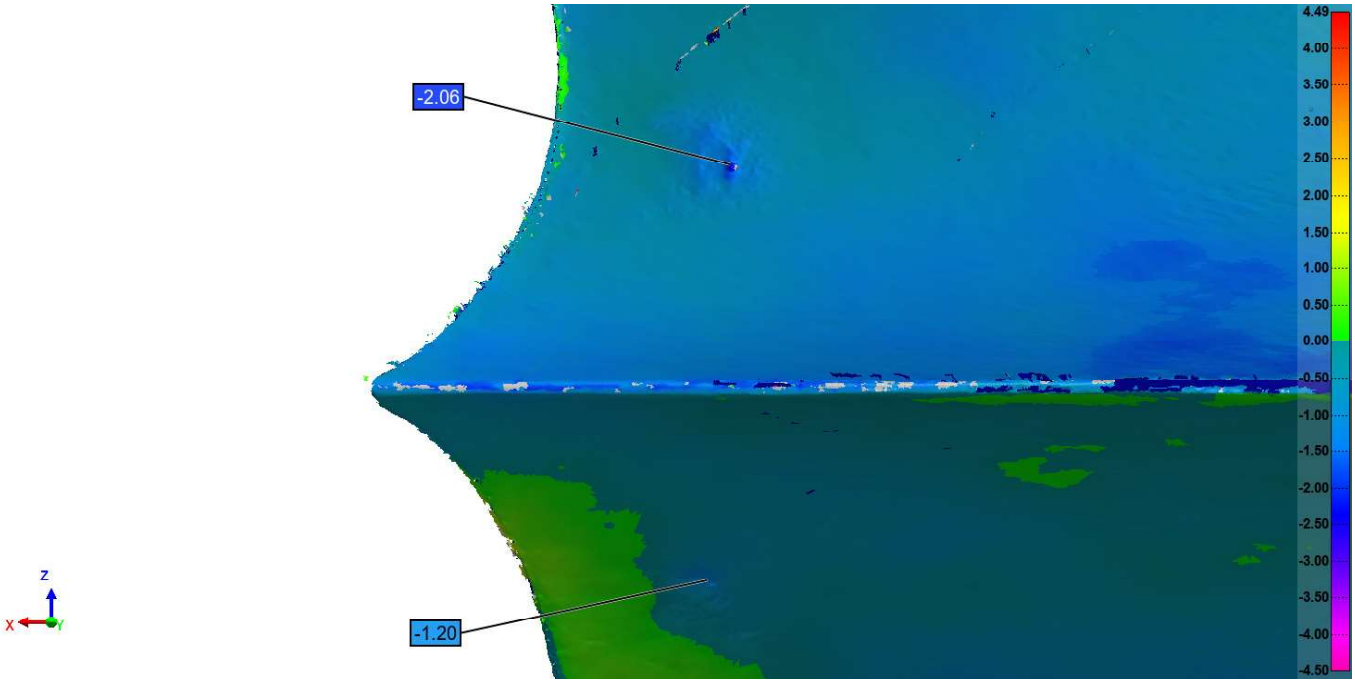
Bucket #16 - Wear colormaps

Global view





Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

ALIGNEMENT BEAUDOIN

Bucket #17 - Punch marks bestfit results

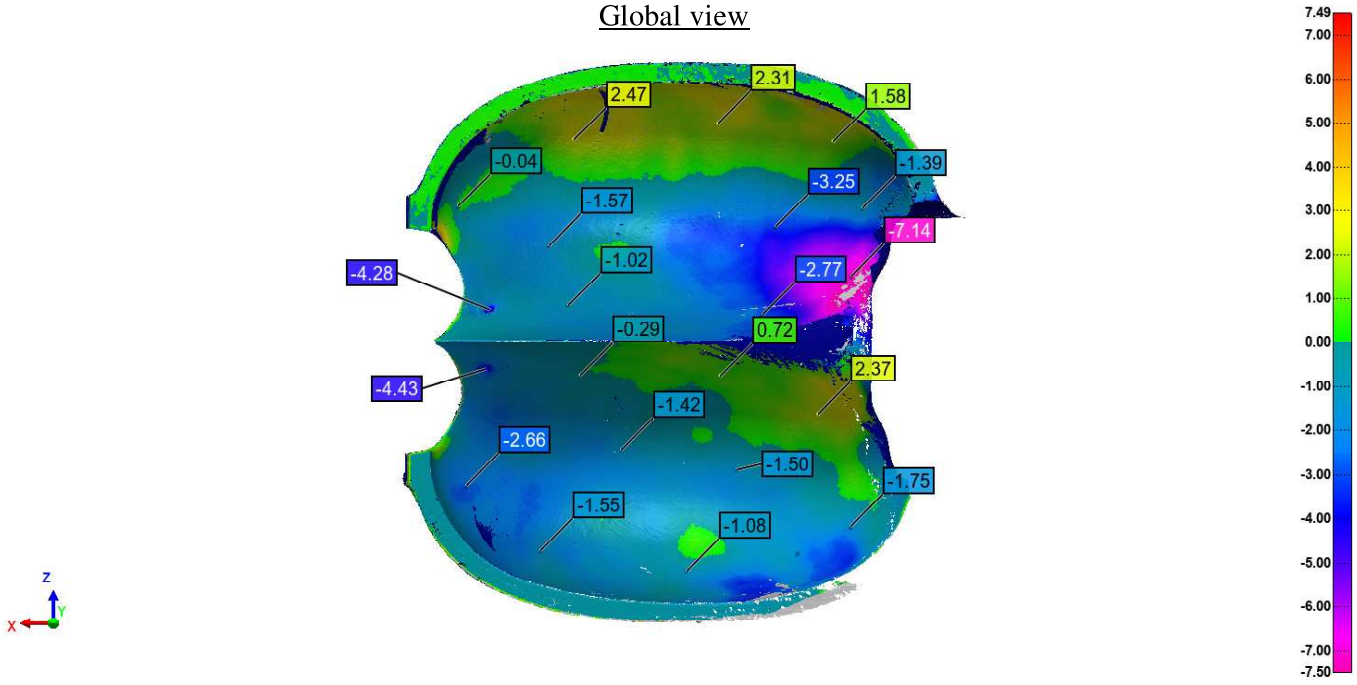
Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #17.1	X	-220.04	-219.89	±1.00	0.15	Pass	
	Y	-0.01	-0.06	±1.00	-0.05	Pass	
	Z	353.01	351.82	±1.00	-1.19	Fail	-0.19
• Pt #17.2	X	-82.00	-81.13	±1.00	0.87	Pass	
	Y	-0.01	0.04	±1.00	0.05	Pass	
	Z	357.11	356.78	±1.00	-0.33	Pass	
• Pt #17.3	X	76.47	77.21	±1.00	0.74	Pass	
	Y	0.01	0.04	±1.00	0.03	Pass	
	Z	331.93	330.87	±1.00	-1.06	Fail	-0.06
• Pt #17.4	X	226.81	226.61	±1.00	-0.20	Pass	
	Y	0.03	0.00	±1.00	-0.03	Pass	
	Z	175.11	176.62	±1.00	1.51	Fail	0.51
• Pt #17.5	X	226.64	228.08	±1.00	1.44	Fail	0.44
	Y	-0.04	-0.09	±1.00	-0.05	Pass	
	Z	-175.11	-173.56	±1.00	1.55	Fail	0.55
• Pt #17.6	X	75.87	81.46	±1.00	5.59	Fail	4.59
	Y	0.01	0.07	±1.00	0.06	Pass	
	Z	-332.32	-330.67	±1.00	1.65	Fail	0.65
• Pt #17.7	X	-82.61	-77.95	±1.00	4.66	Fail	3.66
	Y	0.00	0.01	±1.00	0.01	Pass	
	Z	-357.64	-357.78	±1.00	-0.14	Pass	
• Pt #17.8	X	-221.15	-234.38	±1.00	-13.23	Fail	-12.23
	Y	0.01	-0.01	±1.00	-0.02	Pass	
	Z	-353.01	-355.00	±1.00	-1.99	Fail	-0.99

AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

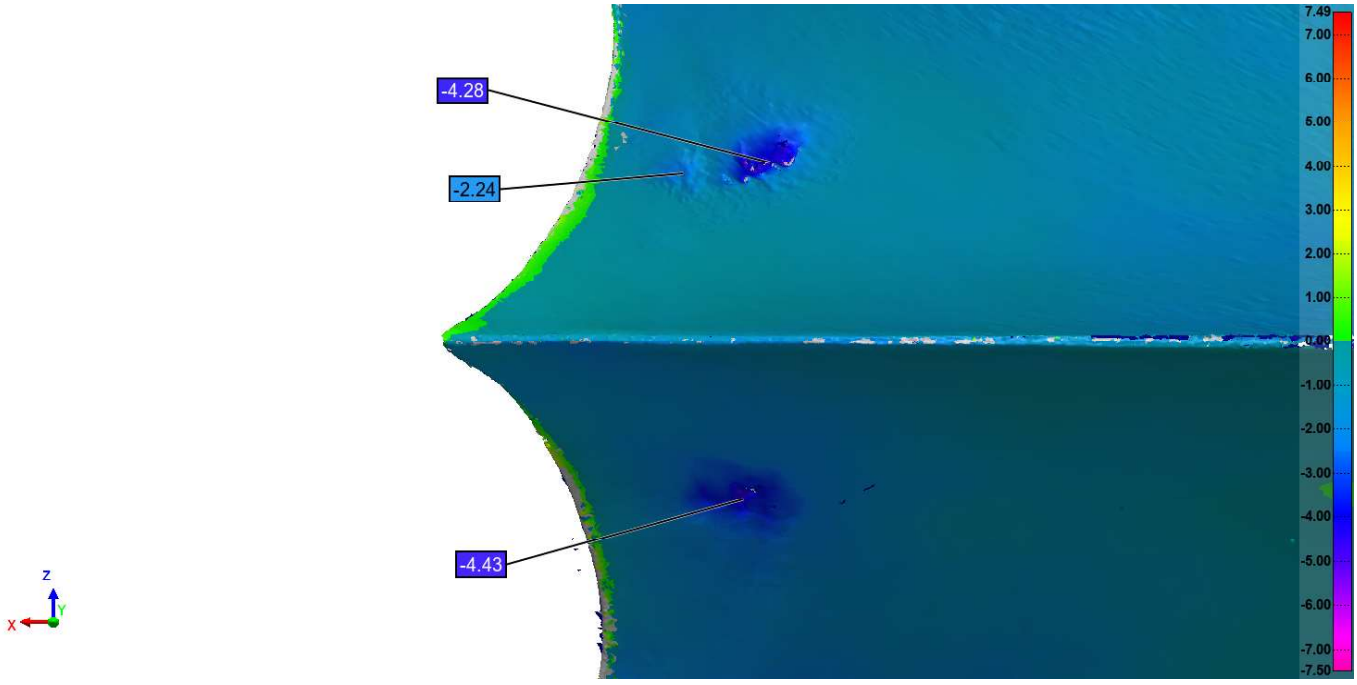
Bucket #17 - Wear colormaps

The color map range have been increased from ±4.5mm to ±7.5mm to reflect a worse wear

Global view



Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

ALIGNEMENT BEAUDOIN

Bucket #18 - Punch marks bestfit results

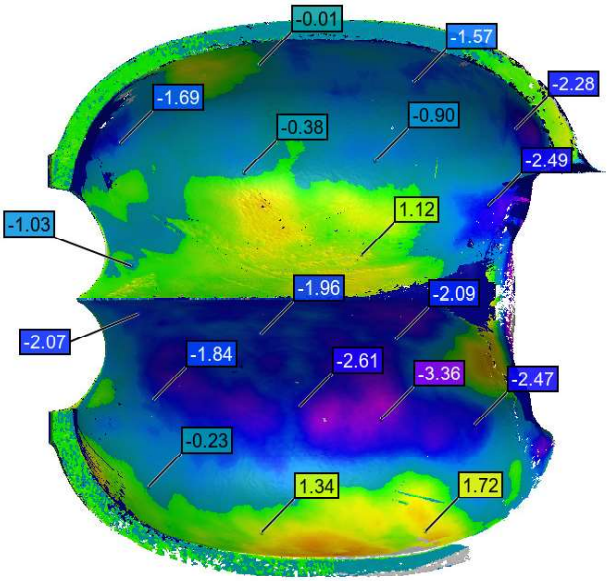
Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #18.1	X	-220.04	-219.83	±1.00	0.21	Pass	
	Y	-0.01	0.00	±1.00	0.01	Pass	
	Z	353.01	357.18	±1.00	4.17	Fail	3.17
• Pt #18.2	X	-82.00	-81.88	±1.00	0.12	Pass	
	Y	-0.01	-0.04	±1.00	-0.03	Pass	
	Z	357.11	348.95	±1.00	-8.16	Fail	-7.16
• Pt #18.3	X	76.47	77.14	±1.00	0.67	Pass	
	Y	0.01	0.03	±1.00	0.02	Pass	
	Z	331.93	321.03	±1.00	-10.90	Fail	-9.90
• Pt #18.4	X	226.81	225.10	±1.00	-1.71	Fail	-0.71
	Y	0.03	0.04	±1.00	0.01	Pass	
	Z	175.11	178.58	±1.00	3.47	Fail	2.47
• Pt #18.5	X	226.64	227.34	±1.00	0.70	Pass	
	Y	-0.04	-0.09	±1.00	-0.05	Pass	
	Z	-175.11	-171.78	±1.00	3.33	Fail	2.33
• Pt #18.6	X	75.87	76.58	±1.00	0.71	Pass	
	Y	0.01	0.06	±1.00	0.05	Pass	
	Z	-332.32	-328.96	±1.00	3.36	Fail	2.36
• Pt #18.7	X	-82.61	-82.40	±1.00	0.21	Pass	
	Y	0.00	0.02	±1.00	0.02	Pass	
	Z	-357.64	-355.82	±1.00	1.82	Fail	0.82
• Pt #18.8	X	-221.15	-222.04	±1.00	-0.89	Pass	
	Y	0.01	-0.02	±1.00	-0.03	Pass	
	Z	-353.01	-350.10	±1.00	2.91	Fail	1.91

Bestfit on punch locations seem to be offset in Z. The next page anaylsis is then displayed with the bestfit of the scan of the bucket #18 on the reference bucket's edges (area which is not supposed to wear).

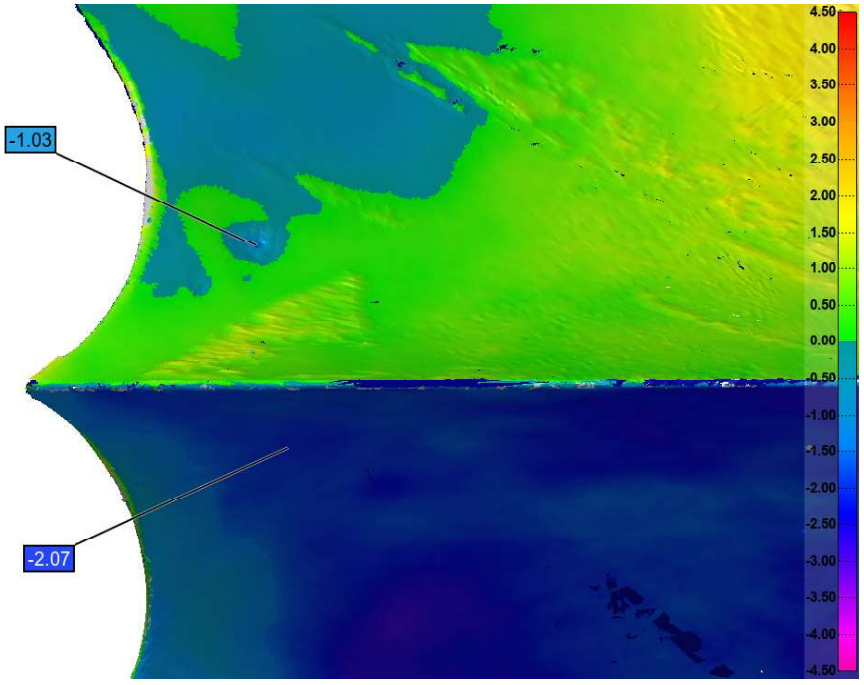
Bucket #18 - Wear colormaps

NOTE : Alignement bestfit with scan

Global view



Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

ALIGNEMENT BEAUDOIN

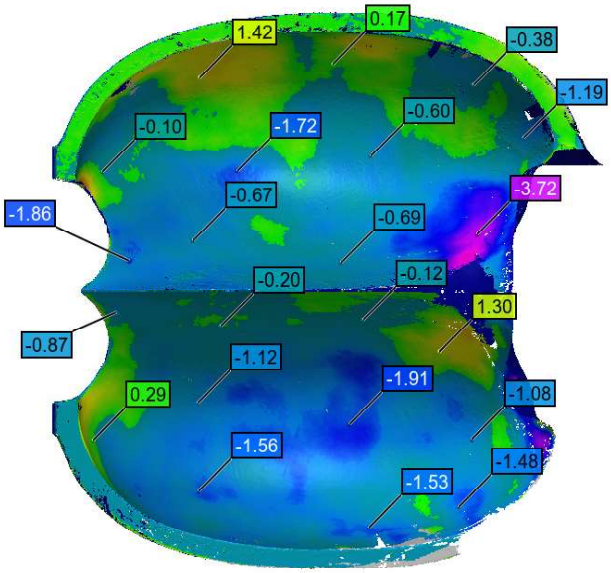
Bucket #19 - Punch marks bestfit results

Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #19.1	X	-220.04	-219.88	±1.00	0.16	Pass	
	Y	-0.01	0.00	±1.00	0.01	Pass	
	Z	353.01	355.09	±1.00	2.08	Fail	1.08
• Pt #19.2	X	-82.00	-81.33	±1.00	0.67	Pass	
	Y	-0.01	-0.01	±1.00	0.00	Pass	
	Z	357.11	355.14	±1.00	-1.97	Fail	-0.97
• Pt #19.3	X	76.47	77.51	±1.00	1.04	Fail	0.04
	Y	0.01	0.03	±1.00	0.02	Pass	
	Z	331.93	329.19	±1.00	-2.74	Fail	-1.74
• Pt #19.4	X	226.81	224.88	±1.00	-1.93	Fail	-0.93
	Y	0.03	-0.01	±1.00	-0.04	Pass	
	Z	175.11	175.04	±1.00	-0.07	Pass	
• Pt #19.5	X	226.64	225.51	±1.00	-1.13	Fail	-0.13
	Y	-0.04	-0.05	±1.00	-0.01	Pass	
	Z	-175.11	-174.53	±1.00	0.58	Pass	
• Pt #19.6	X	75.87	75.35	±1.00	-0.52	Pass	
	Y	0.01	0.05	±1.00	0.04	Pass	
	Z	-332.32	-329.16	±1.00	3.16	Fail	2.16
• Pt #19.7	X	-82.61	-82.04	±1.00	0.57	Pass	
	Y	0.00	0.04	±1.00	0.04	Pass	
	Z	-357.64	-357.76	±1.00	-0.12	Pass	
• Pt #19.8	X	-221.15	-220.00	±1.00	1.15	Fail	0.15
	Y	0.01	-0.05	±1.00	-0.06	Pass	
	Z	-353.01	-353.95	±1.00	-0.94	Pass	

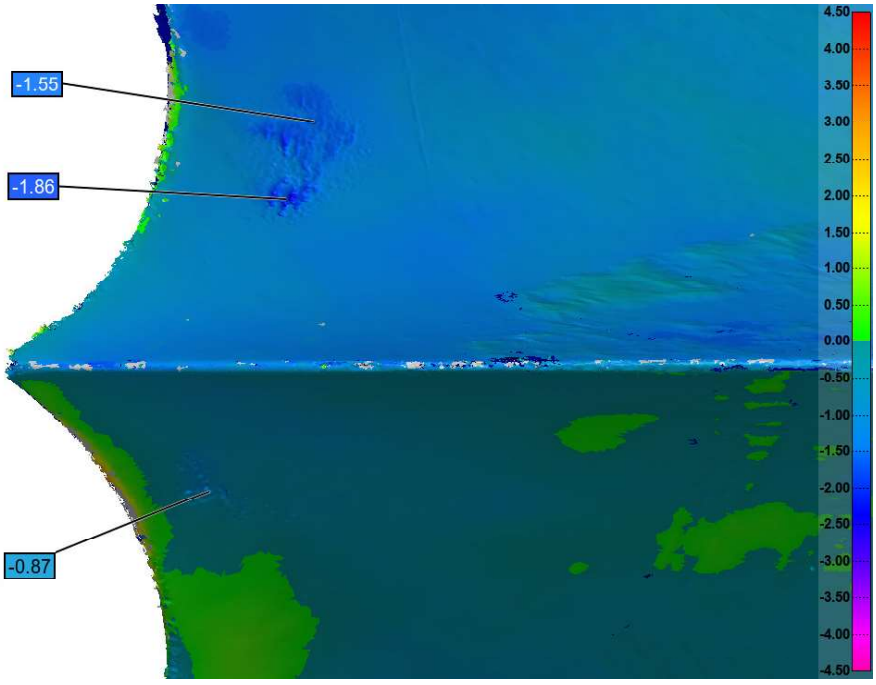
AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

Bucket #19 - Wear colormaps

Global view



Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

ALIGNEMENT BEAUDOIN

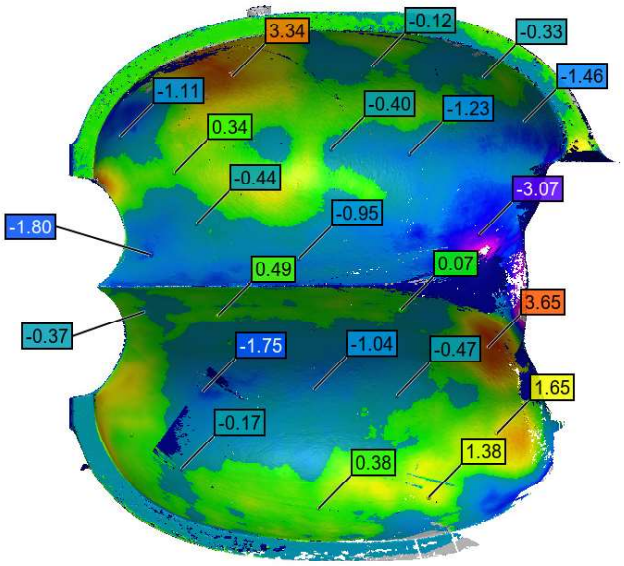
Bucket #20 - Punch marks bestfit results

Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #20.1	X	-220.04	-219.79	±1.00	0.25	Pass	
	Y	-0.01	-0.02	±1.00	-0.01	Pass	
	Z	353.01	352.26	±1.00	-0.75	Pass	
• Pt #20.2	X	-82.00	-81.62	±1.00	0.38	Pass	
	Y	-0.01	-0.01	±1.00	0.00	Pass	
	Z	357.11	357.77	±1.00	0.66	Pass	
• Pt #20.3	X	76.47	76.84	±1.00	0.37	Pass	
	Y	0.01	0.07	±1.00	0.06	Pass	
	Z	331.93	330.74	±1.00	-1.19	Fail	-0.19
• Pt #20.4	X	226.81	224.70	±1.00	-2.11	Fail	-1.11
	Y	0.03	-0.05	±1.00	-0.08	Pass	
	Z	175.11	174.94	±1.00	-0.17	Pass	
• Pt #20.5	X	226.64	227.72	±1.00	1.08	Fail	0.08
	Y	-0.04	-0.02	±1.00	0.02	Pass	
	Z	-175.11	-175.09	±1.00	0.02	Pass	
• Pt #20.6	X	75.87	75.82	±1.00	-0.05	Pass	
	Y	0.01	0.03	±1.00	0.02	Pass	
	Z	-332.32	-331.91	±1.00	0.41	Pass	
• Pt #20.7	X	-82.61	-82.55	±1.00	0.06	Pass	
	Y	0.00	0.00	±1.00	0.00	Pass	
	Z	-357.64	-357.75	±1.00	-0.11	Pass	
• Pt #20.8	X	-221.15	-221.13	±1.00	0.02	Pass	
	Y	0.01	-0.01	±1.00	-0.02	Pass	
	Z	-353.01	-351.89	±1.00	1.12	Fail	0.12

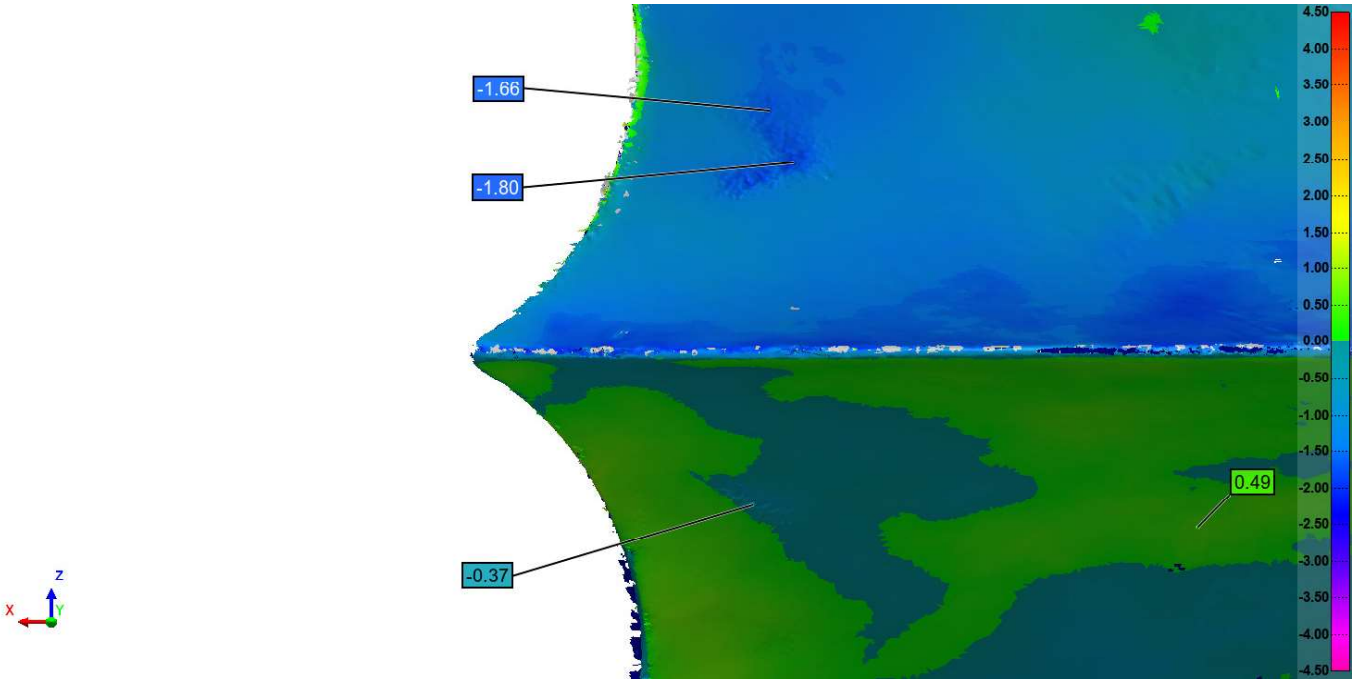
AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

