

REQUEST FOR PROPOSAL FOR THE PRODUCTION OF ROTATING SHAFT BALANCES (REV. 1)

May 2024



Korea Aerospace Research Institute

169-84 Gwahak-ro, Yuseong-gu,
Daejeon, 34133, Korea

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General Instruction to Bidders

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Introduction

Korea Aerospace Research Institute (KARI) is a government funded research institute, engaged not only in developing aerospace-related technologies, but also in supporting a national aerospace development policy.

KARI Low Speed Wind Tunnel (LSWT) is constructed in 1998. The wind tunnel is powered by 4.1MW electric motor, and it has two test sections: closed wall test section and open-jet test section. The size of the closed-wall test section is 4m in width and 3m in height, and the maximum wind speed of the closed-wall test section is 120m/s. The size of the open-jet test section is 5m in width and 3.75m in height, and the maximum wind speed of the open-jet test section is 65m/s.

KARI is performing a project to develop a co-axial rotor system for high-speed helicopters. One of the objectives of this project is to build a scaled rotor test stand and to test it in the wind tunnel. The purpose of this procurement is to obtain Rotating Shaft Balances (RSBs) for the rotor test stand.

This Request for Proposal (RFP) explains the procedures to be taken by the Bidders who are willing to respond to the RFP. Bidders are requested to submit the Proposal in accordance with the guidelines and instructions as contained in the RFP. This RFP also specifies the technical requirements, terms and conditions for the procurement of the Rotating Shaft Balances (RSBs). This RFP consists of the following documents;

- (1) General Instruction to Bidders
- (2) Appendix A. General Terms and Conditions
- (3) Appendix B. Technical Specification and Statement of Work

Bidder's Proposals shall include all data and/or information as requested by this RFP and all attachments hereto. All information contained in this RFP shall be treated as proprietary and confidential.

1. Qualification of Bidder

Bidder's qualification for this bidding is as follows;

- (1) Bidder shall have direct experience of design, fabrication, and calibration of Rotating Shaft Balances (RSBs). Bidder shall have at least two (2) international project records in successful RSB fabrication and calibration as of Bid Closing Date.

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- (2) The qualifying statement for the above requirements and supporting materials shall be included in the Proposal. Additional qualifying evidence may be requested to substantiate Bidder's claim during the evaluation period.
- (3) Bidder shall be in possession of all the necessary licenses, in effect as of Bid Closing Date, required for the procurement of the Rotating Shaft Balances (RSBs) as described in this RFP.
- (4) The qualification of the Bidder is at the KARI evaluation committee's discretion so that any Bidder shall not raise any objection regarding the KARI evaluation committee's decision thereupon.

2. Bid Closing Date

Proposal is due May 23th, 2024 at 15:00(KST). If any part of the Proposal or bid bond as required under this RFP is submitted after the stipulated closing time as above, the entire Proposal will be rejected.

3. Submission of Proposal

Bidders are requested to submit their Proposals in the following four (4) Volumes;

- (1) Volume 1. Capability and Experience (Heritage)
- (2) Volume 2. Technical Specifications Proposal
- (3) Volume 3. Statement of Work Proposal
- (4) Volume 4. Price Proposal (to be sealed in a separate envelope)

In the Volume 1, Contractor's introduction and technical capability shall be described. The facilities and tools of the Bidder related to the development experience for the design, fabrication, gauging, and calibration of Rotating Shaft Balances (RSBs) should be included. Bidder shall describe current or past work similar to this RFP, which is being implemented or has been done by Bidder.

In the Volume 2, Bidder shall describe technical specifications of the Rotating Shaft Balances (RSBs) to comply with RFP requirements. Technical specification shall include:

- Expected overall size of RSBs
- Expected load envelope and standard deviation
- Fabrication material and heat treatment
- Temperature range for the temperature compensation
- Number of full-bridges and temperature sensors

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- Expected zero and sensitivity drifts
- Mechanical and electrical interfaces

In the Volume 3, Bidder shall describe work scope of the Bidder in detail. Statement of work proposal shall include:

- RSBs design process
- Fabrication and gauging process
- Plans for static and dynamic calibrations
- Respective schedule
- Deliverables

In the Volume 4, Bidder shall provide total bid value with the itemized price list in detail. The Price Proposal is subject to be sealed and submitted in a separate envelope.

Bidders shall submit one (1) original hardcopy marked as "ORIGINAL COPY" on the cover and seven (7) duplicate hardcopies, without Volume 4 Price Proposal. For Volume 4 Price Proposal, only one (1) hardcopy shall be submitted in a separate envelope. In addition, the electronic files of the Proposal in Microsoft Office Word for Windows and Portable Document Format (PDF) shall be submitted (except for Volume 4 Price Proposal). In order to substantiate a Proposal, all relevant data shall be submitted as attachments. In case of any discrepancy between the original copy and electronic file or the other hardcopies, the original copy, which is marked as "ORIGINAL COPY" on the cover, shall prevail.

4. Method of Submission

The Proposal shall be hand-carried or delivered using a registered mail service to the following KARI personnel or his designee:

Mr. Won-Suk LEE
Head of Overseas Contracts Office

Korea Aerospace Research Institute (KARI)
169-84 Gwahak-Ro, Yuseong-Gu
Daejeon, 34133, Korea

Tel: +82-42-860-2406
Fax: +82-42-879-4370
e-mail: wsl@kari.re.kr

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The communication between KARI and prospective Bidder for contractual matters (Terms and Conditions) shall be controlled through the following designee:

Ms. Eun-Jung LEE
Principal Administrator, Overseas Contracts Office

Korea Aerospace Research Institute (KARI)
169-84 Gwahak-Ro, Yuseong-Gu
Daejeon, 34133, Korea

Tel: +82-42-860-2148
Fax: +82-42-879-4370
e-mail: monicalee@kari.re.kr

In addition, the point of contact for all communications for technical matters shall be

Dr. Seunghoon LEE
Senior Researcher, Aeronautics Technology Research Division

Korea Aerospace Research Institute (KARI)
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Bidder shall specify in its Proposal, its single point of contact for KARI to communicate in connection with the RFP, Proposal and the subsequent evaluation, etc. Bidder's information on the point of contact shall include the name, title/position, telephone no., and e-mail address.

5. Bid Schedule

The following schedule is a tentative milestone for the eventual Contract and may be changed at KARI's sole discretion;

- (1) RFP Release: T0
- (2) Bid Closing Date: T1 = T0 + 10 calendar days
- (3) Review of Proposal, Q&A, Evaluation of Proposal: T2 = T1 + 1 Week
- (4) Expected Contract: T3 = T2 + 1 Week

6. Validity of Proposal

Proposal shall be valid for three (3) months from the Bid Closing Date. It can be extended up to six (6) months with KARI's written notice.

7. Price Requirements

The price or rate proposed by Bidder shall be Firm and Fixed Price that is not subject to any price escalation, price change or increase of actual costs during the Contract period.

Any kinds of taxes and duties arising in connection with Bidder's work under the eventual Contract shall be Bidder's responsibility, except for the customs duties and VAT on the Deliverable Items levied in Korea and the price proposed by Bidder shall be in accordance with Table 1 as below.

Considering the participation of domestic bidder in this bidding, the price proposal of a domestic bidder shall include all costs including price of Deliverable items, Service cost, Shipment cost, customs duties and value added tax. The price proposal of an overseas bidder shall be proposed in accordance with Table 1. "Bid Quotation Form for Overseas Supplied Goods". In the event that the price proposal of an overseas bidder has not been quoted in accordance with Table 1 as below, the bidder shall be liable for any losses arising from its submission of price proposal that do not satisfy any of the requirements set forth in this Section.

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Table 1. Bid Quotation Form for Overseas Supplied Goods

Item no.	Description		Price
1	Deliverable Items	Rotating Shaft Balances (w/carrying cases)	
2		Dummy Balances and Spline Shaft(w/carrying cases), including Balance free end adapter	
3		Documentation and Data package	
4	Shipment Cost outside Korea		
Sub-sum (A) : The CIP Price for the Deliverable Items			
5	Shipment Cost inside Korea		
Sub-sum (B)			
Total Price (Sub-sum (A) + Sub-sum (B))			

[Note1] Considering the delivery rule of DPU in the Contract, Shipment Costs (Item no. 4 and 5) shall be proposed.

[Note2] Shipment Cost outside Korea means all costs incurred by the bidder in relation to the delivery of Deliverable Items prior to customs clearance in Korea under the DPU, Incoterms 2020. (i.e. packing, inland transportation in export country, storage fee, overseas freight, insurance, etc.)

