

## Expression of Interest (Eoi)

### To identify parties interested in development and implementation of AI /IoT-enabled features in BEML equipment

Eoi-Ref.:CPC/VDS/Q/AI\_IoT/2021-22

Date: 21-04-2021

#### 1.0 Introduction:

BEML is seeking technology partnership in the following areas to develop an AI/IoT-enabled, Technologically-sophisticated portfolio of Defence & Aerospace, Rail & Metro, Mining & Construction, Engines and aggregates with the overarching objective of “Make in India” and enhancing Self-Reliance in line with the vision of Hon’ble Prime Minister of India.

- 1) Predictive maintenance system
- 2) Multilingual verbal warning smart system
- 3) Fleet Management system
- 4) Oil Condition Monitoring
- 5) Collision avoidance & Proximity Warning System
- 6) Driver’s Fatigue monitoring system
- 7) 360°- surround view monitoring system
- 8) Water sprinkling for dust suppression system
- 9) Telematics system (Health monitoring/Fuel monitoring/Geo-fencing/Work cycle/productivity)
- 10) Rear vision system & Proximity back up alarm.

#### 2.0 Back ground:

BEML Limited is a leading multi-technology and multi-location Mini-Ratna category-I company under the Ministry of Defence. BEML is operating its business in three verticals viz., Defence & Aerospace, Mining & Construction and Rail & Metro. It offers high-quality products for diverse sectors of economy, such as coal, mining, steel, limestone, power, irrigation, construction, road building, aviation, defence, metro and railways. It has emerged as the forerunner of heavy engineering industry with a track record of growth and revenues for over five decades.

The company has state-of-the-art manufacturing facilities at Kolar Gold Fields, Mysuru, Bengaluru and Palakkad, all possessing ISO 9001-2015 and ISO 14001 (HSC) certifications. BEML has its own world-class composite R&D establishment for Design & Development of products.

The Company has a nationwide Marketing Network and an International Business Division for Exports activity.

Details of BEML Ltd are available at [www.bemlindia.in](http://www.bemlindia.in)

## **2.0 Overview of BEML Capabilities:**

BEML Limited, a Central Public Sector Enterprise under the Ministry of Defence was incorporated in 1964. Subsequently it became a listed company and is engaged in the design, development and manufacturing in the areas of Mining & Construction, Defence & Aerospace and Rail & Metro equipment.

### **2.1 Mining & Construction:**

BEML Ltd is engaged in the business of Hydraulic Excavators, Bulldozers, Wheel Loaders, Wheel Dozers, Dump Trucks, Motor Graders, Pipe Layers, Tyre Handlers, Water Sprinklers and Backhoe Loaders to customers in the Mining and Construction segments.

BEML has also developed Mining Dump trucks of 150 Ton and 205 Ton class and Excavators of both Hydraulic and Electrical of 180 Ton capacity.

### **2.2 Defence & Aerospace:**

BEML Ltd is engaged in the business of High Mobility vehicle for all terrain operations, Heavy Recovery Vehicle, Pontoon Mainstream Bridge Systems, Crash Fire Tenders, Mobile Mast Vehicle, Engineering Mine Ploughs, Tank Transportation Trailers, Weapon Loading equipment, Armoured Recovery Vehicle, Milrail Coaches and Wagons, Ground support vehicles and other products to the Indian and other Armed Forces.

### **2.3 Rail & Metro:**

BEML Ltd is engaged in the business of Integral Rail Coaches, Overhead Inspection Cars, AC/DC Electrical Multiple Units, Stainless steel EMUs, Utility vehicles, Track Laying Equipment, Broad-gauge Rail bus, Treasury Vans, Spoil disposal Units to the Indian and other Railways.

BEML Ltd has also successfully diversified into manufacturing state-of-the-art technology stainless steel Metro Cars for various urban Metro Corporations and enjoys a dominant market share in this segment

### **3.0 Research & Development:**

BEML Ltd has R&D establishment for Design & Development of high-tech engineering products for its three verticals. It employs over 300 professionals with high experience and skills spanning a wide range of technology areas.

The R&D establishment has CAD Centre, Fluid-power, Powerline, Structural Engineering & Material Science laboratories and is continuously engaged in New Product Development and upgradation of existing products to meet customer requirements. More than 68% of Company's Sales Turnover is through in-house developed R&D products. The R&D expenditure is around 2 ~ 3% of its turnover.