Bucket #19 - Wear colormaps

Global view



Zoom on cavitation area



AB25-0356 REV A - Cat Arm - Unit #1 old runner wear analysis

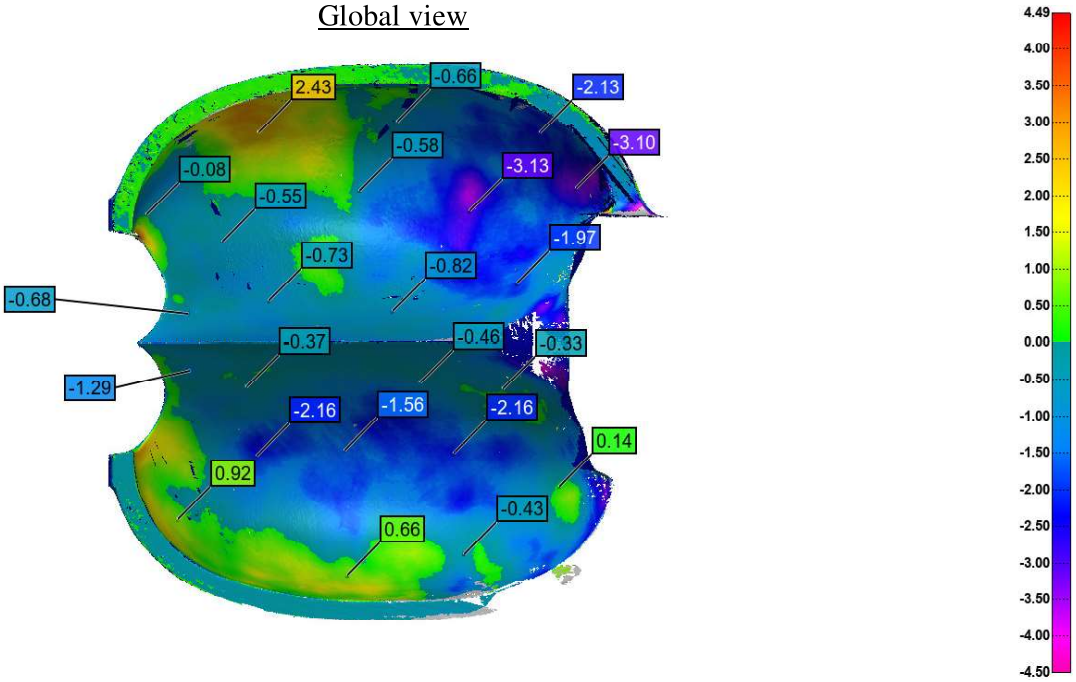
ALIGNEMENT BEAUDOIN

Bucket #21 - Punch marks bestfit results

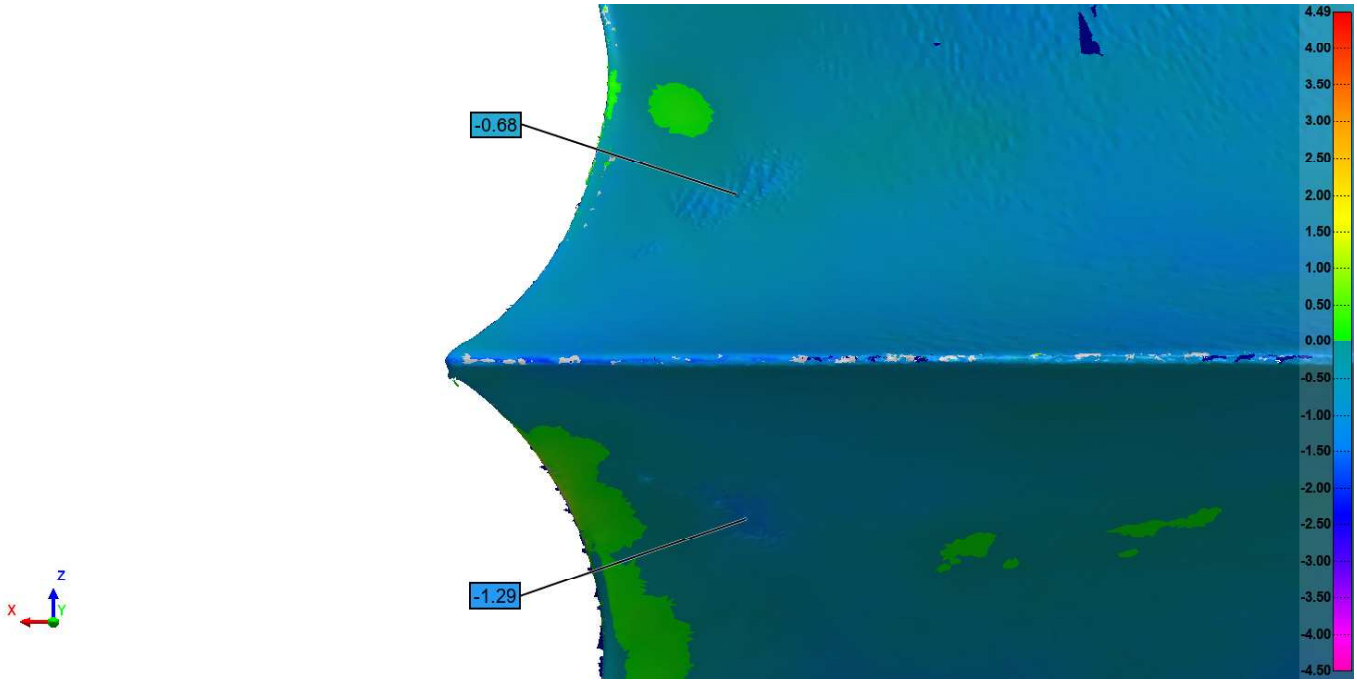
Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
• Pt #21.1	X	-220.04	-220.28	±1.00	-0.24	Pass	
	Y	-0.01	-0.04	±1.00	-0.03	Pass	
	Z	353.01	350.74	±1.00	-2.27	Fail	-1.27
• Pt #21.2	X	-82.00	-81.05	±1.00	0.95	Pass	
	Y	-0.01	0.11	±1.00	0.12	Pass	
	Z	357.11	356.55	±1.00	-0.56	Pass	
• Pt #21.3	X	76.47	77.86	±1.00	1.39	Fail	0.39
	Y	0.01	0.03	±1.00	0.02	Pass	
	Z	331.93	330.31	±1.00	-1.62	Fail	-0.62
• Pt #21.4	X	226.81	225.70	±1.00	-1.11	Fail	-0.11
	Y	0.03	-0.14	±1.00	-0.17	Pass	
	Z	175.11	175.48	±1.00	0.37	Pass	
• Pt #21.5	X	226.64	225.25	±1.00	-1.39	Fail	-0.39
	Y	-0.04	0.04	±1.00	0.08	Pass	
	Z	-175.11	-174.31	±1.00	0.80	Pass	
• Pt #21.6	X	75.87	76.19	±1.00	0.32	Pass	
	Y	0.01	0.06	±1.00	0.05	Pass	
	Z	-332.32	-330.91	±1.00	1.41	Fail	0.41
• Pt #21.7	X	-82.61	-82.48	±1.00	0.13	Pass	
	Y	0.00	0.03	±1.00	0.03	Pass	
	Z	-357.64	-355.83	±1.00	1.81	Fail	0.81
• Pt #21.8	X	-221.15	-221.18	±1.00	-0.03	Pass	
	Y	0.01	-0.08	±1.00	-0.09	Pass	
	Z	-353.01	-352.94	±1.00	0.07	Pass	

Bucket #21 - Wear colormaps

Global view



Zoom on cavitation area



Conclusion

From what have been seen on site, the old runner do not seem to have any unusual wear due to its long use (40 years). Most of the area still had their original paint even inside some buckets (especialy at the water exit zone).

With the range of deviation observed (mainly ±4.5mm) the casting process used 40 years ago to build the runner could the main cause of the defects displayed.