[Note3] Shipment Cost inside Korea means all costs incurred by the bidder in relation to the delivery of Deliverable Items after customs clearance in Korea under the DPU, Incoterms 2020. (i.e. inland transportation in Korea, storage fee, unloading fee, etc.)

[Note4] For comparison and evaluation with the price proposed by domestic bidder and overseas bidder, KARI will add the sum of the customs duties and value added tax in Korea to the price proposed by overseas bidder and evaluate the whole price (the sum of proposed price, the customs duties and value added tax in Korea). For the calculation and evaluation of customs duties and value added tax, bidder shall provide the CIP price for Deliverable Items (Please refer to the Sub-sum (A)). Please refer to the Section 13. "Evaluation of Proposal" for the more detailed information on the price evaluation.

The currency quoted in the Price Proposal shall be expressed in USD/EURO however, other currency may be allowed instead. If Bidder's proposed price is in a currency other than USD/EURO, for the conversion of the Bidder's proposed price, the 1st basic exchange rate announced by KEB Hana Bank on the price evaluation date shall be used in the price evaluation. Likewise, the currency of the Contract may be the national currency of Contractor within the estimated budget of this Bidding, if necessary. In such a case, the 1st basic exchange rate noticed by KEB Hana Bank of Korea on the price evaluation date shall be applied for the exchange rate for currency change.

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8. Bid Bond

Bidder shall establish a bid bond in favor of KARI no later than the Bid Closing Date and submit a certificate to KARI along with its Proposal. The total amount of the bid bond shall be at least five percent (5%) of the total bid price. The bond shall remain valid for three (3) months after the Bid Closing Date and if the Bid validity is extended as per Section 6, the bid bond shall also be extended accordingly. The bid bond shall be in the form of a surety bond issued by the Seoul Guarantee Insurance Company, in the form of an irrevocable standby letter of credit or bank guarantee by first class international bank, cash or other means of guarantee acceptable to KARI. In case of a surety bond, it shall be advised through "Seoul Guarantee Insurance Company". In case of cash, bank guarantee, or the irrevocable standby letter of credit, it shall be advised through "Woori Bank" (Daejeon Branch at 29 Munye-ro, Seo-gu, Daejeon, 35241 Korea, Tel:+82-42-488-9704 (Ext.312), Fax:+82-505-003-0759). The bond shall be available by KARI's request on the Seoul Guarantee Insurance Company or by KARI's draft at sight drawn on the bank, accompanied by the statement of KARI **stating that;**

- (a) Bidder has refused to enter into a Contract with the terms and conditions in the Request for Proposal, if any,
- (b) Bidder has hindered the fair bidding by fraud or misrepresentation, or
- (c) Bidder has withdrawn its Proposal after the Bid Closing Date.

The bid bond shall contain the substantial part of the terms and conditions of the bond, date of establishment, account, amount, payment terms, and date of expiry, etc. When the Contract is executed with Successful Bidder, the bid bond of Successful Bidder shall be amended to the performance bond of ten percent (10%) of the total Contract Price under the Contract as part thereof in accordance with the terms and conditions of the Contract.

The bid bonds except for that of the Successful Bidder will be released, upon the instructions of KARI, to unsuccessful Bidders, without interest, promptly after execution of the Contract between KARI and Successful Bidder. The bid bond of the Successful Bidder shall be likewise released only when KARI decides not to enter into a Contract after the selection of the Successful Bidder.

The bid bond is a critical requirement by Korean government regulation. Therefore, if any Bidder does not submit the bid bond then, such Bidder will be disqualified.

9. Questions and Modifications

Any questions as to the intent and clarity of this RFP may be submitted in writing to KARI's designees as specified in Section 5 "Method of Submission" by e-mail, fax or letter no later

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than five (5) days before the Bid Closing Date.

After the Bid Closing Date, Bidder shall not amend, modify, or supplement the Proposal, or submit any other documents to KARI, except on KARI's written request.

KARI may ask each Bidder in writing for clarifications, amendments, revisions, or supplementation of the Proposal and any other documents submitted by Bidder at any time before the execution of the Contract. KARI may also ask each Bidder to submit and file additional information or documents necessary for evaluation of the Proposal, if necessary.

10. Acceptance and Rejection of Bids

KARI reserves the right to accept or reject this Bidding, and to amend the Bidding process at any time prior to the award of the Contract without thereby incurring any liability to the affected Bidder(s), and KARI is not under any obligation to inform the affected Bidder(s) of the ground for its action.

11. No Contractual Obligation

This RFP shall not be interpreted as an offer for a Contract or any type of guarantee by KARI. It is KARI's sole discretion whether or not to allow the Contract award to any Bidder. KARI owes no responsibility or obligation to select the Contractor among Bidders.

This RFP shall neither be construed to create an obligation on KARI to enter into a contractual instrument, nor shall it serve as a basis for any claim for reimbursement of costs for the effort to prepare, submit, amend, revise or supplement the Proposal, and other related documents expended by the Bidder regardless of whether or not the Bidder is successful in receiving an award as a result of the solicitation.

12. Withdrawal of Proposal

Bidder may withdraw its Proposal at any time before the Bid Closing Date. Withdrawal shall be made in writing, and shall be received by KARI before the Bid Closing Date.

13. Evaluation of Proposal

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The evaluation of the Proposals will be made by the KARI evaluation committee and the following evaluation process is for information only. The evaluation committee reserves the right to modify the evaluation process and criteria without any prior notification to Bidders.

During the Bid evaluation, KARI may send to Bidders a set of questions for clarification and request any supplement to the Proposals and the evaluation will be made based on the Proposal, the answers and the supplement received from Bidders.

The evaluation consists of two (2) steps of the technical part and bidding price part and, after the evaluation of technical part, the evaluation committee will select the Qualified Bidders and perform the bidding price evaluation for the selected Qualified Bidders. The total technical evaluation score is one hundred (100) points and Bidders, who get score exceeding eighty (80) points in technical part, will be selected as Qualified Bidders. And then, the Qualified Bidder, who proposes the lowest price among the Qualified Bidders, will be selected as the Successful Bidder.

Table 2 represents the evaluation factors and score for the technical part.

Table 2. Itemized list for technical evaluation

Major Classification	Detail Classification	Points	Remark
Expertise and Capability (20)	Expertise and experiences in the production of RSBs	10	
	Availability of the calibration rigs for RSBs	10	
Design Requirements (20)	Suitability of the dimension and material of RSBs	10	
	Expected load envelope and accuracy of RSBs	5	
	Design plan for mechanical and electrical interfaces	5	
Fabrication and gauging requirements (20)	Number of strain-gauges and temperature sensors	5	
	Expected zero and sensitivity drifts of full-bridges	10	
	Temperature range for temperature compensation	5	
Calibration requirements (20)	Plan for static load and deformation calibration	10	
	Plan for dynamic loading test	10	
Contract (20)	Conformity of General Terms & Conditions	10	
	Feasibility of detailed task schedule	5	
	Conformity of submitted deliverables	5	
Total		100	

The bid prices submitted by the Bidders shall be compared and evaluated by converting

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the bid prices, being the sum of the prices for all items, to prices under an identical delivery rules. The optional price proposed by bidder, if any, shall not be included in the bid price.

The price proposal of a domestic bidder including the Value Added Tax (VAT) shall be evaluated as it is. On the other hand, the price proposal of an overseas bidder will be evaluated in accordance with the following calculation. The sum of P1, P2, P3, P4 and P5 shall be evaluated for the price proposal of an overseas bidder.

$$P1 + P2 + P3 + P4 + P5 = \text{evaluation price}$$

- (1) P1: Sub-sum (A) in the Table 1.
- (2) P2: Customs duties for the P1. This tax rate (8%) is decided in accordance with HSK number (9031.80-9099) of Deliverable Items and if the P2 can be exempted or reduced in accordance with any relative regulations, the exempted or reduced amount will be applied for the evaluation.
 ※An overseas bidder shall submit any documents to prove that the customs duties exemption is applicable.
- (3) P3: Value added tax (VAT) for the sum of P1 and P2. This tax rate is 10% and if the P3 can be exempted or reduced in accordance with relative regulation, the exempted or reduced amount will be applied for the evaluation.
- (4) P4: Sub-sum (B) in the Table 1.
- (5) P5: Value added tax (VAT) for the P4. It is calculated as “P4 x 10%”.

