



ADVANCE CONTRACT AWARD NOTICE (ACAN)

1. Title

Laser overlay welding procedure development for Q1N/HY-80 base metal applications, development and validation of laser surface cladding of IN625 protective layers on HY-80 and development of laser hot wire cladding and gas tungsten arc welding repair method for six corroded link arms.

2. Definition

An Advance Contract Award Notice (ACAN) allows departments and agencies to post a notice, for no less than fifteen (15) calendar days, indicating to the supplier community that it intends to award a good, service or construction contract to a pre-identified contractor. If no other supplier submits, on or before the closing date, a Statement of Capabilities that meets the requirements set out in the ACAN, the competitive requirements of the government's contracting policy have been met. Following notification to suppliers not successful in demonstrating that their Statement of Capabilities meets the requirements set out in the ACAN, the contract may then be awarded using the Treasury Board's electronic bidding authorities.

If other potential suppliers submit Statement of Capabilities during the fifteen calendar day posting period, and meet the requirements set out in the ACAN, the department or agency must proceed to a full tendering process on either the government's electronic tendering service or through traditional means, in order to award the contract.

3. Background

The Department of National Defence (DND) Victoria class submarines are in need of a reliable and efficient weld overlay procedure on various components for corrosion protection as well as management of structural material corrosion damage problems. Laser cladding technique is identified as a promising candidate to be further developed into a viable solution to deal with corrosion issues on the Victoria class submarines.

Six casted link arms onboard a DND submarine has suffered from corrosion damage. The material wastage on the working surface of the link arms renders them inoperable, as the profile dimension is out of tolerance. The purposed work is to develop and validate laser hot wire cladding (LHWC) and gas tungsten arc welding (GTAW) procedures to repair the corroded HY80 steel link arms, followed by actual repair of the six link arms.

LHWC repair has been considered as a viable option to restore the surface profile of the link arm, while maintaining the mechanical properties of the base metal and the matching build-up material. LHWC cladding repair process has been approved during an earlier work on the LHWC cladding repair of a spline shaft. It is desirable to use LHWC process to conduct repair of link arms, together with GTAW repair for corrosion pits on the surface of link arms.

This project requires a contractor which possesses the experience and technical expertise to perform LHWC and GTAW on HY80 steel, and laser cladding for corrosion protection/management of structural material corrosion damage.

4. Objectives

The objective of this work is as follows:

- 1) To develop and qualify a laser overlay welding procedure for Q1N/HY-80 steel application;
- 2) To develop and qualify a laser surface cladding procedure for IN625 cladding on Q1N/HY-80 steel substrate; and
- 3) To develop a process to repair six corroded HY80 steel link arms using LHWC and GTAW procedures.



5. Project Requirements

5.1 Tasks, Deliverables, Milestones and Schedule

Natural Resources Canada will supply sufficient quantity steel plates and filler materials in order to develop the laser cladding procedures and to produce enough material for the required testing.

Viable laser hot wire cladding procedures will be developed using supplied base metal and filler materials to meet the following requirements:

- 1) The cladding procedures developed are to be usable in the following positions - HY-80 (1" to 1.5" thick) steel and HY-80 (20-25mm thick) steel will be used as base material (objective 1), cladding must be able to be performed in the vertical (i.e. the 3G) position (objective 2), and HY-80 (1- 1.5" thick) steel will be used as base material, cladding will be performed in the flat (i.e. the 1G) position (objective 3);
- 2) The clad layer is to be the same alloy type as the base metal;
- 3) Complete fusion between base metal and cladding, as well as between cladding layers;
- 4) A minimum of porosity and other welding defects. The amount of distribution or porosity/defects as determined by non-destructive testing (NDT) are to meet the requirements of CSA W59.1;
- 5) Adequate mechanical properties;
- 6) No cracks in the heat-affected zone and in the clad; and
- 7) Relatively low distortion.

There is no quantitative requirement for the maximum allowable distortion; however, preference should be given to cladding procedures that have low distortion. Ultimately a sufficient amount of clad shall be produced using the developed procedures and delivered to Natural Resources Canada such that the following test samples can be extracted.

Objectives 1 & 2

The following is a list of two phases for the work:

Phase 1: Process development and feasibility analysis

In this phase, it is proposed to laser clad using hot wire, Process parameters will be developed to ensure complete fusion between base material and the clad material with minimal porosity, dilution and material distortion. HY-80 steel will be cladded using Spoolarc 95 filler wire in preheat conditions with a preheat temperature between 100-250 °C.

Upon process development, more than 5 clad coupons will be cut for evaluation. The vendor will need to carry out some initial cross sectioning, metallographic and micro-hardness evaluation in order to optimize process parameters and clad quality.