### **4.0 International Business Division (IBD):**

BEML has a sizeable market share in export markets with exports to 68 countries across the globe. Over the years this division has exported over 1200 machines covering all the three verticals.

### **5.0 Scope of Partnership**

- a) BEML scope of Supply: BEML shall provide the equipment for installation & testing.
- b) Partner's scope of supply : Software development along with necessary Hardware and engineering of the same on the equipment and proving of system in integrity.

### **6.0 Qualification criteria:**

BEML Ltd. seeks technology partners in the area as indicated in clause-1.0. The firm shall meet the following Qualification criteria (Mandatory) as per **Annexure-A** for responding to the EoI.

- a) Prior experience with heavy equipment.
- b) Minimum experience of 5 years
- c) Has minimum 20 employees
- d) Has an active Indian operation and service support team in India.

- e) Willingness to modify the equipment to the customer's need.
- f) The firm shall accept co-branding of the product.
- g) Willingness for BEML to have the sole right to market the customised product.
- h) Willingness to transfer the technology to indigenise at least 50% of the value of equipment in India to meet "Make in India" criteria as per 'Buy & Make (Indian)' category.
- i) Willingness to share with BEML any up-gradations / improvements made during the period under which the joint working arrangement is effective.
- j) Willingness to train core technology team of Engineers from BEML Ltd.
- k) The firm shall be an OEM or an Information Technology (IT) company having track record in AI/IoT based products/Technology. **Only the OEM needs to respond to this EOI.** Dealers/distributors/agents need not respond.
- l) Submission of Undertaking as per **Annexure-B** regarding that the company has not been debarred / blacklisted by PSU/Government of India / any State Government in India / Central or State Government undertaking for corrupt or fraudulent practices or non-delivery, non-performance. (**Annexure-B** to be uploaded)
- m) Submission of undertaking as per **Annexure-C** regarding number of arbitration cases pending and details regarding the same. (**Annexure-C** to be uploaded).
- n) Submission of Quality Certificates such as ISO 9001, ISO 14000 or any other relevant certificate.

## **7.0 Requirements:**

The bidder should furnish Information on Technical Capability as per the enclosed **Annexure-D**.

### **Brief requirements of the System:**

#### **7.1 Predictive Maintenance System**

The telematics based onboard unit fitted on OFF-Highway equipment shall be a non-intrusive electronic device which uses mobile communication and internet-based technology to monitor the equipment data such as current location, operating time, critical aggregates operating parameters and vehicle cautionary information etc. through remote location.

The system shall provide prognostics solutions to:

- (i) Trend data and predict events.
- (ii) Monitor degradations, predict real time failures & provide alerts.
- (iii) Remaining useful life (RUL) of equipment major aggregates like engine, Transmission, PTO, hydraulic aggregates like pumps etc.,.

The proposed system shall have an AI based Data analytics for prediction of failure. It shall also have the logical build up capability to analyse the data receive from different sensors mounted on equipment and identify the components which require maintenance or needs replacement in near future. Logics need to be further developed and evolved based on data analytics during operation of machine for a period of time. Data collected need to be analysed through AI technique including machine learning to unravel hidden patterns and provide actionable predictive information.

## **7.2 Multilingual verbal warning smart system**

Presently many of the operators of Earthmoving equipments like Dozer, Excavator, and Loader etc are not so literate to understand, read & interpret the visual warning system appearing on instrument panel along with buzzer. Hence there is a need for development of AI based multilingual verbal smart system for equipment operator of different regions and alerts them in their native language. This system should ensure that the operator understands the criticality of warning and take prompt action in accordance with audio verbal messages, like bring the equipment to low idle, shutting down the engine etc.

Conventional monitoring systems have audio visual warning whereas the proposed system will have voice synthesizer in bilingual / multilingual annunciations to warn the Operator whenever the fault occurs. With this unique feature the operator need not be familiar with various symbols and need not always look into the monitoring panel in case of abnormality. Hence the operator can concentrate more on driving.

### **7.3 Fleet Management System**

The proposed system shall be comprehensive, robust and reliable solution for tracking, managing & optimizing the fleet performance.