In case of no domestic bidder participating in the bidding, the price evaluation shall be conducted according to Total Price in Table 1 of Section 8 “Price Requirements”.

Notwithstanding this Section 14, the Contract price will be Total Price in Table 1 of Section 8 “Price Requirements”.

14. Contract

The Contract will be effective subject to the KARI's approval thereof and the Appendix A “General Terms and Conditions” of this RFP is the Contract with the Successful Bidder. All Bidders shall note that there is no Contract negotiation under this bidding. Thus, Bidder shall comply with the Appendix A “General Terms and Conditions” without any non-compliance.

15. Language and Measurement Unit

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The Proposal, any documents submitted to KARI under the RFP, communication and the Contract language shall be in English and measurements and quantities shall be in International System of Units.

16. Certificate and Government Approvals

Bidder shall receive any government approval and certificates (e.g. export licenses) in relevant countries necessary for Bidder's work for this RFP. Bidder's ability and plan to get such approval and certificates shall be submitted to KARI, together with any appropriate assurance letters from the relevant governments, in the Proposal. All necessary approvals and certificates for the delivery of RSBs shall be acquired by Contractor from the relevant governments before the first payment in accordance with the payment schedule of the Contract.

17. Confidentiality

There shall be no news releases, public announcements, denials or confirmation in connection with this RFP or contract award without prior written approval of KARI. Also, Bidder shall not disclose any part of this RFP to third parties without prior written approval of KARI.

All documentation submitted in response to this RFP shall be marked "COMMERCIALS-IN-CONFIDENCE" on the first page of each document. All elements of the Proposal shall be kept confidential, and shall not be intentionally disclosed by KARI to any third parties other than any case to meet the purpose of this RFP such as evaluation.

18. Property of Proposal

All documents submitted in response to the RFP shall become the property of KARI and will be retained by KARI.

19. Expenses

Expenses incurred by Bidder in connection with the preparation, submittal, and any subsequent clarification of Proposal are for their own account and will not be reimbursed by KARI.

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20. Governing Law

This RFP and the Contract shall be construed in accordance with and governed by the laws of the Republic of Korea.

21. Arbitration

Any disputes in relation to, and under the RFP and Contract shall be resolved through arbitration in Seoul, Korea, under the Rules of the Korean Commercial Arbitration Board (KCAB).

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Appendix A. General Terms and Conditions

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Preamble

This Contract made and entered into this on _____, **2024** by and between Korea Aerospace Research Institute ("KARI"), a Korean Government-funded research institution, established and operating under the laws of the Republic of Korea, with its principal office at 169-84 Gwahak-ro, Yuseong-gu, Daejeon, 34133 Korea, and **[Name of Contractor]** ("Contractor") established under the law of **[Nationality]** with its principal office at **[Address]**.

Witnesseth

WHEREAS, KARI has been undertaking the development of co-axial rotor system for high-speed helicopters with the main goal of building a scaled rotor test stand.

WHEREAS, KARI would like to procure the Rotating Shaft Balances (hereinafter, RSBs) for the rotor test stand and desires Contractor to provide the RSBs including technical data and technical support as needed; and

WHEREAS, Contractor is willing to provide KARI with the RSBs for the rotor test stand on the terms and conditions as set forth in this Contract;

NOW, THEREFORE, in consideration of the mutual covenants and premises, both Parties hereto have agreed to the following:

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Article 1. Definitions

The terms defined in this Article shall have the meaning described to them herein whenever they are used in this Contract, unless otherwise clearly indicated by the context.

- 1.1 **“Associates”** mean all individual or legal entities organized under public or private law, who shall act, directly or indirectly, on behalf of KARI or Contractor, or at the direction of either Party to this Contract to fulfill the obligations undertaken by such Party in this Contract, including, without limitation, the employees of each Party, their suppliers and Subcontractors.
- 1.2 **“Contract”** means this Contract for the procurement the RSBs for the rotor test stand, including Appendices as attached hereto, and all amendments that may be agreed to by the Parties in accordance with the terms and conditions of this Contract.
- 1.3 **“Contractor”** means [Name of Contractor] as a Party to the Contract.
- 1.4 **“Deliverable Data”** means all information and documents related to the RSBs required to be delivered by Contractor, at its expense, to KARI as listed in PART 2 “Technical Specifications and Statement of Work” hereof.
- 1.5 **“Deliverable Items”** means the RSBs and Deliverable Data that Contractor shall deliver to KARI under this Contract and any materials that Contractor may deliver to KARI on KARI’s request, including any additional data and information, in the course of the provision of the RSBs.
- 1.6 **“EDC” or “Effective Date of the Contract”** means the date identified in Article 17 “Effectiveness of Contract”.
- 1.7 **“Factory Acceptance Test”** means pre-shipment inspection held at Contractor’s site before the shipment of Deliverable Items.
- 1.8 **“Final Acceptance Test”** means incoming inspection held at KARI site after delivery of Deliverable Items to KARI.
- 1.9 **“Force Majeure”** means any act of God, war, act or failure to act of any government in its sovereign capacity except for the export license, fire, flood, earthquake, strike, epidemic, quarantine, embargo, nuclear incident, or any other event, unforeseeable and beyond the reasonable control without any fault by the Party or its Subcontractors relying upon the Force Majeure.
- 1.10 **“Rotating Shaft Balance (RSB)”** means a device to measure forces and moments imposed on a test model, which is attached to a rotating shaft.

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- 1.11 **“KARI”** means Korea Aerospace Research Institute as a Party to the Contract.
- 1.12 **“Party”** or **“Parties”** means KARI or Contractor, or both, in accordance with the context.
- 1.13 **“Service(s)”** means all professional services and labor required to be provided including, without limitation, design, development, manufacture, research, analysis, integration, training, transportation, installation, test, and warranty.
- 1.14 **“Subcontract”** means any subcontract, including purchase orders and all similar forms of agreements at any tier under this Contract.
- 1.15 **“Subcontractor”** means a contractor under any Subcontract, including suppliers and vendors.
- 1.16 **“Third Party”** means any individual or legal entity other than the Parties and the Associates.

Article 2. Contract Documents

- 2.1 This Contract shall comprise the following documents, as amended from time to time by written agreement by and between both Parties:
 - (a) PART 1: General Terms and Conditions
 - (b) PART 2: Technical Specifications and Statement of Work
- 2.2 In the event of any inconsistency or discrepancy between or among the Contract documents as listed in Article 2.1 above, the Contract documents shall be applied in the decreasing order of precedence.

Article 3. Scope of Works

- 3.1 In accordance with the requirements and scopes of work as set forth in this Contract including PART 2 “Technical Specifications and Statement of Work”, Contractor shall provide the Deliverable Items.
- 3.2 After the delivery of Deliverable Items, Contractor shall, without any additional charge to KARI, provide KARI with such technical data, documentation and information as may be reasonably required by KARI to understand the output of the Contractor’s work hereunder.

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- 3.3 Contractor shall keep KARI informed with respect to the progress of the RSBs, and shall comply with instructions given by KARI, but this instruction should be mutually agreed in advance.
- 3.4 After the completion of Factory Acceptance Test, the Contractor shall provide the Report of Factory Acceptance Test and the Documentations of fabrication, calibration, and structural analysis process to KARI.

Article 4. Contract Price

- 4.1 For the full, satisfactory and timely performance of all obligations by Contractor in accordance with the provisions of this Contract, KARI shall pay to Contractor the Contract Price of _____ (USD/EURO TBD) in accordance with the terms of payment as specified in Article 5 "Terms of Payment".
- 4.2 The Contract Price as specified in Article 4.1 above shall be firm and fixed price that is not subject to any escalation or to any adjustment or revision by reason of the increase of actual costs incurred by Contractor in the performance of the work under this Contract.
- 4.3 The Contract Price as specified in Article 4.1 above shall be comprised of the following items;

Description		Price (EURO/USD)
Deliverable Items	- Rotating Shaft Balance (2EA)	
	- Dummy Balance (2EA)	
	- Spline Shaft (1EA)	
	- Balance free end adapter (1EA)	
	- Carrying case for the RSB (2EA)	
	- Carrying case for the Dummy Balance (2EA)	
	- Carrying case for the Splice Shaft (1EA)	
	- Documentation and Data package	
Total Sum		

- 4.4 Contract Price shall include any federal, state or local taxes, funds, stamp duties, fees, transfer taxes, duties or charges of any kind whatsoever levied or imposed pursuant to related laws on the payment of the Contract Price under this Contract by the government or any political divisions of any country except for the customs duties and the value added taxes levied on all Deliverable Items and any charges for the customs clearance in Korea.
- 4.5 All banking charges incurred in Korea shall be borne by KARI, and those charges incurred outside Korea shall be borne by Contractor.