Phase 1 will be completed in December 2016.

Phase 2: Runoff samples

Upon the laser hot wire cladding procedural approved by NRCan, runoff parts will be made using the developed parameters. The following runoff samples will be made during this phase. All test coupons will be evaluated by UT.

Laser-hot wire cladding of surface corrosion		
Material	HY80	HY80
Thickness	37mm	37mm



Filler Material	SPOOLARC 95	SPOOLARC 95
Explosion bulge specimens	3	3
Explosion bulge specimens dimensions (mm)	317 x 317 x 18(d)	610 x 610 x 18 (d)
	Quarter overlay	Quarter overlay
Machined groove 6mm x 15mm x 250mm (tensile)	2	
Machined groove 15mm x 15mm x 250mm (charpy)	2	
Clad on steel surface 50mm x 70mm (corrosion test)	10	

Phase 2 will be completed by December 31, 2016

For Objective 3

Phase 1: Process development and feasibility analysis

In this phase, it is proposed to laser clad using hot wire and GTAW with cold wire. Process parameters will be developed to ensure complete fusion between base material and the clad material with minimal porosity, dilution and material distortion. HY-80 steel will be cladded using Spoolarc 95 filler wire in preheat condition with a preheat temperature between 100-250 °C.

Upon process development, more than 5 clad coupons will be cut for evaluation. The vendor will need to carry out some initial cross sectioning, metallographic and micro-hardness evaluation in order to optimize process parameters and clad quality.

The phase 1 will be completed by January 31, 2017.

Phase 2: Repair of 6 link arms

Upon the LHWC and GTAW procedural approved by NRCan, 6 link arms will be repaired using developed procedures. The following tasks will be included,

1. 3D laser scan to establish the link arm profile model for post machining after repair;
2. Pre-machine the link arms to form a suitable surface for further material build-up;
3. Apply the developed procedure to conduct the repair to restore the link arm profile;
4. Post welding processing of the link arm necessary, such as stress relieving heat treatment immediately after cladding;
5. NDT inspection of the repaired link arms using ultrasound, LPI and magnetic particle;
6. Final machining or grinding of the link arm as per the drawing;
7. Inspection of the link arm to ensure conformance; and
8. Deliver the repaired link arms to NRCan.

The phase 2 will be completed by February 20, 2017.

5.2 Technical, Operational and Organizational Environment

This work is expected to be completed at the Contractor's place of business.

5.3 Contractor's Responsibilities

In addition to the obligations outlined above, the Contractor shall:

- 1) Keep all documents and proprietary information confidential;
- 2) Return all materials belonging to NRCan upon completion of the contract;



- 3) Submit all written reports in hard copy and electronic Microsoft Office Word or Corel WordPerfect format;
- 4) Attend meetings with stakeholders, if necessary;
- 5) Participate in teleconferences, as needed;
- 6) Attend meeting at NRCan sites, if required; and/or;
- 7) Maintain all documentation in a secure area.

6. Trade Agreements

This requirement applies to any vendor(s) in Canada and is not subjected to any trade agreements.

7. Title to Intellectual property

This requirement will not result in the creation of intellectual property.

8. Contract Period

The contract period shall be from date of award of contract to February 20, 2017.

9. Estimated Cost

The estimated maximum value of the contract is between \$70,000.00 to \$75,000.00 CAD, including all applicable taxes.

10. Exception to the Government Contracts Regulations and applicable trade agreements

Sole Source Justification - Exception of the Government Contract Regulations (GCR):

(d) Only one person or firm is capable of performing the contract

The contractor must:

- 1) Possess experience with the development of procedural application of Q1N/HY-80 steel, laser hot wire cladding, laser powder cladding and gas tungsten arc welding;
- 2) Be able to execute laser cladding with hot wire;

Whitfield Welding Inc. is the only provider that can meet all of the criteria above as well as the project requirements in paragraph 5.1 to 5.3.

11. Name and Address of the Proposed Contractor

Whitfield Welding Inc.

5425 Roscon Industrial Dr.
Oldcastle, Ontario
NOR 1L0

12. Inquiries on Submission of Statement of Capabilities

Suppliers who consider themselves fully qualified and available to provide the services/goods described herein, may submit a Statement of Capabilities in writing, preferably by e-mail, to the contact person identified in this Notice on or before the closing date and time of this Notice. The Statement of Capabilities must clearly demonstrate how the supplier meets the advertised requirements.



13. Closing Date

Closing Date: 17 November 2016

Closing Time: 9:00 a.m. EST

14. Contract Authority

Len Pizzi

Procurement Officer

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