Here are the recurrent/significant defects observed :

- On each buckets (from #1 to #21) there are two cavitations areas (2mm to 4.5mm deep) where the water hits the surface with the most force
- The bucket #1 is missing a small part of metal probably due to a collision with a rock or debris

Appendix B – Cat Arm runner supply budgetary proposal 771-769-U0-00-000-00 R0

LITOSTROJ HYDRO

45 Pacifique East
Bromont, (Québec)
Canada, J2L 1J4
Tel.: 1 (450) 534 2929
Fax: 1 (450) 534 0136

Customer	Jordan Hull
Dam Name	Cat Arm
Company name	Newfoundland & Labrador Hydro
Address	Hydro Place, 500 Columbus Drive P.O. Box 12400 St. John's, NL A1B 4K7 (709) 737-1927

Title — Cat Arm runner supply budgetary proposal

Proposal 771-769-U0-00-000-00 R0

Date 2025.05.13



LITOSTROJ HYDRO

1 Summary

We are pleased to present our budgetary proposal for the supply of 2 runners for the Cat Arm Project based on the provided technical data. There are 2 pricing scenarios. The first one is a replacement **in-kind** based on the actual geometry. The second scenario is a replacement with a **new enhanced profile.**

At this stage, this proposal offers a preliminary indication of the conditions under which we would deliver the supplies and **does not** constitute **a binding offer**. Specifically, our indicative prices are provided for informational purposes only. Litostroj reserves the right to modify any aspect of this proposal.

Nevertheless, we believe the information provided is sufficiently detailed to enable you to assess the range of products and services that Litostroj can offer. We wish to confirm our keen interest in collaborating with you on this project.

We remain available to further discuss the contents of this proposal and to prepare a binding offer at your earliest convenience, including definitive prices and complete terms and conditions.

Sincerely,

Eric Michaud

_____

Eric Michaud

Proposal Manager

2 Scope of supply and Pricing

LITOSTROJ HYDRO

Scope of Supply

In-kind replacement

		($CAN)
	First runner supply and engineering	
	Sub-total	**1 905 865,18**
7	**2nd Runner Supply**	**1 679 135,31**

Total for 2 runners **3 585 000,49**

New runner profile

		($CAN)
	First runner supply and engineering	
	Sub-total	**1 989 109,38**
O6	**Price for 2nd Runner**	**1 734 232,40**

Total for 2 runners **3 723 341,78**

Inclusions

Spare Parts, Transport DDP Site,

Exclusions

Civil works, Engineering Installation, Ducting, BOPe other than specified,
Taxes,

LITOSTROJ PRICE SCHEDULE NOTES

1 Price is based on lump sum price, Litostroj reserves the right to adjust price if broken down.

2 Litostroj used EURO-CAD exchange rate of 1.58 to illustrate potential final price. Litostroj proposes to apply the spot rate-0.02 at the time of execution.

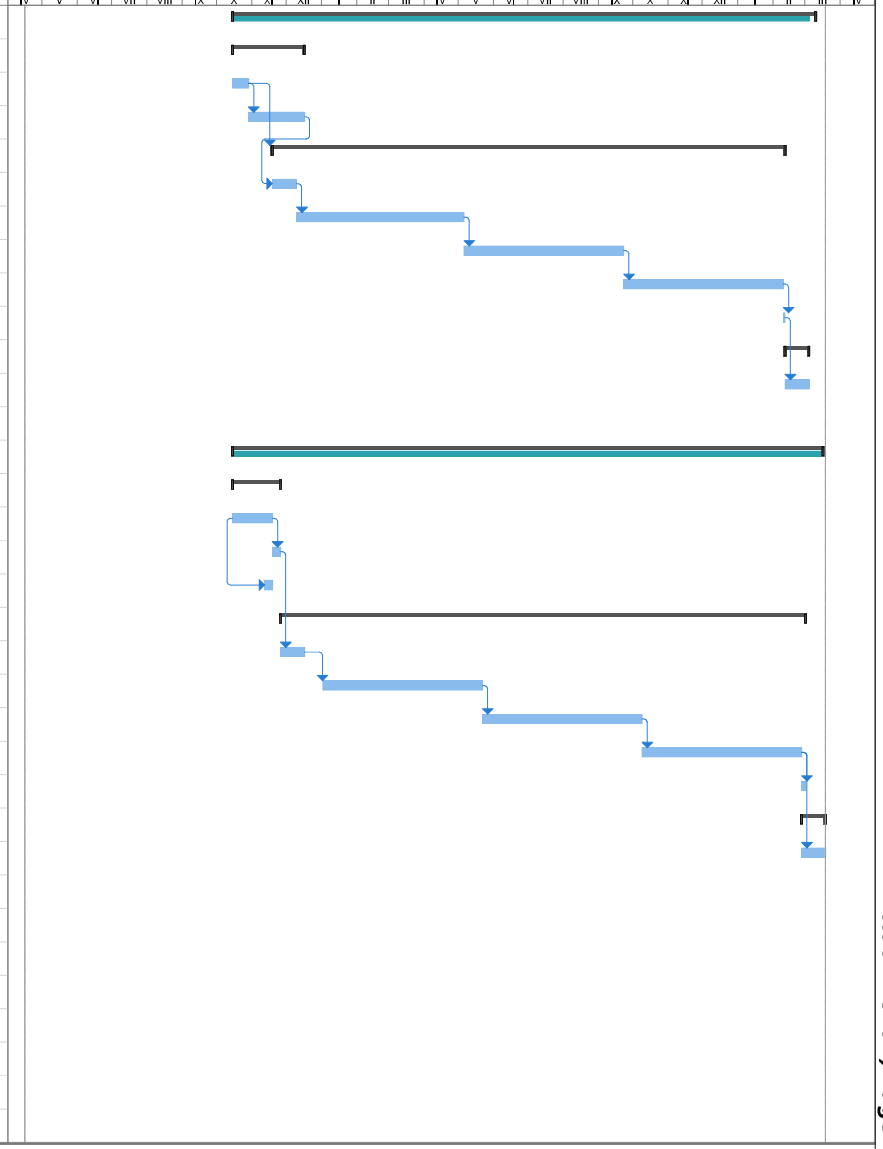
3 Until execution, if price of materials or labor incorporated into the Litostroj's final products vary by more than three percent (3%), Litostroj shall have the right to submit a new price that shall be updated according to the following related indexes, Litostroj are open to have natural Hedging at the time of execution if this is preferred by the Owner.
References:
•Exchange rates
•Consumer price index
•Industrial products price index

4 Delivery Terms: DDP (Incoterms 2020)

LITOSTROJ HYDRO

3 Schedule

ID	Režim úkolu	Název úkolu	Doba trvání	Zahájení	Dokončení	Předchůdci	Názvy zdrojů
1		**IN KIND REPLACEMENT**	**73.1 týdny**	**15.10. 25**	**10.03. 27**		
2		**Reverse engineerng**	**9 týdny**	**15.10. 25**	**16.12. 25**		
3		Scan of the runner + post processing	2 týdny	15.10. 25	28.10. 25		
4		Reverse Enginnering	7 týdny	29.10. 25	16.12. 25	3	
5		**Procurement**	**64.3 týdny**	**19.11. 25**	**11.02. 27**	**3**	
6		Supplier selection-forging	3 týdny	19.11. 25	09.12. 25	4FS-20 dny	
7		Semi-product forging U1&U2	21 týdny	10.12. 25	05.05. 26	6	
8		Final Machining U1	20 týdny	06.05. 26	22.09. 26	7	
9		Final Machining U2	20 týdny	23.09. 26	09.02. 27	8	
10		FAT U1+U2	0.3 týdny	10.02. 27	11.02. 27	9	
11		**Transportation U1&U2**	**3 týdny**	**11.02. 27**	**04.03. 27**		
12		EU+Oversea Delivery To Port	3 týdny	11.02. 27	04.03. 27	10	
13							
14		**NEW RUNNER WITH NEW DESIGN**	**74 týdny?**	**15.10. 25**	**16.03. 27**		
15		**Design of runner**	**6 týdny**	**15.10. 25**	**25.11. 25**		
16		Hydraulic Design	5 týdny	15.10. 25	18.11. 25		
17		Mechanical design	1 týden	19.11. 25	25.11. 25	16	
18		FEM Analysis	1 týden	12.11. 25	18.11. 25	16SS+20 dny	
19		**Procurement**	**65.7 týdny**	**26.11. 25**	**01.03. 27**		
20		Supplier selection	3 týdny	26.11. 25	16.12. 25	17	
21		Semi-product forging U1&U2	20 týdny	02.01. 26	21.05. 26	20FS+12 dny	
22		Final Machining U1	20 týdny	22.05. 26	08.10. 26	21	
23		Final Machining U2	20 týdny	09.10. 26	25.02. 27	22	
24		FAT U1+U2	0.3 týdny	26.02. 27	01.03. 27	23	
25		**Transportation U1&U2**	**3 týdny**	**26.02. 27**	**18.03. 27**		
26		EU+Oversea Delivery To Port	3 týdny	26.02. 27	18.03. 27	23	
27							
28							
29							
30							
31							
32							
33							
34							



Projekt: Runner delivery
Datum: 16.04. 25

Úkol	Souhrn projektu	Ruční úkol	Pouze zahájení	Konečný termín
Rozdělení	Neaktivní úkol	Pouze s dobou trvání	Pouze s datem dokončení	Průběh
Milník	Neaktivní milník	Ruční úkoly zahrnuté v souhrnném úkolu	Vnější úkoly	Průběh ručně zadaného úkolu
Souhrnný	Neaktivní souhrn	Ruční souhrn	Vnější milník	