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Article 5. Terms of Payment

5.1 Payment Schedule

5.1.1 Payment shall be executed subject to the establishment of performance bond under this Article 7 “Performance Bond”.

5.1.1 The Contract Price as specified in Article 4 “Contract Price” shall be paid in accordance with the following schedule:

No.	Performance Milestone	Payment Due Date	Percentage (%)	Amount (USD/EURO)
1	EDC and the establishment of P-bond (EDC + 1M)	EDC + 2M	15	
2	Completion of RSB Design (EDC + 4M)	EDC + 5 M	35	
3	Completion of Delivery and Final Acceptance at KARI site (EDC + 12M)	EDC + 13 M	50	
Total			100	

* EDC means the Effective Date of Contract as per Article 17 “Effective Date of Contract”.

* M means calendar month.

5.2 Billing Procedure

5.2.1 All invoices the Contractor submits for payment shall be in duplicate and received by KARI at least thirty (30) days before the payment due dates as specified in Article 6.1.2.

5.2.2 All payments shall be made in U.S Dollar/EURO by telegraphic transfer to the bank account as designated by Contractor in the table below. And KARI shall remit the payment by due date as stipulated in Article 6.1 or not later than thirty (30) days after KARI’s receipt of Contractor’s invoice whichever becomes later. If Contractor’s bank account information is amended, Contractor shall provide the amended information to KARI in writing on issue of its invoice.

Contractor		Contractor’s Bank	
Account No. / IBAN		Bank Address	
SWIFT code / Bank code			

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5.2.3 Whenever the payment due date falls on Saturday, Sunday, KARI's non-business day or a Korean legal holiday, the payment date shall be the following business day.

5.3 Suspension of Payment

5.3.1 Notwithstanding any provisions of this Contract, if any milestone has not been accomplished for any reasons attributable to Contractor, KARI may, with an advance notice, suspend the payment which is due for such milestone until KARI and Contractor agree that such delayed milestone has been accomplished.

5.3.2 In the event of KARI's suspension of payment under Article 5.3, Contractor shall nevertheless continue to perform its obligations under this Contract regardless of whether KARI is entitled to suspend the payment.

5.4 Deduction of Payment

5.4.1 All losses, costs, charges and expenses which KARI incurs or sustains by reason of any act or omission of the Contractor in the performance of the Contract and any other amounts (e.g. liquidated damages) which KARI is entitled to receive from Contractor under the terms of this Contract, may be deducted from any payment that may be or become due to Contractor from KARI provided KARI notifies Contractor of such losses, costs, charges and expenses in accordance with Article 5.4.1 and Contractor has not otherwise cured such losses.

5.4.2 A prior written notice given by KARI accompanied with documents stating the amount of the losses, costs, charges, expenses and other amounts referred to in Article 5.4.1 shall be prima facie evidence of the matters stated herein.

Article 6. Taxes

6.1 In the event taxes are charged in Korea, KARI shall be fully responsible for payment of such taxes. Contractor shall be fully responsible for the payment of all applicable taxes imposed outside Korea including any customs duties and charges.

6.2 Neither Party shall be responsible for paying the customs duties, and related taxes, fee, or charges for the personnel and the personal effects of the other Party.

6.3 The Contractor shall further comply with instructions KARI may issue from time to time in order to facilitate any exemption or reductions from customs duties and other taxes that might be levied on KARI and shall impose the same obligations on the Subcontractor.

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Article 7. Performance Bond

- 7.1 Contractor shall establish a performance bond within two (2) week after EDC in favor of KARI in the value of ten percent (10 %) of the Contract Price, in the form of an irrevocable and unconditional standby letter of credit available by KARI's draft at sight.
- 7.2 The entire amount covered by the performance bond shall be payable to KARI on demand together with KARI's written statement to the effect:
- (a) that there was a default of the Contractor in the performance of the Contract (including Subcontractor's default under the Subcontract), or
 - (b) that any amount KARI is entitled to receive from Contractor has not been paid by Contractor to KARI through any other means, or
 - (c) that this Contract was terminated by Contractor's breach as specified in Article 18.2.

Whenever any amount has been withdrawn by KARI due to the case of (a) or (b) above, the performance bond shall be replenished.

- 7.3 The performance bond under this Article shall be issued by a first class international bank acceptable to KARI. The performance bond shall be drawn in favor of KARI and advised through the Woori Bank (Daejeon Branch at 29, Munye-ro, Seo-gu, Daejeon, 35241 Korea, Tel: +82-42-488-9704, Ext. 312 / Fax : +82-505- 003-0759) and available with such bank by presentation and shall remain valid until the end of the warranty period in accordance with Article 11 "Representations and Warranties".
- 7.4 It is hereby agreed between the Parties that payment from the performance bond under this Article shall not affect any other of KARI's rights, privileges, interests or remedies under this Contract or the applicable law.

Article 8. Delivery

- 8.1 General
- 8.1.1 Contractor agrees that delivery or provision of time and place under this Contract, whether specifically provided for or not, or in subsequent amendments thereto, are of the essence of this Contract.
- 8.1.2 Contractor shall deliver Deliverable Items in accordance with the defined schedule and method as set forth in PART 2 "Technical Specifications and Statement of Work", and the delivery shall be deemed to have occurred only when the Deliverable Items has been delivered to KARI site irrespective of whether or not the Final Acceptance is conducted.

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- 8.1.3 Contractor shall bear any charges or costs of whatsoever nature that are incurred in relation to delivery or provision hereunder until such delivery or provision is duly made under this Contract to KARI.
- 8.2 Delivery to KARI
- 8.2.1 Contractor shall deliver any Deliverable Items under the terms of DPU KARI (Delivered at Place Unloaded in accordance with the Incoterms 2020) in accordance with the delivery schedule of this Contract and Partial shipment shall be allowed.
- 8.2.2 To obtain import certificate, Contractor shall notify KARI by e-mail (address: "lee@kari.re.kr" for Dr. Seunghoon Lee and "monicalee@kari.re.kr" for Ms. Eun-Jung Lee) fourteen (14) calendar days prior to each shipment with one (1) set of proforma invoice and packing list specifying the number of boxes, name of Items, unit price, and size and volume of each container or box to be shipped. As soon as each shipment as provided for in this Article is made, Contractor shall send one (1) copy each of the following shipping documents to KARI by e-mail;
- (a) Clean on board vessel bill of lading/or airway bill,
 - (b) Commercial invoice (including the custom authorization no.)
 - (c) Packing list with harmonized system codes,
 - (d) Weight and measurement list,
 - (e) Contractor's Inspection Report,
 - (f) Export License, if any, and
 - (g) Certificate of Origin, if possible.

Article 9. Delays in Performance

- 9.1 Excusable Delay
- 9.1.1 Neither Party shall be responsible to the other Party for any delay in performing its obligations under this Contract due to any events of Force Majeure.
- 9.1.2 The Party whose performance of obligations hereunder has been affected by any events of Force Majeure shall notify the other Party within ten (10) working days thereafter by sending a detailed statement and sufficient evidence with respect thereto, and promptly of any subsequent change in the circumstances, if any. The affected Party shall exercise its best efforts under the circumstances to remove or remedy the events of Force Majeure and the effects thereof and resume full performance hereof as soon as possible.
- 9.1.3 Notwithstanding Article 9.1.1 above, any such delay that has not been notified to the other Party pursuant to Article 9.1.2 above shall not be excused for any reason whatsoever.

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Notwithstanding Article 9.1.1 above, any delay of performance of the affected Party falling due after any delay, failure or incompleteness in exercising the pertinent best efforts to remove or remedy the pertinent events of Force Majeure or the effects thereof pursuant to Article 9.1.2 shall not be excused for any reason whatsoever.

