

### 3.2.2: Grants for research projects sponsored by government agencies during the last five years (INR in Lakhs)

e-copies of the grant award letters for research projects sponsored by government agencies

# GUJARAT COUNCIL ON SCIENCE AND TECHNOLOGY

Department of Science & Technology, Government of Gujarat

Block: B, 7th Floor, M.S. Building, Nr.Pathikashram, Sector-11,  
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URL : www.gujcost.gujarat.gov.in



सत्यमेव जयते



**Dr. Narottam Sahoo**

Advisor & Member Secretary

No: GUJCOST/ MRP/ 2016-17/ 503

27th June, 2016

**Dr. Yogesh P. Kosta**

Director

Marwadi education foundation group of institution,

Morbi Highway, Rajkot-36003

Sub: Release of first installment of the sanctioned grant for Minor Research Project 2015-16

Dear Sir,

Warm Greetings from Gujarat Council on Science and Technology (GUJCOST), Gandhinagar.

We are pleased to inform you that the first installment of your Minor Research Project entitled "Evaluation of current control strategy and direct power control Algorithm for shunt active power filter" amounting Rs.2,02,500/-has been released through RTGS/NEFT to your Bank account directly vide online transaction on 27th June, 2016.

Further, on successful completion of 1st year of research work, if there is any delay in disbursing the 2nd year installment by GUJCOST, the concern institute should arrange to provide the necessary financial support (As approved by GUJCOST) to the PI to continue the work and to complete the project as per the project time schedule and duration. Once the GUJCOST grant is disbursed, the amount provided by institute shall be reimbursed accordingly.

We request you to please acknowledge us the stamped receipt of the above payment for our records.

Thanking you and with best regards.

Yours sincerely,

(Narottam Sahoo)

Copy to: Dr. Rajendrasinh Jadeja, Professor, Electrical Engineering Department,  
Marwadi education foundation group of institution, Rajkot

No. DST/TSG/AMT/2015/332(General)

Government of India  
Ministry of Science & Technology  
Department of Science & Technology

Technology Bhavan  
New Mehrauli Road  
New Delhi- 110 016  
Dated: 17.08.2016

ORDER

Subject: **Financial assistance for the project entitled "SMART Foundry 2020 (SMART=Sustainable Metalcasting using Advanced Research and Technology)." submitted by Dr. S. Savithri, Sr. Principal Scientist, National Institute for Interdisciplinary Science & Technology (NIIST), Pappanamcode Industrial Estate, Thiruvananthapuram- 695 019, Kerala, Dr. Nagahanumaiah, Sr. Principal Scientist & Head, Micro Systems Technology Laboratory, CSIR-Central Mechanical Engineering Research Institute (CMERI), M.G. Avenue, Durgapur- 713 209, West Bengal, Dr. A.M. Kuthe, Professor and Head, Mechanical Engineering Department, Visvesvaraya National Institute of Technology (VNIT), Nagpur- 440 010, Maharashtra and Dr. Goutam Sutradhar, Professor, Mechanical Engineering Department, Jadavpur University, Kolkata-700 032, West Bengal.**

Sanction of the President is conveyed for the sanction of ₹. 9,50,15,160/- (Rupees Nine Crore Fifty Lakh Fifteen Thousand One Hundred Sixty only) i.e ₹. 8,25,15,160/- (Rupees Eight Crore Twenty Five Lakh Fifteen Thousand One Hundred Sixty only) as the contribution of DST and ₹. 1,25,00,000/- (Rupees One Crore Twenty Five Lakh only) as the contribution of five Industrial Collaborators viz. M/s Aha 3D Innovations Private Ltd, M/s 3D Foundry Tech Pvt. Ltd, M/s Marco Polo Products Pvt. Ltd, M/s Treelabs Foundations and M/s Atomberg Technologies Pvt. Ltd with contribution of ₹. 25,00,000/- (Rupees Twenty Five Lakh only) each.

2. Out of the DST's contribution of ₹. 8,25,15,160/- (Rupees Eight Crore Twenty Five Lakh Fifteen Thousand One Hundred Sixty only) the break up of ₹. 3,13,12,200/- (Rupees Three Crore Thirteen Lakh Twelve Thousand Two Hundred only) will be the share for National Institute for Interdisciplinary Science & Technology (NIIST)-Thiruvananthapuram, ₹. 2,97,94,400/- (Rupees Two Crore Ninety Seven Lakh Ninety Four Thousand Four Hundred only) will be the share for CSIR-Central Mechanical Engineering Research Institute (CMERI)- Durgapur, ₹. 1,34,51,600/- (Rupees One Crore Thirty Four Lakh Fifty One Thousand Six Hundred only) will be the share for Visvesvaraya National Institute of Technology (VNIT)-Nagpur and ₹. 79,56,960/- (Rupees Seventy Nine Lakh Fifty Six Thousand Nine Hundred Sixty only) will be the share for Jadavpur University-Kolkata.