Appendix C – Refurbishment budgetary quote

Soumission

Date	No.	Révision
28-10-2025	15204	0

FAB 3R
227 boul. du St-Maurice
Trois-Rivières, Qc G9A 3N8

À l'attention de : Karl Tremblay
Client : Litostroj Hydro inc.
45 Pacifique Est
Bromont Québec J2L 1J4

Représentant : Francis Boissel
Courriel : francis.boissel@fab3r.com
Référence : 769-U1-100-SP-01 R0

Tél. : (819)
Cour. : Karl Tremblay <karl.tremblay@litostrojhydro.ca>

Suite à votre demande de soumission, il nous fait plaisir de vous présenter le(s) prix suivant(s) :

N° Article	Description	Qté	Prix Unitaire	Total
1	**Pelton Runner Repair (BUDGETARY)** Geometrical inspection prior and after welding repair to know if the part remain per drawing. Cleanning and passivation after welding repair. Packaging and preparation for shipment Static balancing excluded.	1	53 245.00 $	53 245.00 $
2	**Optional work Item 7 page 10 (BUDGETARY)** Sandblast and additional inspection.	1	33 125.00 $	33 125.00 $
3	**Bucket #1 repair (BUDGETARY)** Typical scope of work for all the buckets: Excavation of the defects. 100% PT of the zone to be repaired to know taht all the defects have been removed.. Welding repairs Grinding and polishing of the welds to the profile of the bucket. 100% PT of the zone repaired. Inspection repors with photos for each bucket.	1	13 700.00 $	13 700.00 $
4	**Bucket #2 repair (BUDGETARY)**	1	19 895.00 $	19 895.00 $
5	**Bucket #3 repair (BUDGETARY)**	1	24 865.00 $	24 865.00 $
6	**Bucket #4 repair (BUDGETARY)**	1	31 050.00 $	31 050.00 $
7	**Bucket #5 repair (BUDGETARY)**	1	26 190.00 $	26 190.00 $
8	**Bucket #6 repair (BUDGETARY)**	1	21 920.00 $	21 920.00 $
9	**Bucket #7 repair (BUDGETARY)**	1	25 525.00 $	25 525.00 $
10	**Bucket #8 repair (BUDGETARY)**	1	32 090.00 $	32 090.00 $
11	**Bucket #9 repair (BUDGETARY)**	1	40 185.00 $	40 185.00 $
12	**Bucket #10 repair (BUDGETARY)**	1	26 750.00 $	26 750.00 $
13	**Bucket #11 repair (BUDGETARY)**	1	28 800.00 $	28 800.00 $
14	**Bucket #12 repair (BUDGETARY)**	1	27 875.00 $	27 875.00 $
15	**Bucket #13 repair (BUDGETARY)**	1	26 485.00 $	26 485.00 $
16	**Bucket #14 repair (BUDGETARY)**	1	26 485.00 $	26 485.00 $
17	**Bucket #15 repair (BUDGETARY)**	1	25 305.00 $	25 305.00 $
18	**Bucket #16 repair (BUDGETARY)**	1	24 500.00 $	24 500.00 $
19	**Bucket #17 repair (BUDGETARY)**	1	28 735.00 $	28 735.00 $
20	**Bucket #18 repair (BUDGETARY)**	1	19 735.00 $	19 735.00 $
21	**Bucket #19 repair (BUDGETARY)**	1	24 105.00 $	24 105.00 $

Date	No.	Révision
28-10-2025	15204	0

N° Article		Description	Qté	Prix Unitaire	Total
22	**Bucket #20 repair**	**(BUDGETARY)**	1	23 840.00 $	23 840.00 $
23	**Bucket #21 repair**	**(BUDGETARY)**	1	22 595.00 $	22 595.00 $

Total : 627 000.00 $
Devise : CAD

NOTES

1. Prix et livraison sujets à révision sur réception des instructions et dessins certifiés pour construction.
2. Tous les prix affichés sont valides pour une période de 10 jours et sont sujets à révision selon les taux en vigueur au moment de l'octroi de la commande.
3. Compte tenu de la volatilité des coûts des matières, notre prix est sujet à révision selon les coûts réels lors de la réception du matériel dans nos installations.
4. Tous travaux additionnels suite au rapport d'inspection seront traités en extra et pourraient affecter le délai de livraison.
5. Dans le cadre d'un projet de réparation et ou d'un projet en régie contrôlée, un processus de facturation progressive devra être considéré et mis de l'avant advenant un changement d'envergure du projet au niveau de la valeur ou du délai de réalisation.

Transport : FCA, 227 boul. du St-Maurice Trois-Rivières Qc. selon Incoterms 2020
Livraison : **32 semaines** (à confirmer au moment de la commande) après réception de la commande,
Termes : 10 % à la commande
20 % 6 semaines après réception de la commande
20 % 12 semaines après réception de la commande
30 % 24 semaines après réception de la commande
20 % à la livraison ou avis que les pièces sont disponibles.
Tous les paiements sont net 30 jours
Taxes : En sus

Cette proposition est soumise aux termes et conditions de FAB 3R énoncés dans le document ci-joint.

Francis Boissel

Conseiller Technique
Technical advisor

FAB 3R

Termes et conditions - Fabrication

1. ACCEPTATION. La proposition de FAB 3R inc. («VENDEUR »), ainsi que les présents termes et conditions de vente (collectivement, l' « Entente »), constituent l'offre contractuelle de services de fabrication et de produits y reliés du VENDEUR, et l'acceptation de cette offre par l'ACHETEUR est expressément limitée aux termes de cette Entente. L'étendue ainsi que les termes et conditions de cette Entente représentent l'intégralité de l'offre du VENDEUR, et remplacent la totalité des demandes de soumissions, entretiens, accords, protocoles et déclarations antérieurs entre les parties. Toute étendue ou tous termes et conditions compris dans l'acceptation/bon de commande de l'ACHETEUR qui sont en sus ou différents de ceux de cette Entente sont par les présentes rejetés.

2. LIVRAISON. Toute déclaration relative à la date d'expédition des Produits (tels que définis ci-après) représente la meilleure évaluation du VENDEUR mais n'est pas garantie, et le VENDEUR ne sera pas responsable de dommages imputables à une livraison tardive des Produits. Les Produits sont livrés au(x) point(s) de livraison conformément aux conditions de livraison mentionnées dans la proposition du VENDEUR. Si telle livraison est empêchée ou retardée pour cause de Force Majeure (telle que définie ci-après), le VENDEUR pourra, à son gré, offrir d'effectuer la livraison à l'ACHETEUR au(x) lieu(x) de fabrication et, à défaut d'acceptation de la livraison par l'ACHETEUR, faire en sorte que les Produits soient entreposés à tel(s) lieu(x) de fabrication, aux frais de l'ACHETEUR. Ladite offre de livraison, si elle est acceptée, ou ledit entreposage, constituera la livraison aux fins de la présente Entente. Si l'expédition est retardée à la demande de l'ACHETEUR, ou pour cause de retard dans la réception de directives d'expédition, le paiement du prix d'achat deviendra exigible sur avis du VENDEUR à l'ACHETEUR à l'effet que les Produits sont prêts à être expédiés. Les frais de manutention, de transport, d'entreposage, d'assurance et autres frais ultérieurement encourus par le VENDEUR relativement aux Produits seront à la charge de l'ACHETEUR et devront être payés par l'ACHETEUR lorsque facturés.

3. TITRE ET RISQUE DE PERTE. Le VENDEUR conserve le droit de propriété, notamment les droits, titres et intérêts rattachés aux Produits de plein droit, dans la mesure permise par la loi applicable, incluant un droit de sûreté grevant les Produits, jusqu'à paiement intégral du prix d'achat au VENDEUR. La remise et l'acceptation de traites, billets ou autres acceptations commerciales attestant des paiements exigibles ne constitueront pas ou ne pourront être considérés comme un paiement susceptible de transférer les intérêts du VENDEUR tant que lesdits traites, billets ou acceptations commerciales n'auront pas été honorés en totalité. Le risque de perte sera transféré à l'ACHETEUR au point de livraison.

4. CONDITIONS DE PAIEMENT. Le VENDEUR se réserve le droit d'expédier les Produits et d'être payé pour ceux-ci au pro rata des Produits expédiés. Si les paiements ne sont pas effectués à la date prévue du paiement, des intérêts au taux de deux pourcent (2%) par mois, calculés journalièrement, seront chargés à compter de la date prévue du paiement. et L'ACHETEUR est responsable pour le paiement des frais légaux et autres dépenses du VENDEUR encourus pour faire valoir ou tenter de faire valoir les droits du VENDEUR rattachés à un bris ou menace de bris des conditions de paiement par l'ACHETEUR.