- 9.2 The Party who has received or was entitled to duly receive the notice of events of Force Majeure under Article 9.1.2 above may suspend performance of its obligations, which shall be due subsequent to such events of Force Majeure, until the other Party has effected such delayed performance to the full extent after and in view of such events of Force Majeure.
- 9.3 Non-Excusable Delay
 - 9.3.1 In the event that, unless otherwise excused by virtue of this Contract or the governing or applicable law, Contactor delays the Delivery of the Deliverable Items as stipulated under this Contract or Final Acceptance is failed as the result of not meeting the requirements of this Contract at KARI site, Contractor shall pay for liquidated damages to KARI as a result of such delay in accordance with Article 9.3.2.
 - 9.3.2 Contractor acknowledges and agrees that the timely completion of the Delivery and Final Acceptance Test as stipulated under this Contract is essential to KARI, and that such delay as provided for in Article 9.3.1 hereof may cause substantial financial loss or damage to KARI's right, interests and benefit, which may not be assessable or recoverable. Both Parties therefore specifically agree that in the event of such loss or damage caused by delay attributable to Contractor, its Subcontractor or any of its agents, Contractor shall pay KARI as liquidated damages zero point zero seven five percent (0.075%) of Contract Price per delayed day of Final Acceptance. In no case, however, shall the aggregated liquidated damages for the delayed Final Acceptance exceed thirty percent (30%) of the Contract Price; provided, however, that if the liquidated damages calculated by the aggregated number of days of delay under this Article, excluding those days of delay excused by KARI in writing, exceed ten percent (10%) of the Contract Price, KARI may terminate this Contract for Contractor's breach pursuant to Article 18.2. Notwithstanding the foregoing sentence, if KARI makes decision to maintain this Contract instead of termination, the liquidated damages shall continually be imposed up to thirty percent (30%) of the Contract Price and, on KARI's written request, Contractor shall establish the additional performance bond with the amount corresponding to the liquidated damages, accordingly. This additional performance bond shall be valid until the due date of Final Acceptance as set forth in Article 10 "Inspection and Acceptance"
- 9.4 This Article shall not affect other remedies, rights, privileges, interests, benefits of KARI under this Contract or the governing or applicable law. Contractor agrees that any right of KARI under this Article is not an alternative or substitute to other remedies, rights, privileges, or interests of KARI.
- 9.5 For the purpose of this Article, any action or omission of Contractor's Subcontractor, agent, or servant, *de facto* or *de jure*, shall be deemed to be Contractor's own.

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Article 10. Inspection and Acceptance

- 10.1 Factory Acceptance Test shall be occurred by the Contractor at the Contractor's site before the shipment of Deliverable Items. After the Factory Acceptance Test, Contractor shall deliver the test report to KARI, via e-mail, KARI shall decide whether to accept Factory Acceptance Test according to it. If KARI determines that the test results are not acceptable, it shall notify the Contractor, in writing, the reasons therefore. If no written notification is given within seven (7) calendar days from the receipt of the test report, the Factory Acceptance Test should be regarded as acceptable and Contractor shall proceed delivery.
- 10.2 If Factory Acceptance Test is determined to be unacceptable, Contractor shall promptly correct or improve the problem and provide a test report which is acceptable by KARI.
- 10.3 After the delivery is completed, the incoming inspection of Deliverable Items shall be occurred at KARI site within fourteen (14) calendar days, and KARI's authorized representative shall notify the inspection result to the Contractor, in writing. If KARI determines that any Deliverable Item is unacceptable, it shall notify the Contractor, in writing, the reasons therefore. If no written notification is given fourteen (14) days from the receipt of Deliverable Items, the Deliverable Items should be regarded as finally acceptable.
- 10.4. If any Deliverable Item is determined to be unacceptable, it shall be considered as non-delivery and the Contractor shall, at its own cost including airfreight, insurance, duties and taxes for customs clearance in Korea, promptly make all necessary supply and/or workmanship required to remedy such faults or defects in order to assure that the Deliverable Items are conformable to the requirements set forth in this Contract specification. If there is any type of rework or extra work not attributable to the Contractor's failure, then the cost occurred will be quoted and be borne by KARI.

Article 11. Representations and Warranties

- 11.1 Contractor represents and warrants to KARI that:
- (a) Contractor shall provide the Deliverable Item in a timely and efficient manner and in accordance with the-state-of-art engineering and design industry standards and practices;
 - (b) All Deliverable Items that Contractor shall provide under this Contract shall be free from all defects in workmanship and materials and shall comply with the specifications and requirements of this Contract;
 - (c) Contractor shall have good title to all design, engineering or technical data or documents, and all material, and the Rotating Shaft Balances (RSBs) provided to KARI, including, but not limited to, any other Deliverable Items and Deliverable Data, free from any and all claims, demands, liens and encumbrances on title;

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- (d) Neither part of the design, engineering or technical data or documents, and all material, and the Rotating Shaft Balances (RSBs) provided to KARI, including, but not limited to, any other Deliverable Items and Deliverable Data, when given and in the future, shall be the subject of any Third Party infringement claim or action; and
 - (e) The warranty will not cover the damage or failure due to improper operation, lack of maintenance, unauthorized alteration, normal wear and tear, and abnormal use.
- 11.2 The warranty period hereof shall be twelve (12) months from the Final Acceptance date of RSBs at KARI site.
- 11.3 KARI shall notify Contractor and allow Contractor to access to the RSBs to assure proper handling and use under the warranty. Any action performed by Contractor under the terms of this warranty clause will not extend the warranty period.
- 11.4 Upon the receipt of written notification from KARI that Deliverable Item delivered by Contractor is defective of non-conforming, Contractor shall, for the period agreed by both Parties, immediately repair or replace, at Contractor's expense, such Deliverable Item so as to comply with the above warranties. The Contractor shall not be entitled to any additional costs incurred or to recover any damages suffered due to defect in the Deliverable Item or rejection of the Deliverable Item by KARI.

Article 12. Legal Compliance and Governmental Authorizations

- 12.1 Contractor and its employees shall comply with all applicable legal requirements of any place in which any part of the work under this Contract is to be done and with the legal requirements of public, municipal and other authorities in any way affecting or applicable to any work performed by Contractor and its employees.
- 12.2 Unless otherwise provided for herein, Contractor shall, at its own expense, obtain any permits, licenses, approvals or certificates including any other requirements necessary for the export of Deliverable Item and for the performance of the work under the Contract. Contractor shall perform the work in accordance with the conditions of any applicable permits or licenses, approvals or certificates.
- 12.3 No Party shall be responsible in any way for direct or indirect consequences of any violation of law by the other Party, its Subcontractors or their officers, employees, agents or servants.
- 12.4 Contractor shall be responsible for obtaining all non-Korean governmental authorizations necessary for the performance of the Contractor's obligations hereunder in a timely manner.

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Article 13. Non-Transfer and Use Assurances

- 13.1 In case that any part of the Deliverable Items to be provided to KARI by Contractor under this Contract are subject to export control regimes of the Contractor's country for the purpose of non-proliferation of dual use articles and technology, KARI hereby assures and certifies that KARI will use the Deliverable Items and Deliverable Data only for peaceful purposes and, as an end user, except as specifically authorized by prior written approval of the relevant authorities of the Contractor's country, will not re-export, re-sell or otherwise dispose of the Deliverable Items and Deliverable Data outside the Republic of Korea or to any Third Party. If requested by Contractor, KARI shall execute and issue to Contractor a non-transfer and end use certificate containing the said KARI's assurances.

Article 14. License and Ownership of Data and Information

- 14.1 If any license or consent from Contractor or any Third Party is required to ensure KARI's right in this Article, Contractor shall grant and shall have such Third Party grant such license and consent to KARI and KARI's Associates.
- 14.2 Subject to Article 14.1 above, Contractor shall retain ownership rights in its prior existing standards, reference materials, drawings, and engineering tools, used in connection with the RSBs under this Contract.

Article 15. Suits for Infringement

- 15.1 In the event that any suit, claim, action or proceeding against KARI and its Associates arises from allegations that any proprietary rights to be provided by Contractor hereunder constitute infringement of any patent, copyright, trade secret, know-how, or any other proprietary right of any Third Party, Contractor shall defend KARI's and KARI Associates' right, title and interest to the same against such suit, claim, action, or proceeding at Contractor's expense and shall hold KARI and KARI Associates' harmless from any damages or losses of any kind including without limitation legal fees. If as a result of such suit, claim, action or proceeding, the proprietary rights or any part thereof is held to constitute an infringement and the use of said proprietary rights, or any part thereof, is enjoined, Contractor shall promptly, at its option and expense, either procure for KARI and KARI's Associates the right to continue using said proprietary rights, or the part thereof, or replace the same with non-infringing proprietary rights acceptable to KARI and KARI's Associates.
- 15.2 The Contractor owns the intellectual property right of the Rotating Shaft Balances (RSB) and KARI and KARI's Associates shall not copy the design or allow any Third Party to copy the design for any purpose without prior written approval from the Contractor.