It shall monitor the position of mobile mining equipment online in mines and thereby optimise the use and performance of the equipment. In particular the system shall facilitate dispatch of dump trucks between the shovels, excavators and dumping points of the mine. The system shall also monitor our end customer defined performance indicators of BEML equipment like trip count, working hour, idle hour, break down hours, maintenance Hours, cycle time details, TPH (Ton per hour), MTBF (mean time between failures), MTTR (mean time to repair), HEMM (Heavy earthmoving machine) availability, HEMM utilization, HEMM overall equipment efficiency, Operator performance etc.,.

The system shall have service management and reports generating features catering all the aspects of Machine Health monitoring & remote diagnosis, Service scheduling / plan, Service reminder, Machine data backup, Critical machine health alerts, engine ON/OFF or running status, etc.

### **7.4 Oil Condition Monitoring (OCM)**

The proposed AI based Oil Condition Monitoring (OCM) is a crucial element of any predictive maintenance schedule. The system includes measuring, monitoring and analysing for abnormal (ferrous) wears, condition of the fluid and presence of contaminants, thereby tracking degradation in oil quality from new to end-of-life. Accurate, high quality oil condition analysis provides a deep insight into the health and status of equipment and provides an early indication of potential breakdowns in gear boxes, transmissions and engine aggregates etc.

The device for monitoring oil contamination shall have the following:

- Accurate, reliable, ISO 4406 or NAS1638 cleanliness codes for most types of fluids, in multiple environments.
- Monitor contamination levels in mineral, synthetic, or water-based fluids.
- Can be connected online to the machine directly.
- Measure particle count, water saturation, oil temperature.

## **7.5 Collision avoidance & Proximity Warning System**

The production of any mine is heavily dependent on safe interface between mining equipment and human beings. Protecting these resources and workers against possible accidents and maximizing their utilization through real time location monitoring and control can improve the mine safety and productivity to a great extent. Detection of other vehicle in the vicinity of a moving vehicle is of primary importance to help the driver safely negotiate acceleration, deceleration and parking. In these situations, the vehicle must acquire its positional knowledge with respect to others and be able to identify a possible collision.

This AI based system can analyze the likelihood of a collision based on data from sensors/camera/ GPS etc. and alert the operator and thereafter an action need to be taken to avoid an accident. This will ensure the detection of other vehicle in the vicinity of moving vehicle.

## **7.6 Driver's Fatigue monitoring system**

The real time and non-intrusive Driver fatigue monitoring system predicts accurately and identifies situations where drowsiness and fatigue may be setting into a driver, thereby it helps in preventing accidents and fatalities. The system has to detect drowsiness based on driver's performance (considering both physiological and physical signs).

The intelligent system has to detect the onset of drowsiness in drivers, while the vehicle is in motion. Detection to be done by continuously looking out for symptoms of drowsiness, while considering both physiological and physical signs. Physiological factors include core body temperature and pulse rate. Physical cues including yawning, drooping eyelids, closed eyes and increased blink durations. The percentage of eyelid closure over the pupil over time (PERCLOS), Physiological measurements like electroencephalogram (EEG), electrocardiogram (ECG), capturing eye closure, facial features, or driving performance (such as steering characteristics, lane departure, etc.) are to be used for drowsiness detection by adopting suitable proven technology. When drowsiness is detected while driving, audible sound, vibrations, and warning messages are to be provided to warn the driver to concentrate on driving or to take a rest.

### **7.7 360°- surround view monitoring system**

A blind spot (or blind area) is the area around a vehicle of mining equipment that is not visible to the operator, either by direct line-of-sight or indirectly by use of internal and external mirrors, each vehicle has its own, unique blind spots. The objective of this system is to eliminate blind spots and associated accident involving off-highway mining equipment. This AI based 360° surround view system is to assist low speed maneuverability by providing driver with a complete surround view of the vehicle in real time by using image processing technique. Ultra wide-angle cameras mounted on the front, sides and rear of the vehicle shall capture the surrounding areas of the vehicle including all blind spots. Simultaneous digital images from these cameras are to be processed a video stitched resulting in a 360° bird's-eye view within a single image. The software shall instantly eliminate any fisheye camera distortion delivering a clear, real time picture on the driver's monitor.

### **7.8 Water sprinkling for dust suppression system**

The water sprinkler used in opencast mines with built-in water tank and functioning of the same is pressurized water will be discharge through sprinkling nozzles, mist nozzles and higher spreading width for effective dust settling in and around haul road based on the operator selection. The water sprinkler operator has to perform the equipment normal operation and also to perform various sprinkler selection based on the need bases by operating various functional valves manual. By introduction of automation for sprinkling operation based on voice command of the operator to make operator comfort. Also, automation is required to avoid the physical contact of valve operating by different operators during shift wise duty.

