NINESIGMA

Request for Proposal

NineSigma – Connecting technology seekers with solution providers around the globe

REQUEST # 0371737

Non-Contact Bearings or Seals for High-speed Rotors

RESPONSE DUE DATE: **April 6, 2018**

MANAGER: M. Takagi

SOLUTION PROVIDER HELP DESK

EMAIL: PHD2@ninesigma.com

Opportunity
Joint/contract development, licensing

Timeline
Phase 1 – Develop prototype sample: within 6 months
Phase 2 – Develop mass production quality sample: 2022

(Timeline can be discussed)

Financials
Necessary development expense will be covered (Details to be discussed).


Illustration of Non-contact bearings

REQUEST FOR PROPOSAL DESCRIPTION

NineSigma, representing a **major machinery manufacturer**, seeks **non-contact bearings or seals that support high-speed rotors in an oil-free environment**. Proposals not only for both but also for either the bearing or the seal are welcome. The client will provide potential partners with its development or production resource, if necessary.

Non-contact bearings to be achieved

- Shall be usable in an oil-free environment
- Maximum number of rotations: 200,000 rpm
- Load capacity under the max RPM:
  - Radial load: 70 N or more, or
  - Thrust load: 50 N or more
- Shaft diameter size (radial) to be supported: 8–12 mm
- Preferably, should have a damping effect on shaft vibration.
- Type and intended use of the bearing:
  Case1: For test rig
  - Type of bearing:
    - Magnetic bearings (shall be provided with control technology and auxiliary equipment)
    - Gas bearings (either hydrostatic or hydrodynamic can be the solution. If hydrostatic, shall be provided with a feeding technology)
    - Other bearings based on new mechanisms

  Case 2: For mass production machine
  - Type of bearing:
    - Gas bearings
    - Other bearings based on new mechanisms
  - Use of auxiliary equipment (ex. Compressor for gas feeding): NO

Non-contact seals to be achieved

- Shall be usable in an oil-free environment
- Acceptable target leakage: 7×10^{-6} m^3/s
  - Operation conditions
    - Maximum number of rotations: 100,000 rpm or more
    - Differential pressure: Approximately 0.8 MPa
- Shaft diameter size (radial) supported by the bearings: 8–12 mm
- Type of non-contact seal:
  - Labyrinth seal
  - Microgrooved seal
  - Mechanical seal
  - Other non-contact seals based on new mechanisms

Proposals not only for both but also either the bearing or seal technology are welcome. Meeting all the requirements is not anticipated at present. Technologies that can potentially achieve the target performance through 6 months additional development efforts are also welcome.

BACKGROUND

To make motors and other rotating machines more compact and efficient, high-speed rotary drive using

non-contact bearings and seals is effective. As the expectation to the faster rotation speed goes up, the performance requirements of non-contact bearings and seals go up. The client of this request is engaged in high-speed-rotating machine development, has yet to identify non-contact bearings or seals meeting their requirements, and has issued this open request.

POSSIBLE APPROACHES

Possible approaches might include, but are not limited to:

- Magnetic bearings
- Gas bearings (hydrostatic and hydrodynamic bearings)
  - Adoption of a vibration damping mechanism
- Non-contact seal
  - Labyrinth seal
  - Microgrooved seal
  - Mechanical seal
- Other non-contact bearings or seal based on new mechanism

ANTICIPATED PARTNERS

The following organizations are sought as potential partners for collaboration:

- Can provide a prototype in six months or so
  - It is preferable they can provide such by August 1, 2018.
  - It is even more preferable that they can provide 10 prototypes or so.
- Mass-production capacity is not necessarily required.

APPROACHES NOT OF INTEREST

The following approaches are not of interest:

- Concept-level technologies
- Bearings or seals using a lubricant oil or mist

ANTICIPATED PROJECT PHASES OR PROJECT PLAN

Respondents should submit proposals using the attached Response Template.

The client will review submitted proposals and possibly ask clarifying questions before selecting the most suitable candidates for collaboration. The client will select the best candidate(s) through evaluations. During the selection process, the client may execute non-disclosure agreements (NDA) with selected respondent(s), seek further information disclosure, and discuss specific development targets or potential opportunities. The client will execute necessary agreement(s) with the selected respondent(s) and move to the advanced development phase. Specifics of any collaboration will be determined through consultation with the concerned parties.

ITEMS TO BE INCLUDED IN THE PROPOSAL

Responses will use the Proposal Template which is linked to the "attachments" shown at the bottom of the link <REQ#0371737> and include the following items:

- Overview of the technology (principal, characteristics, and composition)
- Type of the technology
- Development stage (performance verified at the lab level/prototype already developed/already commercialized)
- Current performance
  - In case of non-contact bearings:
    - Maximum acceptable number of rotations per minute
    - Load Capacity (radial and thrust) at maximum rotational number
    - Size of the bearing
    - If auxiliary equipment (support parts, pressure-feeding mechanism, etc.) is used, describe the size
  - In case of non-contact seals:
    - Leakage and pressure to be used
    - Maximum acceptable number of rotations
    - Acceptable shaft displacement
    - Size and diameter of the seal
- Current challenges and future plans
- Cost and conditions required for the development and provision of prototypes (quality of the sample, quantity to be provided, cost, period, terms of agreement, etc.)

SUBMITTING A RESPONSE

Proposals should be submitted online at NineSights, the NineSigma open innovation community, or via email to the Solution Provider Help Desk (PHD2@ninesigma.com). Supplemental files may be submitted in addition to the proposal document.

For assistance, please contact the Solution Provider Help Desk (PHD2@ninesigma.com).

REQUEST GUIDELINES

Non-Confidential Disclosure

By submitting a response you represent that the response does not and will not be deemed to contain any confidential information of any kind whatsoever.

Response Evaluation

NineSigma's client will evaluate the response using the following criteria:

- Overall scientific and technical merit of the proposed approach
- Approach to proof of concept or performance
- Potential for proprietary position (i.e., is the technology novel or protectable)
- Economic potential of concept
- Respondent's capabilities and related experience
- Realism of the proposed plan and cost estimates

Response Selection

By submitting a response, you acknowledge that NineSigma's client reserves the sole and absolute right and discretion to select for award all, some, or none of the responses received for this announcement. NineSigma's client also may choose to select only specific tasks within a proposal for award. NineSigma's client has the sole and absolute discretion to determine all award amounts. NineSigma will contact respondents with highly responsive proposals for next steps, or the client may contact respondents directly.