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Article 16. Confidentiality

- 16.1 Each Party agrees to keep secret and confidential all information obtained pursuant to this Contract from the disclosing Party, which is designated as confidential by the disclosing Party. The Parties agree to take all necessary precautions in a manner acceptable to the Party furnishing the confidential information in order to keep secret and confidential such information and to restrict its use outside and beyond the scope of this Contract; provided, however, that the above shall not apply to information which is or becomes part of the public domain or obtained from an independent source through no fault of the disclosing Party, nor shall the above restrict or prohibit the disclosure of such information to competent government authorities as is required to bring about the purposes intended by this Contract.
- 16.2 Any information derived from KARI's property in connection with this Contract, shall be kept secret and confidential and shall not, without the consent in writing of an authorized representatives of KARI, be published or disclosed to any Third Party, or used by Contractor, except for the purpose of implementing this Contract.
- 16.3 The obligations undertaken by the Parties pursuant to this Article 16, shall survive termination of this Contract and shall remain in effect and be binding on the Parties for a period of five (5) years after the termination or expiration of this Contract except for such information as shall become part of the public domain or is received from an independent source through no fault of the Party wishing to disclose.
- 16.4 Contractor shall obtain the prior written approval of KARI concerning the content and timing of news releases, articles, brochures, advertisements, prepared speeches, and other information releases, proposed to be made by such party concerning this Contract or the work performed or to be performed hereunder. KARI shall be given a reasonable time to review the proposed text prior to the date scheduled for its release.

Article 17. Effectiveness of Contract

- 17.1 The effective date of this Contract ("EDC") is the date the duly authorized representatives of the Parties have signed this Contract.
- 17.2 Any amendment to this Contract shall be effective upon signature by the duly authorized representatives of both Parties.

Article 18. Termination

- 18.1 Termination for Events of Force Majeure

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- 18.1.1 In the event that the excusable delay under Article 9 “Delay in Performance” exceeds three (3) months for any single Event of Force Majeure or six (6) months in the aggregate for all Events of Force Majeure, KARI, at its sole discretion, may declare frustration of this Contract, and terminate the whole or any part of this Contract by sending a seven (7) days prior notice to the Contractor.
- 18.1.2 In the event that the Contract is terminated for Events of Force Majeure, Contractor shall be entitled to the payments received and payments due as of the date of termination, in which case Contractor shall return fifty percent (50%) of the amount paid by KARI under this Contract. Also KARI shall return the Deliverable Item to Contractor, if any.
- 18.2 Termination for Breach
- 18.2.1 KARI may, by written notice to the Contractor, terminate the whole or any part of the Contract, if any of the following circumstances occurs;
- (a) The Contractor fails to deliver any Deliverable Item under the Contract in accordance with the delivery schedule, or
 - (b) The Contractor fails to obtain the export license in accordance with Article 12 “Legal Compliance and Governmental Authorization”, or
 - (c) The Contractor fails to perform any substantial work under the Contract or fails to progress with the work within the time specified and in accordance with the terms of the Contract, or
 - (d) The Contractor fails to remedy any or all defects and non-conformity on the Deliverable Item in accordance with Article 11 “Representations and Warranties”.
- 18.2.2 In the event of the circumstances in Article 18.2.1, KARI may notify the Contractor and may suspend any further performance of its obligation under this Contract. If the Contractor fails, within ten (10) days from the dispatch of the notice, to produce and notify KARI of reasonable evidence of its intent and ability to effect due performance of the obligation in breach within sixty (60) days from due dispatch of written notice, then KARI may terminate this Contract with seven (7) days’ prior notice of termination.
- 18.2.3 In the event this Contract is terminated for Contractor’s breach, the Contractor shall return all the amounts paid by KARI under the Contract and also pay same amount covered by performance bond as a termination charge to KARI. If Contractor fails to pay such termination charge within a period of one (1) month after termination date, KARI shall call up the performance bond in accordance with Article 7 “Performance Bond”. In addition, KARI shall return the Deliverable Item to Contractor, if any.
- 18.3 Termination for Special Circumstances
- 18.3.1 KARI may terminate this Contract anytime upon or after due dispatch of notice of such effect, without any other conditions, in the event that the Contractor falls within any of the following categories:

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- (a) the Contractor has fallen bankrupt or insolvent, or
- (b) the Contractor passed a resolution for its reorganization (bankruptcy related), dissolution, liquidation or winding-up, or
- (c) a court order for proceedings for the bankruptcy, reorganization (bankruptcy related), dissolution or winding-up of the Contractor has been applied for by any person and such application has not been dismissed within sixty (60) days.

18.3.2 If the Contractor is in default pursuant to Article 18.3.1, the Contractor shall immediately inform KARI thereof. KARI may then terminate the Contract with reasonable prior written notice.

18.3.3 In the event this Contract is terminated by Article 18.3.1 above, Contractor shall return all amount paid by KARI under the Contract. The Contractor shall be entitled to keep all of the items procured and manufactured by Contractor under this Contract as of the date of termination.

18.4 Termination for Convenience

18.4.1 KARI may terminate this Contract, in whole or in part, at any time for its convenience, upon reasonable prior written notice to Contractor. In case of such termination for convenience, Contractor shall be entitled to the payments received and payments due as of the date of termination, out of the aggregate payments as set forth in the Article 5 "Terms of Payment" hereof. In addition, KARI shall be entitled to any products paid and products due as of the date of such termination.

Article 19. Resolution of Disputes and Governing Law

19.1 In cases any controversy or claim arises out of or in relation to this Contract or with respect to a breach hereof, the Parties shall seek to resolve the matter amicably through discussions between themselves. In the event of any disagreement between KARI and Contractor about the interpretation of the provisions or definitions used in this Contract, the interpretation of KARI shall govern until and unless otherwise decided by arbitration conducted pursuant to the following provisions.

19.2 If the Parties cannot resolve such controversy or claim in accordance with Article 19.1 above, it shall be finally settled by arbitration under the rules of arbitration of the Korean Commercial Arbitration Board (KCAB) and the place of arbitration shall be Seoul in Korea. The proceedings shall be conducted in English. The award rendered by the board shall be final and binding on the Parties and may be entered in any court of competent jurisdiction for execution.

19.3 The validity, performance, construction, and effect of this Contract shall be governed by the laws of Korea.

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Article 20. Notice

20.1 All notices, requests, demands, approvals, reports, invoices, and other correspondence to be provided pursuant to this Contract shall be in writing and shall be deemed to have been duly given to the Party to be notified;

- (a) on the date of delivery if delivered in person;
- (b) on the date of dispatch if by email or facsimile;
- (c) on the date of receipt if by registered airmail or overnight courier.

All notices shall be addressed to the appropriate Party at its address as follows:

- a) If to KARI : Korea Aerospace Research Institute
 169-84 Gwahak-ro, Yuseong-Gu
 Daejeon, 34133 Korea

Technical Matter

Attn.: Dr. Seunghoon Lee
 Dep't: Aeronautics Technology
 Research Division

Tel.: +82-42-870-3565
 Fax: +82-42-860-2604
 e-mail : lee@kari.re.kr

Contract Matter

Attn.: Ms. Eun-Jung Lee
 Dep't: Overseas Contract Office

Tel: +82-42-860-2148
 Fax: +82-42-879-4370
 e-mail : monicalee@kari.re.kr

- b) If to Contractor : **Name of Contractor**
Address

Technical Matter

Attn.: **TBD**
 Dep't: **TBD**

Tel.: **TBD**
 Fax: **TBD**
 e-mail : **TBD**

Contract Matter

Attn.: **TBD**
 Dep't: **TBD**

Tel: **TBD**
 Fax: **TBD**
 e-mail : **TBD**

20.2 Each Party may change its address for notice by notice given to the other Party in the manner set forth above. Any notices given as provided herein shall be considered effective on the date delivered in accordance with Article 20.1.

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Article 21. Miscellaneous

21.1 Assignment

This Contract and each and every covenant, term and condition hereof shall be binding upon and inure to the benefit of the Parties and their respective successors, and neither this Contract nor any rights and obligations hereunder shall be assignable or delegable directly or indirectly by any Party without the prior written consent of the other Party, which consent shall not be unreasonably withheld.

21.2 Language and Units

This Contract is executed in English and all documents, drawings, plans and any other writings as well as communication between the Parties shall be in English. Weight and measurement for deliverable documentation including Deliverable Data shall be recorded in units of metric system.

21.3 Entire Agreement

This Contract embodies the entire agreements between both Parties with respect to the subject matter hereof and supersedes and cancels any and all prior understandings or agreements, oral or written, in relation hereto, which may exist between the Parties. Neither oral explanation nor oral information by any of the Parties shall alter the meaning or interpretation of this Contract.