This AI based system shall control all sprinkling operations by monitoring dust concentration in open cast mines by using Artificial Neural Network and voice command by equipment operator. The AI based system should have CAN compatible and user interface. The system should monitor the real time dust condition by sensor/camera and actuate the solenoid to perform respective operation. The system should have voice command provision for manual mode operation. The toggle Switch for switching from Auto to Manual mode to be provided on the controller. After selection of toggle switch to manual mode, the system should consider voice command to perform various operation.



### **7.9 Telematics system (Health monitoring/Fuel monitoring/Geo-fencing/Work cycle/ productivity)**

Remote data downloading system to be a non-intrusive electronic device which can use state-of-the-art mobile communications technology and Internet based technology to track from one's office such data for mining equipment as the current location, operating time, vehicle information, PLMS (Pay Load Monitoring System) data and maintenance alerts. Telematics system shall monitor the health of major components using Telemetry Technology on equipped Mining and Production class machines, enabling the evaluation of the machine's condition and operations. This system is to reduce repair costs and maintain optimal machine availability by helping to prevent unscheduled downtime. Also, system has to build the predictive models for prediction of equipment condition and performance. In addition, system should provide fuel monitoring, Geo-fencing, Work cycle & productivity data.

### **7.10 Rear vision system & Proximity back up alarm**

A system that consists of a Monitor (component that provides visual image of Blind Area), Camera (component that transmits the images detected by it to the monitor) and other components capable of detecting objects including people within the Blind area unambiguously with an uninterrupted sequence or signal or information appropriate to detection Zone I Field of View (Blind spot).

The system shall boot automatically along with starting of Engine / Power source of Machine, shall perform an initial system check and shall give readiness indication. The system shall shutdown along with shutting down of Engine / Power source. The system shall have system readiness, standby and system malfunction indication to indicate its status.

The system shall remain in stand-by mode (operation mode whereby the system is active, but no information is transmitted by the camera Or monitor) and shall wake up automatically upon selection/engagement of appropriate control(s) (such as reverse gear, etc) by Machine Operator for negotiating Blind spot'(Killing Zone) to provide uninterrupted vision of Blind spot(s) to the operator. The system shall return to Stand-by mode upon release the appropriate controls by the operator.

The system shall be provided with auto mode tail light with adequate illumination for better visibility during darkness, The system shall be capable of operating in dark and

shall automatically switch to infrared / any other suitable technique /mode when the brightness of field of view is too low or in case of failure of the tail light.

### **8.0 Evaluation Criteria:**

The bidder should upload/furnish the supporting documents/Information on (B),(C), (D) & (E) of Evaluation Criteria as per **Annexure-E**.

### **9.0 Presentation on proposed Solution/ Methodology**

The firms shortlisted based on the qualification criteria may be invited to make a VC presentation at a date, time and location notified by BEML. The purpose of the presentation would be to allow the participants to present their solution/ methodology, experience, capabilities, infrastructure, and other key points (if any).

### **10.0 Benefits of partnering with BEML**

BEML Ltd has an extensive Marketing network and service centres. BEML has a strong R&D in all business verticals which have developed high end Mining and Construction equipment such as 150 and 200 Ton Dumpers and 180 Ton Excavators etc. BEML have delivered more than 1600 Metro Cars and have a dominant market share in the Indian Market.

BEML is having extensive Land bank at Bangalore, Mysore, Kolar Gold Fields and Palakkad to partner for a Make In India Park for self-reliance through indigenization in line with “Make in India” vision of Hon’ble Prime Minister of India. The products manufactured through collaboration/partnership may also be exported to other countries.

With extensive manufacturing facilities spread across India, a highly skilled and experienced manpower, presence and reach through its wide network of offices and divisions in India and a successful model of collaborating with other reputed OEMs, BEML is ideally placed to be the partner of choice in India for cooperation

## **11. Clarification**

If any bidder requires any clarification with respect to Eol , you may contact following officer in this regard..