5. TAXES. À défaut de stipulation contraire dans la proposition/offre de service du VENDEUR, l'ACHETEUR devra payer et/ou rembourser au VENDEUR, outre le prix des Produits, la totalité des taxes de vente, taxes d'utilisation et autres taxes, taxes d'accise et frais que le VENDEUR peut payer ou être tenu de payer, directement ou indirectement, à un gouvernement relativement à la fabrication, à la vente, au transport ou à l'utilisation par le VENDEUR ou par l'ACHETEUR de l'un des Produits ou services définis aux présentes (qu'ils soient considérés comme des biens meubles ou immeubles). L'ACHETEUR accepte de payer la totalité des taxes sur les biens ou tous autres frais pouvant être prélevés, établis ou imputées aux Produits, à compter de la date d'expédition réelle des Produits ou de leur entreposage pour le compte de l'ACHETEUR.

6. GARANTIE MÉCANIQUE. Au seul profit de l'ACHETEUR, le VENDEUR garantit que le nouvel équipement et les pièces qu'il fabrique et fournit à l'ACHETEUR (collectivement, les « Produits ») sont exempts de vices matériels ou de main d'oeuvre. La période de garantie est de douze (12) mois à compter du démarrage de l'équipement et ne peut dépasser dix-huit (18) mois à compter de l'expédition (« Période de Garantie »). Si l'un des Produits du VENDEUR ne respecte pas la garantie précitée, le VENDEUR réparera ou remplacera, sans frais à l'ACHETEUR, depuis L'USINE DU VENDEUR (EX WORKS) ou tout autre lieu désigné par ce dernier, tout Produit ou pièce du Produit retourné au VENDEUR, dont l'examen démontrera qu'il a failli sous des conditions d'utilisation et de service normales par l'ACHETEUR à l'intérieur de la Période de Garantie, à la condition que s'il s'avérait impossible de retourner le Produit ou la pièce du Produit au VENDEUR, celui-ci enverra un représentant sur le chantier de l'ACHETEUR pour inspecter le Produit ou la pièce. Si, après inspection, il est constaté que le VENDEUR est responsable, en vertu de la présente garantie, de réparer ou de remplacer le Produit ou la pièce du Produit, le VENDEUR assumera les frais de transport pour le (a) retour du Produit ou de la pièce du Produit au VENDEUR pour son inspection ou l'envoi de son représentant sur le chantier et (b) retour du Produit réparé ou remplacé. Cependant, s'il est constaté, après inspection, que le VENDEUR n'est pas responsable en vertu de la présente garantie, l'ACHETEUR paiera ces frais. Pour que le VENDEUR soit tenu responsable en vertu de la présente garantie, l'ACHETEUR doit adresser ses réclamations en vertu de la présente garantie au VENDEUR par écrit au plus tard trente (30) jours après la date à laquelle l'ACHETEUR constate les bases de sa réclamation en garantie, et en aucun cas, plus de trente (30) jours après l'expiration de la Période de Garantie. En sus de toute autre limitation ou exclusion concernant la présente garantie, le VENDEUR n'aura aucune responsabilité dans les cas suivants : i) un défaut, une omission ou toute autre erreur dans la conception et la description des Produits ou dans toute autre documentation reliée aux Produits; ii) la défaillance des Produits, ou les dommages à ces Produits, imputables à la négligence ou à la faute intentionnelle de l'ACHETEUR, à l'abus ou à l'entreposage, l'installation, l'application ou l'entretien non conforme (tel que précisé dans les guides ou directives écrites que le VENDEUR fournit à l'ACHETEUR) ; iii) les Produits qui ont été modifiés ou réparés de quelque manière que ce soit sans le consentement écrit préalable du VENDEUR ; iv) les frais de démontage et de réinstallation des Produits ; v) les Produits endommagés pendant le transport ou par suite d'un accident ; vi) la décomposition des Produits causée par une réaction chimique, l'érosion ou la corrosion, ou l'usure des Produits ou par les conditions de température, d'humidité ou de salété; ou vii) les réclamations concernant des pièces qui sont consomptibles et qui sont habituellement remplacées en cours d'entretien, tels les matériaux filtrants, les systèmes de drainage par bande et les systèmes analogues, sauf si telles pièces ne fonctionnent pas selon l'estimation de durée d'utilisation normale du VENDEUR, auquel cas le VENDEUR ne sera responsable que du pro rata des frais de remplacement, sur la base de l'estimation du VENDEUR de ce qu'aurait dû être la durée de vie restante des dites pièces, à la condition que la défaillance des pièces n'ait pas découlée de l'une ou l'autre des raisons indiquées dans les clauses (i) à (vi) précitées. Concernant les pièces, l'équipement, les accessoires ou les composantes de tierces parties, non conçus par le VENDEUR, la responsabilité du VENDEUR se limitera uniquement à la cession des garanties disponibles des tierces parties. **LES PARTIES CONVIENNENT QUE TOUTES LES AUTRES GARANTIES, EXPRESSES OU IMPLICITES, NOTAMMENT LES GARANTIES D'ADAPTATION À UN USAGE PARTICULIER ET DE VALEUR COMMERCIALE, ÉCRITES, ORALES OU PRÉVUES PAR LA LOI, SONT EXCLUES DANS TOUTE LA MESURE OÙ LA LOI LE PERMET.** La totalité des garanties et obligations du VENDEUR prendront fin si l'ACHETEUR manque à ses obligations en vertu de la présente Entente, notamment s'il omet de payer n'importe quels frais au VENDEUR. Le prix de soumission du VENDEUR pour les Produits est basé sur la présente garantie. Toute augmentation de l'obligation de garantie pourrait résulter en une majoration de prix.

7. RENSEIGNEMENTS CONFIDENTIELS. Tous les renseignements et données non publics fournis à l'ACHETEUR en vertu des présentes, incluant mais non limités au prix, à l'ordre de grandeur, au genre et au design des Produits, sont la propriété exclusive du VENDEUR et lui sont fournis à titre confidentiel pour utilisation par l'ACHETEUR strictement dans le cadre de la présente Entente, et ne sauraient être divulgués ou fournis à un tiers sans le consentement écrit préalable du VENDEUR.

8. PEINTURE. Les Produits sont peints conformément aux normes du VENDEUR, et les éléments achetés tels que moteurs, commandes, contrôleurs de vitesse, pompes, etc. seront peints conformément aux normes du fabricant, sauf si autrement consenti par écrit.

9. DESSINS ET DOCUMENTATION TECHNIQUE L'Acheteur garantit que tous les dessins, spécifications et autres documents soumis au Vendeur dans le cadre de la présente Entente seront sans défauts, omissions ou autres erreurs, et l'Acheteur reconnait que le Vendeur fabriquera les Produits pour l'Acheteur en se fiant strictement sur l'exactitude de tels documents.

10. COMPENSATION. La présente Entente est totalement indépendante de tous les autres contrats intervenus entre les parties, et toutes les sommes dues au VENDEUR en vertu des présentes doivent être payées à terme échu. L'ACHETEUR ne peut opérer compensation de toute somme due ou réclamée par lui du VENDEUR au titre de toute autre opération ou réclamation.

11. INDEMNISATION – PROPRIÉTÉ INTELLECTUELLE. L'ACHETEUR contestera, à ses frais, toute poursuite intentée à l'encontre du VENDEUR, fondée sur toute prétention voulant que les Produits fabriqués ou vendus en vertu de la présente Entente contreviennent aux droits de propriété intellectuelle d'une tierce partie, incluant, mais sans se limiter à celles-ci, les réclamations valides en vertu de brevets émis et en vigueur en date de la présente Entente, et ce s'il en est avisé sans délai, par écrit, et si tous les renseignements, l'aide et le pouvoir exclusif de contester et de régler ladite poursuite lui sont fournis, et l'ACHETEUR s'engage à indemniser le VENDEUR contre toute responsabilité à l'égard de telles réclamations pour contrefaçon. En outre, si la fabrication ou la vente des Produits est interdite dans le cadre d'une telle poursuite ou si le VENDEUR le juge à propos, l'ACHETEUR s'engage, à ses propres frais et à sa discrétion, a) à obtenir pour le VENDEUR le droit de continuer à fabriquer et vendre les Produits ; b) à fournir au VENDEUR des dessins de Produits non contrefaits ; ou c) à modifier la conception des Produits de façon à ce qu'ils deviennent non contrefaits.

12. INDEMNISATION GÉNÉRALE. Sous réserve des droits, obligations et limite de responsabilités des parties prévus à la présente Entente, l'ACHETEUR s'engage à protéger et à indemniser le VENDEUR, sa société mère et/ou ses entités affiliées, leurs dirigeants, administrateurs, salariés et mandataires respectifs, contre toute réclamation, demande ou cause de poursuite engagée par toute entité suite à la négligence ou à la faute intentionnelle de l'ACHETEUR en rapport avec la présente Entente.