21.4 Amendment

No amendment or change hereof or addition hereto shall be effective or binding on any of the Parties unless reduced to writing and executed by the respective duly authorized representatives of each of the Parties.

21.5 Subcontract

Each Party shall be fully responsible for the work of its Subcontractors under this Contract, and such subcontracting shall not relieve that Party of its obligation under this Contract.

21.6 Headings

The headings and titles in this Contract have been inserted for convenience of reference only and shall not be deemed a part hereof or affect the construction or interpretation of any provision hereof.

21.7 Unenforceable Terms

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If any term or provision of this Contract shall for any reason be invalid, illegal or unenforceable in any respect, this Contract shall be interpreted and construed as if such term or provision had never been included herein. Any remaining part of this Contract shall not be influenced by such ineffectiveness.

21.8 Non-Waiver

The failure or delay of any Party to require any performance by the other Party of any provision of, or of any right or obligation under this Contract, shall not constitute a waiver thereof, nor shall such affect that Party's right to thereafter require performance of such or any other provision, right or obligation.

21.9 Disclaimer of Agency

This Contract or performance under this Contract shall not be interpreted or deemed to constitute any Party the agent of the other Party. Neither Party shall have the authority to commit the other Party or its Subcontractor in any manner or to incur any obligation on behalf of or in the name of the other Party or its Subcontractor.

21.10 Limitation of Liability

The aggregate liability of Contractor under this Contract for any and all claims, losses, liabilities, costs, including Contractor's liability for default under the Contract or damages arising out of or resulting from the Contract shall be limited to one hundred and thirty percent (130%) of the Contract Price. Contractor shall not, under any circumstances, have any liability to KARI for any indirect, special, consequential and/or incidental or punitive damages resulting from the performance, non-performance or bad performance of this Contract, including but not limited to the loss of profits, the loss of revenues, loss of capital and any other similar loss. However, in case of Contractor's act of intentional, gross negligence or willful misconduct, the foregoing sentence shall not apply for.

21.11 Time Limits

Unless otherwise indicated, any time limits to which this Contract binds Contractor or KARI shall be counted in calendar days from the day following that of the event marking the start of the time limit, and shall end on the last day of the period specified. When the last day of a time limit is a Saturday or Sunday, or a legal holiday in the country in which the particular contractual performance is required, such time limit shall be extended to the first working day following.

21.12 Change

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In the event that any changes during the performance of this Contract, within the general scope of this Contract, which add or delete Deliverable Items, change the method of Deliverable Items, adjust the Contract period or affect any other requirement of the Contract are requested by either Party, those change requests shall be submitted in writing to the other Party. If such change causes an increase or decrease in the Contract Price, that information shall be included in the change request or shall be identified by the other Party within thirty (30) days of receipt of the request for change. The Party receiving the change request shall ask the other Party to discuss the change request within ten (10) days after receipt of it. Both Parties shall discuss such a matter and reach an agreement within thirty (30) days from the date of commencement of the discussion. In the event the both Parties reach an agreement on any changes requested by either Party in due time, then this Contract shall be amended, otherwise this Contract shall be performed as unchanged.

IN WITNESS WHEREOF this Contract has been issued in two (2) signed English originals of equivalent validity, executed on behalf of KARI and the Contractor by their respective persons authorized on that behalf.

Korea Aerospace Research Institute

Name of Contractor

By : _____

By : _____

Name : Dr. Sang-Ryool LEE

Name :

Title : President

Title :

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Appendix B. Technical Specification & Statement of Work

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Technical Specification

I. General

The **Rotating Shaft Balances (RGBs)** are intended for the rotor test stand which is to be built for co-axial rotor system development. For the rotor test stand, two RSBs, dummy balances and a spline need to be provided as a set.

II. Rotating Shaft Balances

2.1 Quantity

Two RSBs with identical dimension shall be manufactured.

2.2 Dimension

The RSBs shall be an axisymmetric, hollow cylindrical shape. The allowable maximum outer diameter is 200mm, and the diameter of the inner space shall be greater than 70mm. Height shall be shorter than 80mm.

2.3 Load Range

2.3.1 The RSBs shall be designed and manufactured to meet the load envelope shown in Table 2.1. The load envelope in Table 2.1 specifies single axis load limits. Figure 2.1 shows the coordinate notation of the forces and moments.

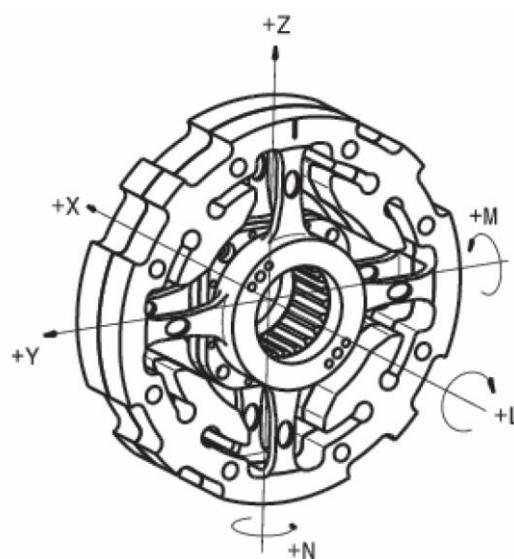


Fig 2.1. Coordinate notation of the RSB (C. Zimmermann et al., AIAA 2010-4541)

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Table 2.1. Load envelope of the RSB

X (N)	Y (N)	Z (N)	L (Nm)	M (Nm)	N (Nm)
4000	4000	4000	400	800	800

- 2.3.2** The RSBs shall be designed, manufactured, and calibrated to meet the accuracy shown in Table 2.2.

Table 2.2. Standard Deviation of Static Calibration

X (%FS)	Y (%FS)	Z (%FS)	L (%FS)	M (%FS)	N (%FS)
0.05	0.4	0.4	0.05	0.4	0.4

- 2.3.3** The RSBs shall be designed for a safety factor of at least three of its own worst-case load conditions. If the Contractor has a typical safety factor for RSB design, the number can be suggested. KARI will review the proposed safety factor and confirm after internal review.

- 2.3.4** The RSBs shall be designed with fail-safe mechanism, which can prevent the rotating parts from falling off even though the RSB has damaged.

2.4 Operating Condition

- 2.4.1** The RSB will be operated at rotational speeds from 500 to 2000RPM. The natural frequency of the RSB must avoid the rotational speed range. Dynamic loading test shall be also required in this condition.

- 2.4.2** The RSBs will be operated in a temperature range of 0 to +70°C. To meet the accuracy, zero drift, and sensitivity drift criteria in this temperature range, the RSB shall be designed to be temperature compensated. Zero and sensitivity drift tests shall be required in this condition.

- 2.4.3** The RSBs shall not be damaged under a temperature of 100°C.

2.5 Electrical Specification

- 2.5.1** At least 12 full-bridge strain gauges shall be installed to resolve the 6-component force and moment with an accuracy described in Table 2.2.

- 2.5.2** KARI recommend using 1,000 Ω foil-type strain gauge. However, the Contractor can propose suitable strain gauge that can be satisfy this specification.

- 2.5.3** The recommend excitation voltage is 5V.

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2.5.4 Zero and sensitivity drifts of each full-bridge shall not be greater than $\pm 0.01\text{mV/V}$ in the operating condition.

2.5.5 At least two temperature sensors shall be installed to measure the temperature of the RSB.

2.5.6 The insulation resistance between the components shall be greater than $100\text{M}\Omega$.

2.6 Material

2.6.1 The RSB shall be made of material that have sufficient mechanical properties to meet the technical specification. KARI recommends using maraging type steel. However, the Contractor can suggest appropriate materials to manufacture the RSB. KARI will review the proposed material properties and confirm after internal review.

2.6.2 Heat treatment shall be done in order to improve mechanical properties of the RSB.

2.7 Mechanical Interface

2.7.1 Metric part of the RSB shall have a structure that can be attached with a model. The metric part shall have at least six threaded bolt holes and two dowel pin holes. The size of the bolt and the pin holes will be determined during design process. The number of the bolt holes will be also determined during design process.

2.7.2 Non-metric part of the RSB shall have a structure that can be attached with a shaft. The RSB shall be designed to be tightly attached to a spline shaft, which is manufactured according to international standards such as ISO 4156—straight cylindrical involute splines.