**Shri.H.Sahu**

**General Manager**

**Innovation Cell, Corporate Quality**

**BEML Soudha,23/1, 4<sup>th</sup> main,**

**S R Nagar, Bangalore-560 027,**

**Karnataka, India.**

**Tel (Off): +91-80-22963118**

**Email: e-mail:gmic@beml.co.in**

## **12.0 Submission of response against Eol**

Interested firms may forward their interest by providing the details of their organization with other details as per EOI to following email only **(bemleoi@beml.co.in)** on or before **12-05-2021, Time: 5 PM.**

**General Manager –Corporate Materials**

**BEML Soudha,23/1, 4<sup>th</sup> main,**

**S R Nagar, Bangalore-560 027,**

**Karnataka, India.**

**Tel (Off): +91-80-22963 253**

**Email: gmcm@beml.co.in**

**ANNEXURE-A**

**INFORMATION SOUGHT QUALIFICATION CRITERIA:**

The firm should have the followings:

Sl. No.	Parameter	Unit	Details
1	Prior experience with heavy equipment	Yes/No.	Yes <input type="checkbox"/> No <input type="checkbox"/>
2	Minimum experience of 5 years	Yes/ No.	Yes <input type="checkbox"/> No <input type="checkbox"/>
3	Has minimum 20 employees	Yes/ No.	Yes <input type="checkbox"/> No <input type="checkbox"/>
4	Has an active Indian operation and service support team in India.	Yes/No	Yes <input type="checkbox"/> No <input type="checkbox"/>
5	Willingness to modify the equipment to the customer's need.	Yes/No.	Yes <input type="checkbox"/> No <input type="checkbox"/>
6	The firm shall accept co-branding of the product.	Yes/No.	Yes <input type="checkbox"/> No <input type="checkbox"/>
7	Willingness for BEML to have the sole right to market the customised product.	Yes/No.	Yes <input type="checkbox"/> No <input type="checkbox"/>
8	Willingness to transfer the technology to indigenise at least 50% of the value of equipment in India to meet "Make in India" criteria as per 'Buy & Make (Indian)' category.	Yes/No	Yes <input type="checkbox"/> No <input type="checkbox"/>
9	Willingness to share with BEML any up-gradations / improvements made during the period under which the joint working arrangement is effective.	Yes/No	Yes <input type="checkbox"/> No <input type="checkbox"/>
10	Willingness to train a core technology team of Engineers from BEML Ltd.	Yes/No	Yes <input type="checkbox"/> No <input type="checkbox"/>
11	The firm shall be an OEM or a Information Technology (IT) company having track record in Artificial Intelligence based products/Technology. <i>Only the OEM needs to respond to this EOI. Dealers/distributors/agents need not respond</i>	Yes/No	Yes <input type="checkbox"/> No <input type="checkbox"/>
12	Submission of Undertaking as per <b>Annexure-B</b> regarding that the company has not been debarred / blacklisted by PSU/Government of India / any State Government in India / Central or State Government undertaking for corrupt or fraudulent practices or non-delivery, non-performance. ( <b>Annexure-B</b> to be uploaded)	Yes/No	Yes <input type="checkbox"/> No <input type="checkbox"/>
13	Submission of undertaking as per <b>Annexure-C</b> regarding number of arbitration cases pending and details regarding the same. ( <b>Annexure-C</b> to be uploaded)	Yes/No	Yes <input type="checkbox"/> No <input type="checkbox"/>

14	Submission of Quality Certificates to be uploaded such as ISO 9001, ISO 14000 or any other relevant certificate. (Certificates are to be uploaded)	Yes/No	Yes <input type="checkbox"/> No <input type="checkbox"/> List of certificates: (i) <input type="checkbox"/> (ii) <input type="checkbox"/> (iii) <input type="checkbox"/> (iv) <input type="checkbox"/>
----	----------------------------------------------------------------------------------------------------------------------------------------------------	--------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Note: Please tick the relevant boxes and provide the information. Documents required to authenticate the above information/details may be enclosed/ uploaded.

**ANNEXURE-B****UNDERTAKING**

This is to certify that \_\_\_\_\_ (Name of the Firm) has not been banned / black listed / debarred from Trade by any PSU/Government of India / Autonomous Institution/any State Government in India / Central or State Government undertaking for corrupt or fraudulent practices or non-delivery, non-performance

I / we hereby certify that all the information given above is factual.

Signature with date of Authorized signatory

Name: \_\_\_\_\_

Designation: \_\_\_\_\_

Firm's Seal: \_\_\_\_\_

**ANNEXURE-C****UNDERTAKING**

This is to certify that \_\_\_\_\_ (Name of the Firm) has \_\_\_\_\_ number of arbitration cases pending and details regarding the same is furnished below.

