PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

Perry Johnson Laboratory Accreditation, Inc. has assessed the Laboratory of:

Proto Manufacturing, Inc./Proto Manufacturing, Ltd.

12350 Universal Drive, Taylor, MI 48180
2175 Solar Crescent, Oldcastle, Ontario N0R 1L0

(Hereinafter called the Organization) and hereby declares that Organization is accredited in accordance with the recognized International Standard:

ISO/IEC 17025:2017

This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system
(as outlined by the joint ISO-ILAC-IAF Communiqué dated April 2017):

NDT, Mechanical and Chemical Testing-Residual Stress and Retained Austenite Measurement by X-Ray Diffraction

(As detailed in the supplement)

Accreditation claims for such testing and/or calibration services shall only be made from addresses referenced within this certificate. This Accreditation is granted subject to the system rules governing the Accreditation referred to above, and the Organization hereby covenants with the Accreditation body's duty to observe and comply with the said rules.

For PJLA:

Initial Accreditation Date:	*Issue Date:*	*Expiration Date:*
October 11, 2011	November 7, 2019	February 28, 2022

Accreditation No.:	*Certificate No.:*
71619	L19-573-1

Tracy Szerszen
President/Operations Manager

Perry Johnson Laboratory Accreditation, Inc. (PJLA)
755 W. Big Beaver, Suite 1325
Troy, Michigan 48084

The validity of this certificate is maintained through ongoing assessments based on a continuous accreditation cycle. The validity of this certificate should be confirmed through the PJLA website: www.pjlabs.com

Certificate of Accreditation: Supplement

Proto Manufacturing, Inc./Proto Manufacturing, Ltd.

12350 Universal Drive, Taylor, MI 48180
William Boyer Phone: 734-946-0974

2175 Solar Crescent, Oldcastle, Ontario N0R 1L0
James Pineault Phone: 519-737-6330

Accreditation is granted to the facility to perform the following testing:

FIELD OF TEST	ITEMS, MATERIALS OR PRODUCTS TESTED	SPECIFIC TESTS OR PROPERTIES MEASURED	SPECIFICATION, STANDARD METHOD OR TECHNIQUE USED	RANGE (WHERE APPROPRIATE) AND DETECTION LIMIT
Chemical [FO]	Polycrystalline Materials	Quantitative Analysis by X-Ray Diffraction	ASMT C1365 ASTM D3720 ASTM D4926 ASTM E975 SAE SP453 AXRD Software Manual-Analysis (Proto)	0 % to 100 % phase fraction D.L. = 0.1 %
Chemical and Mechanical (NDT) [FO] (see footnote 1)	Steel	Volume Fraction Retained Austenite	ASTM E975 SAE SP-453	1 % to 100 % D.L. = 1 %
Mechanical (NDT) [FO] (see footnote 1)	Metal or Other Crystalline	Residual Stress Measurement by X-Ray Diffraction	SAE HS-784 ASTM E915 ASTM E2860	Fe: 7 MPa (1 ksi) A1: 7 MPa (1 ksi) Ti: 10 MPa (1.5 ksi) To Material Yield Strength Positive (Tensile) or Negative (Compressive) DL=7 MPa (1 ksi)
Mechanical [FO] (see footnote 1)	Metal or Other Crystalline	Determining the Effective Elastic Constants for X-Ray Diffraction Measurements of Residual Stress	ASTM E1237 (Gages) SAE HS-784 ASTM E1426	4×10^4 MPa to 5×10^6 MPa (6×10^3 ksi to 7×10^4 ksi) (Mg to Tungsten Carbide) See footnote 2
	Solids	Residual Stress Measurement by the Hole-Drilling Strain-Gage Method	ASTM E837	14 MPa (2 ksi) to Material Yield Strength Positive (Tensile) or Negative (Compressive) D.L.= 14 MPa (2 ksi)
	Crystals	Crystal Orientation by Laue X-Ray Diffraction	ASTM E-82, Software LAUE Manual (Proto)	δ: 0 ° to 90 ° γ : 0 ° to 90 ° α: 0 ° to 54.7 ° β : 0 ° to 120 ° κ: 0 ° to 90 ° R: 0 ° to 63 ° D.L. = 0.1 °

1. The presence of a superscript FO means that the laboratory performs testing of the indicated parameter both at its fixed location and onsite at customer locations. Example: Outside Micrometer[FO] would mean that the laboratory performs this testing at its fixed location and onsite at customer locations.

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Accreditation is granted to the facility to perform the following testing:

2. Values in this range have been measured. Good accuracy and precision are expected for materials having effective elastic parameters beyond this range.

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(Hereinafter called the Organization) and hereby declares that Organization is accredited in accordance with the recognized International Standard:

ISO/IEC 17025:2017

This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system
(as outlined by the joint ISO-ILAC-IAF Communiqué dated April 2017):

Mechanical Calibration
(As detailed in the supplement)

Accreditation claims for such testing and/or calibration services shall only be made from addresses referenced within this certificate. This Accreditation is granted subject to the system rules governing the Accreditation referred to above, and the Organization hereby covenants with the Accreditation body's duty to observe and comply with the said rules.

For PJLA:

Tracy Szerszen
President/Operations Manager

Initial Accreditation Date:	*Issue Date:*	*Expiration Date:*
November 13, 2014	November 7, 2019	February 28, 2022

Accreditation No.:	*Certificate No.:*
71619	L19-572-1

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Accreditation is granted to the facility to perform the following calibrations:

Mechanical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Residual Stress Measurement by X-Ray Diffraction [FO]	0 MPa to -1 035 MPa (0 ksi to -147.9 ksi)	±7 MPa (±1 ksi)	10x Optical microscope with cross-hairs, stress-free metal powder, high stress standard from Proto Manufacturing

1. The CMC (Calibration and Measurement Capability) stated for calibrations included on this scope of accreditation represents the smallest measurement uncertainty attainable by the laboratory when performing a more or less routine calibration of a nearly ideal device under nearly ideal conditions. It is typically expressed at a confidence level of 95 % using a coverage factor *k* (usually equal to 2). The actual measurement uncertainty associated with a specific calibration performed by the laboratory will typically be larger than the CMC for the same calibration since capability and performance of the device being calibrated and the conditions related to the calibration may reasonably be expected to deviate from ideal to some degree.

2. The laboratories range of calibration capability for all disciplines for which they are accredited is the interval from the smallest calibrated standard to the largest calibrated standard used in performing the calibration. The low end of this range must be an attainable value for which the laboratory has or has access to the standard referenced. Verification of an indicated value of zero in the absence of a standard is common practice in the procedure for many calibrations but by its definition it does not constitute calibration of zero capacity.

3. The presence of a superscript FO means that the laboratory performs calibration of the indicated parameter both at its fixed location and onsite at customer locations. Example: Outside Micrometer[FO] would mean that the laboratory performs this calibration at its fixed location and onsite at customer locations.

4. Measurement uncertainties obtained for calibrations performed at customer sites can be expected to be larger than the measurement uncertainties obtained at the laboratories fixed location for similar calibrations. This is due to the effects of transportation of the standards and equipment and upon environmental conditions at the customer site which are typically not controlled as closely as at the laboratories fixed location.