2.7.3 Non-metric part shall also have at least six threaded bolt holes and two dowel pin holes, in case the RSB cannot be fixed with a spline shaft. The size of the bolt and the pin holes will be determined during design process.

2.8 Electrical Interface

The electric wires shall be color coded by function and each bridge shall have a unique identified wire. The wires shall be prepared with open leads. Cable length shall be determined during design process.

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III. Dummy Balance and Spline shaft

3.1 Dummy Balance

Two dummy balances shall be fabricated by the Contractor. The metric and non-metric mechanical interfaces of the dummy balance shall be identical with those of the RSB.

3.2 Spline shaft

The inner diameter of RSB must be fabricated tightly to eliminate any kind of movement with rotating part of test rig. When KARI use the RSBs for other test, we will use a reference spline shaft to fabricate rotating part of test rig. The spline shaft shall also have a thread to lock the RSB with a nut. The specific size and shape will be discussed during design process.

Statement of Work

I. Overview

- (1) This Statement of Work (SOW) defines the tasks to be performed by the Contractor to provide Rotating Shaft Balances (RSBs). Along with this SOW, the Contractor shall perform all tasks necessary to completely successfully operate Rotating Shaft Balances (RSBs).
- (2) The main undertakings of the project are to perform the Design, Fabrication, Gauging, Calibration, Factory Acceptance Test, Delivery of Deliverable Items and Quality Guarantee of Rotating Shaft Balances (RSBs), etc.
- (3) All the descriptions in this SOW are minimum requirements.

II. Procedures of the Work

The Contract for **Rotating Shaft Balances (RSBs)** shall be progressed as follows:

- (1) Design, Fabrication, Gauging, Calibration;
- (2) Manufacturing and Production;
- (3) Factory Acceptance Test at Contractor's site and Provision of Test Report;
- (4) Transportation
- (5) Final Acceptance (Incoming Inspection) at KARI site according to inspection procedure.

III. Scope of Work

A. Design

The Contractor shall design a RSB that meets the requirements of the technical specification. Items not specified in the technical specification shall be proposed by the Contractor. KARI will review the proposal and confirm after internal review.

The Contractor shall design a dummy balance, a spline shaft, and the mechanical parts required for calibrations such as a balance free end adapter. The design of these parts shall be proposed by the Contractor. KARI will review the proposal and confirm after internal review.

The Contractor shall make a 2D and 3D mechanical drawing for the RSB, the dummy balance, the spline shaft, and the balance free end adapter. In the mechanical drawing of the RSB, not only the exact location of the balance center but also the designed location of the strain-gauges shall be included.

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After the design of the RSB is completed, KARI will review the mechanical drawing and confirm after internal review. The fabrication can be started after the review is completed.

B. Fabrication and Gauging

The Contractor shall manufacture two RSBs that meets the requirements of the technical specification. Two dummy balances and a spline shaft shall be also manufactured. Fabrication must conform to the drawings.

The spline shaft must be firmly coupled to the RSBs and the dummy balance so that no movement should occur. The balance free end adapter must be also firmly coupled to the RSBs and the dummy balance.

The strain gauges shall be bonded and wired to meet the requirements of the technical specification. All gages and connections shall be sealed for moisture and corrosion protection.

To meet the zero and sensitivity drift criteria, the strain-gauge bridges shall be temperature compensated.

Fabrication report shall be prepared in order to record the specification of the RSB and to verify the result of the temperature compensation.

C. Calibration

(1) Static Calibration

Calibration test matrix shall be prepared to obtain the calibration coefficient matrix that meets the requirements of the technical specification. KARI will review the calibration test matrix and confirm after internal review. The static calibration can be started after the review is completed.

The mechanical parts required for the calibration shall be prepared by the Contractor. Especially, the balance free end adapter which will be attached on the metric part and used to apply loads shall be delivered to KARI.

Combined loads as well as primary loads shall be applied to the RSB. The number of loading point shall be more than 300 points. Details about the loading points will be determined based on the Contractor's suggestion.

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Deflection angle and translational displacement of the RSB during the static calibration shall be measure and recorded thoroughly.

(2) Dynamic Loading Test

The RSB will measure load signals in the rotational speed range described in the technical specification, so the impact of centrifugal force on the quality of the measurements must be evaluated. The rotating bench calibration rig or a similar means to evaluate the centrifugal force effects shall be prepared thoroughly in the verification test procedure at the calibration site. The Contractor recommends the method which simulates the applied forces and moments on RSB during the operating rotational speed range.

A slip-ring required for the dynamic loading test can be rented free of charge. Alternative telemetry systems can be used for testing at this stage. KARI will bear the cost of shipping the slip-ring, and the Contractor shall bear the cost of returning the slip-ring.

D. Factory Acceptance Test

The Contractor shall conduct factory acceptance test at Contractor's site and provide the test report to KARI, via e-mail, before shipment of Deliverable Items. KARI shall decide whether to accept the test results based on the report and notify the Contractor to proceed the delivery.

E. Delivery

The Contractor shall deliver the Deliverable Items and Data in accordance with the defined schedule and Incoterms under this Contract.

IV. Work Schedule

The Contract shall submit the detailed work schedule and specially, the work schedule at KARI site shall be confirmed by KARI for avoiding overlap with KARI's other schedules. The schedule proposed by KARI is as follows.

- Contract (EDC)
- RSB design review (EDC + 4M)
- Completion of the fabrication and gauging (EDC + 7M)
- Delivery of dummy balances and spline shaft (EDC + 8M)
- Calibration readiness review (EDC + 8M)
- Calibration result review (EDC + 10M)

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- Factory Acceptance Test
- Delivery and Final Acceptance (Incoming Inspection) (EDC + 12M)

V. On-site Meeting

KARI can request an on-site meeting at the Contractor location prior to calibration. The schedule will be agreed upon with the Contractor. The meeting will be held to check the progress of the contract and to visit the static and dynamic calibration rigs in order to establish the calibration test plan.

VI. Delivery and Deliverables

The transportation is responsibility of the Contractor. Contractor should provide transportation and unloading under the terms of DPU KARI (Delivered at Place Unloaded in accordance with the Incoterms 2020).

Contractor shall deliver the following Hardware and Data documents written in English by the Contract period (EDC + 11.5M).

A. Hardware :

- (1) Rotating shaft balance (2EA)
- (2) Dummy balances (2EA)
- (3) Spline shaft (1EA)
- (4) Balance free end adapter (1EA)
- (5) Carrying case for the RSB (2EA)
- (6) Carrying case for the dummy balances and the spline shaft (3EA)

Item (2), (3) and (6) shall be delivered by EDC + 8M and the rest of Deliverable Items shall be delivered by EDC + 11.5M.

Each RSB, Dummy balance and Spline shaft will be provided with its own carrying case. The cases for RSBs should provide for the safe handling and storage of the balance, and should be identified per part number. The calibration information will also be provided with a carrying case. The cases for Dummy balances and Spline shaft should provide for the safe handling and storage of the set, and should be identified as to what is stored inside

B. Deliverable Data : submitted in a USB memory stick

- (1) Two (2) Microsoft Excel files of Fabrication Report including;
 - Strain-gauge specification
 - Temperature sensor specification

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- Temperature compensation procedure
 - Zero drift(mV/V) with respect to temperature
 - Resistance(Ω) with respect to temperature
 - Electrical drawing, including wire color code
- (2) Two (2) Microsoft Excel files of Calibration Report including;
- Static calibration result, including all of the applied and calculated load
 - Deformation test result
 - Dynamic loading test result
 - Calibration matrix coefficient and calibration equation
 - Figures of calibration equipment and rotating bench calibration rig
- (3) One (1) Microsoft Excel file of- Structural Analysis Report
- (4) Two (2) Microsoft Excel files containing Calibration results
- (5) 2D/3D Mechanical Drawings of the hardware item (1), (2), (3) and (4)
- 2D drawing in DWG format
 - 3D drawing in STEP format (ISO 10303-21)

VII. Warranty

The Contractor should carry out followings for the warranty of the Deliverable Items after delivery of it;

- (1) The Rotating Shaft Balances (RSBs) shall be warranted for the duration of twelve (12) months from the Final Acceptance date at KARI site without any operational faults.
- (2) The warranty covers the replacement of faulty parts, the labor required for repair, traveling cost, staying cost and all associated necessary costs.
- (3) The Contractor shall submit the written plan for repair within forty-eight (48) hours after the reception of the notification of fault. The Contractor shall completely finish the repair within thirty (30) days after the reception of the notification of fault.

The End of Documents

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