- 1.
- 2.
- 3.

I / we hereby certify that all the information given above is factual.

Signature with date of Authorized signatory

Name: \_\_\_\_\_

Designation: \_\_\_\_\_

Firm's Seal: \_\_\_\_\_

**ANNEXURE-D**
**Technical Capability Matrix to Clause No. 7.0**

(Please tick the relevant boxes)

Sl. No.	Parameters	Compliance ( Yes or No.)
7.1	Predictive Maintenance System	Yes <input type="checkbox"/>
		No <input type="checkbox"/>
7.2	Multilingual verbal warning smart system	Yes <input type="checkbox"/>
		No <input type="checkbox"/>
7.3	Fleet Management system	Yes <input type="checkbox"/>
		No <input type="checkbox"/>
7.4	Oil Condition Monitoring	Yes <input type="checkbox"/>
		No <input type="checkbox"/>
7.5	Collision avoidance & Proximity Warning System	Yes <input type="checkbox"/>
		No <input type="checkbox"/>
7.6	Driver's Fatigue monitoring system	Yes <input type="checkbox"/>
		No <input type="checkbox"/>
7.7	360°- surrounding view monitoring system	Yes <input type="checkbox"/>
		No <input type="checkbox"/>
7.8	Water sprinkling for dust suppression system	Yes <input type="checkbox"/>
		No <input type="checkbox"/>
7.9	Telematics system(Health monitoring/Fuel monitoring/Geo-fencing/Work cycle/ productivity)	Yes <input type="checkbox"/>
		No <input type="checkbox"/>
7.10	Rear vision system & proximity back up alarm	Yes <input type="checkbox"/>
		No <input type="checkbox"/>



## ANNEXURE-E

### INFORMATION SOUGHT ON EVALUATION CRITERIA:

The bidder should upload /furnish the supporting documents/Information on (B), (C), (D) & (E) of Evaluation Criteria as detailed below;

Dimension	Dimension weight	Parameter	Criteria	Marking scheme			
				Low (0 marks)	Medium (1 marks)	High (2 marks)	
Fit with BEML Requirement	A	40%	Provide Predictive Maintenance	Yes / No	No	-	Yes
			Provide Multi-lingual verbal warning smart system	Yes / No	No	-	Yes
			Provide Fleet management system	Yes / No	No	-	Yes
			Provide Oil condition Monitoring	Yes / No	No	-	Yes
			Provide Collision avoidance & Proximity Warning System	Yes / No	No	-	Yes
			Provide Driver's Fatigue monitoring system	Yes / No	No	-	Yes
			Provide 360° surround view monitoring system	Yes / No	No	-	Yes
			Provide Water sprinkling for dust suppression system	Yes / No	No	-	Yes
			Provide Telematics system (Health monitoring /Fuel monitoring /Geo-fencing / Work cycle/ productivity)	Yes / No	No	-	Yes
			Provide Rear vision system & proximity back up alarm	Yes / No	No	-	Yes
	B	20%	Readiness to implement the solution on BEML equipment. 1.The product to be demonstrated within 30 days upon intimation) 2. The product brochure to be uploaded.	# months required to incorporate features	>9 months	6-9 months	<6 months
R&D Capability	C	25%	R&D caliber and performance	# of patents registered in last 5 years	<5	5 to 25	>25
			% of R&D personnel out of total number of employees	% R&D personnel / total employee in organisation	<5%	5-10%	>10%
Solution Exposure and credibility	D	10%	Global presence (i.e. countries in which customers are served)	# countries	No global presence	<5 countries	5 and above countries
			Number of customers as on March, 2021	# customers	<5	5 to 20	>20
			Number of mining and construction clients served in past 3 years	# customers	0	1 to 3	>3
Financial health and performance	E	5%	Historical health (leverage and capital structure ratios)	Capital structure ratio (D / E)	>2	1.5-2	<1.5
			Revenue and growth in last 4 years	FY17-20 Revenue CAGR	Negative CAGR	<5% CAGR	>5% CAGR
Evaluation formula = (Average of A x 40%) + (Average of B x 20%) + (Average of C x 25%) + (Average of D x 10%) + (Average of E x 5%)							
Companies scoring more than 30% of maximum marks will be preferred							