13. MANQUEMENT À UN ENGAGEMENT, RÉSILIATION. Si l'ACHETEUR devient insolvable, commet un acte de faillite ou est en défaut de respecter tous les termes et conditions de la présente Entente, la portion intégrale non versée du prix d'achat devient, sans autre avis ou demande, immédiatement exigible et payable. Le VENDEUR, à son gré, sans avis ou demande, est en droit d'intenter une poursuite en remboursement dudit solde, de frais juridiques raisonnables, en plus des débours et de l'intérêt; et/ou de pénétrer sur le lieu où se trouvent les Produits et en prendre immédiatement possession ou de les retirer, en recourant ou non au processus judiciaire, conformément aux modalités prévues à l'exercice des droits hypothécaires prévus par la loi et/ou à conserver tous les versements effectués en tant que compensation pour l'utilisation des Produits; et/ou à revendre les Produits, ou une partie de ceux-ci, sans préavis ou demande, pour le compte de l'ACHETEUR et en son nom, et d'affecter le produit net d'une telle vente (après déduction du prix de vente de tous les frais d'une telle vente et de tous les frais de reprise de possession, réparations nécessaires pour remettre les Produits dans un état vendable, frais d'entreposage, taxes et impôts, privilèges, frais de recouvrement et frais juridiques, et tous les autres frais s'y rattachant) au solde alors dû au VENDEUR pour les Produits, et à recevoir de l'ACHETEUR la différence entre un tel produit net de vente et ledit solde. L'ACHETEUR renonce par les présentes à réclamer et/ou intenter toute poursuite pour entrée abusive, dommages ou réclamations qui pourraient découler d'une telle intervention, reprise de possession, enlèvement, conservation, réparation, modification et vente. Les recours prévus au présent paragraphe sont en sus de tous les autres droits du VENDEUR et non des restrictions aux autres droits du VENDEUR.

14. ANNULATION. L'ACHETEUR peut résilier la présente Entente pour des raisons de commodité en transmettant au VENDEUR un préavis écrit de 30 jours l'avisant d'un tel fait et en versant au VENDEUR tous les frais et débours (y compris les frais généraux d'administration) engagés par lui relativement à l'exécution de ses travaux et leur conclusion, majorés d'un bénéfice raisonnable. Tous ces frais et débours seront payés au VENDEUR dans les 10 jours de la terminaison de la présente Entente, ou seront sujets à une pénalité de cinq pourcent (5%) du total des frais et déboursés dus.

15. RECOURS. Les droits et recours de l'ACHETEUR en vertu de la vente des produits ou des services rendus par le VENDEUR en vertu des présentes sont exclusifs aux droits et recours expressément prévus dans la présente Entente.

16. INSPECTION. L'ACHETEUR a le droit d'effectuer une inspection raisonnable des Produits aux installations du VENDEUR. Le VENDEUR se réserve le droit de juger du caractère raisonnable de la demande et de choisir le moment approprié pour une telle inspection. Tous les frais d'inspection non spécifiquement inclus comme un item distinct dans la soumission de fabrication des Produits faisant l'objet de la présente Entente seront payés par l'ACHETEUR.

17. RENONCIATION. Tout manquement du VENDEUR à faire appliquer par l'ACHETEUR l'exécution stricte d'une disposition de la présente Entente ne saurait constituer une renonciation à son droit d'ultérieurement faire appliquer une telle disposition ou toute autre disposition de la présente Entente.

18. RESPECT DES LOIS. Si des lois applicables, ordonnances, règlements ou conditions nécessitent quelque chose de différent ou un ajout à ce qui est prévu dans la présente Entente, le VENDEUR veillera à satisfaire à de telles exigences à la suite d'une demande écrite de l'ACHETEUR et aux frais de ce dernier.

19. FORCE MAJEURE. Si, en raison d'un cas de Force Majeure, le VENDEUR devient incapable, totalement ou substantivement, de remplir ses obligations en vertu des présentes, lesdites obligations seront donc suspendues si le VENDEUR donne un avis écrit à l'ACHETEUR dans un délai raisonnable après la survenance de la cause invoquée. « Force Majeure » s'entend, notamment, mais sans en exclure d'autres, les calamités naturelles, les grèves, la désobéissance civile, la foudre, les incendies, les inondations, un emportement par les eaux, les tempêtes, une défaillance des lignes de communication, les retards de l'ACHETEUR ou de ses sous-traitants, les bris ou les pannes de l'équipement ou de la machinerie, les guerres, les interventions policières, les embargos ou toute autre cause qui échappe au contrôle raisonnable du VENDEUR. Si le retard découle de l'action ou de l'inaction de l'ACHETEUR alors, outre un rajustement en fonction du temps, le VENDEUR est en droit de réclamer le remboursement des frais engagés pour respecter son échéancier.

20. ENTREPRENEUR INDÉPENDANT. Il est expressément entendu que le VENDEUR est un entrepreneur indépendant et que ni celui-ci, ni ses actionnaires, associés, salariés ou sous-traitants sont des préposés, mandataires, associés, coentreprises ou salariés de l'ACHETEUR, de quelque manière que ce soit.

21. DIVISIBILITÉ. Si une partie de la présente Entente est tenue pour invalide ou inexécutable en vertu des lois applicables, alors la validité des parties qui demeurent n'est pas touchée par une telle invalidité ou inexécutabilité et demeurent en vigueur. De plus, toute clause jugée invalide ou inexécutable sera conséquemment modifiée, à l'intérieur des limites permises par les lois applicables, afin de refléter au maximum les intentions des parties aux présentes.

22. DROIT APPLICABLE ET AUTORITÉS COMPÉTENTES. Cette convention sera régie et interprétée en vertu des lois en vigueur au Québec et les parties conviennent et acceptent que seuls les tribunaux du Québec, district judiciaire de Trois-Rivières, auront juridiction pour entendre et décider de tout litige découlant de la présente convention.

23. CESSION. L'ACHETEUR ne pourra céder ou transférer la présente Entente sans le consentement écrit préalable du VENDEUR. Toute tentative d'effectuer une telle cession ou un tel transfert sera nulle et sans avenue. Le VENDEUR aura le droit de céder, ou d'autrement transférer, ses droits et obligations en vertu de la présente Entente, en tout ou en partie, en autant qu'il en aura préalablement avisé l'ACHETEUR par écrit.

24. LIMITE DE RESPONSABILITÉ. DANS LA MESURE OÙ LA LOI LE PERMET, LE VENDEUR NE SERA PAS RESPONSABLE DE TOUT DOMMAGE EN SUS DU COÛT DE CORRECTION DE TOUT DÉFAUT DE FABRICATION, OU EN L'ABSENCE DE TELS DÉFAUTS, EN SUS DE LA VALEUR DES PRODUITS FABRIQUÉS ET VENDUS EN VERTU DES PRÉSENTES. NONOBSTANT TOUTE OBLIGATION OU RESPONSABILITÉ ASSUMÉE PAR LE VENDEUR EN VERTU DES PRÉSENTES, LE VENDEUR NE SERA EN AUCUN CAS RESPONSABLE ENVERS L'ACHETEUR OU UNE TIERCE-PARTIE, CONTRACTUELLEMENT, DÉLICTUELLEMENT (INCLUANT LA NÉGLIGENCE), SELON LA RESPONSABILITÉ STRICTE OU AUTREMENT, POUR TOUTE PERTE DE REVENUS ANTICIPÉS OU TOUT DOMMAGE SUBI, POUR LA PERTE DUE À LA FERMETURE D'USINES, À L'INCAPACITÉ D'OPÉRER OU À L'AUGMENTATION DES FRAIS D'OPÉRATION, À L'INTERRUPTION DE SERVICES, AUX COÛTS RELIÉS À L'ÉNERGIE OU À SON REMPLACEMENT, AUX COÛTS DES FONDS, AUX FRAIS ENGAGÉS SUITE À UNE RÉCLAMATION POUR PERTE DE CAPITAL OU MANQUE À GAGNER OU DE TOUT AUTRE DOMMAGE OU PERTE INDIRECT, ACCESSOIRE, PARTICULIER, PUNITIF, EXEMPLAIRE OU CONSÉCUTIF DÉCOULANT SOIT D'UN DÉFAUT, D'UN RETARD OU DE TOUTE AUTRE CAUSE QUELLE QU'ELLE SOIT.

Affidavit

IN THE MATTER OF the *Electrical Power Control Act, 1994,* SNL 1994, Chapter E-5.1 ("*EPCA*") and the *Public Utilities Act*, RSNL 1990, Chapter P-47 ("*Act*"), and regulations thereunder; and

IN THE MATTER OF an application by Newfoundland and Labrador Hydro ("Hydro") for approval of capital expenditures for the purchase and installation of a runner at the Cat Arm Hydroelectric Generating Station ("Cat Arm") pursuant to Section 41(3) of the *Act*.

AFFIDAVIT

I, Paul Dillon, of St. John's in the province of Newfoundland and Labrador, make oath and say as follows:

1) I am Director of Engineering, Engineering and Technology, Newfoundland and Labrador Hydro, the applicant named in the attached application.

2) I have read and understand the foregoing application.

To the best of my knowledge, information, and belief, all of the matters, facts, and things set out in this application are true.

SWORN at St. John's in the province of Newfoundland and Labrador, this 13th day of February 2026, before me:

Barrister, Newfoundland and Labrador
Witnessed through the use of audio-visual technology in accordance with the *Commissioners for Oaths Act* and *Commissioners for Oaths Regulations*

Paul Dillon