3. Out of the share of ₹. 3,13,12,200/- (Rupees Three Crore Thirteen Lakh Twelve Thousand Two Hundred only) in respect of NIIST-Thiruvananthapuram, the break-up of ₹. 1,25,00,000/- (Rupees One Crore Twenty Five Lakh only) would be for the Capital head and ₹. 1,88,12,200/- (Rupees One Crore Eighty Eight Lakh Twelve Thousand Two Hundred only) will be under the Grant in Aid General head.

4. Out of the share of ₹. 2,97,94,400/- (Rupees Two Crore Ninety Seven Lakh Ninety Four Thousand Four Hundred only) in respect of CSIR-CMERI-Durgapur, the break-up of ₹. 1,14,00,000/- (Rupees One Crore Fourteen Lakh only) would be towards the creation of Capital Assets and ₹. 1,83,94,400/- (Rupees One Crore Eighty Three Lakh Ninety Four Thousand Four Hundred only) would be towards the recurring budget head Grant-in-Aid General.

5. Out of the share of ₹. 1,34,51,600/- (Rupees One Crore Thirty Four Lakh Fifty One Thousand Six Hundred only) in respect of VNIT-Nagpur, the break-up of ₹. 46,00,000/- (Rupees Forty Six Lakh only) would be towards the creation of Capital Assets and ₹. 88,51,600/- (Rupees Eighty Eight Lakh Fifty One Thousand Six Hundred only) would be towards the recurring budget head Grant-in-Aid General.

6. Out of the share of ₹. 79,56,960/- (Rupees Seventy Nine Lakh Fifty Six Thousand Nine Hundred Sixty only) in respect of Jadavpur University-Kolkata, the break-up of ₹. 30,00,000/- (Rupees Thirty Lakh only) would be towards the creation of Capital Assets and ₹. 49,56,960/- (Rupees Forty Nine Lakh Fifty Six Thousand Nine Hundred Sixty only) would be towards the recurring budget head Grant-in-Aid General.

P.T.O.

5. The Item of expenditure for which the total allocation of ₹. 9,50,15,160/- has been approved for a period of 36 months are given below.

**Non-recurring (Capital Items)**

	HEAD	1 <sup>st</sup> year NIIST	1 <sup>st</sup> year CMERI	1 <sup>st</sup> year VNIT	1 <sup>st</sup> Year JUK	Total
1.	<b>EQUIPMENTS</b> : High end CPU Cluster Computer, Other casting simulation software for bench marking, Alloy property databases, 25 KVA UPS with 2 hour backup, High end server for cloud based data management & analytics, Server with monitor, 5KVA UPS & Plotter, Software for layout and work flow modelling, Software like Minitab for DOE & Solid works, High end workstations, High end desktops, Table top induction melting furnace capable of melting 2kg Aluminium, Ultrasonic stirring system, 16 Channel thermocouple unit, Data acquisition system, Casting cleaning and fettling unit, Resistance heating furnace and pouring equipment, Micro hardness tester, Inverted microscope with image analysis software, Ultrasonic flaw detection, Permeability tester (digital) & inverted metallurgical microscope, Controller along with Pneumatic actuators, sensors etc., CAD Software, Hydraulic cylinder of 1 ton capacity along with power pack and accessories, Digital Oscilloscope, Precision motion stages & other automation units, Workstations, Particle reinforcement heating and feeding system, XRF analyser/spectrometer, Vacuum attachment unit with accessories, 3D printing machine accessories, Laser Machine for Micro Machining, Minor equipment like android devices, software, laptops, digital webcam, LED TV etc., and Minor equipment's and accessories costing ₹. 1.00 lakh	₹. 79,50,000/-	₹. 54,00,000/-	₹. 27,00,000/-	₹. 15,00,000/-	₹. 1,75,50,000/-
		2 <sup>nd</sup> year NIIST	2 <sup>nd</sup> year CMERI	2 <sup>nd</sup> year VNIT	2 <sup>nd</sup> year JUK	Total
		₹. 45,50,000/-	₹. 30,00,000/-	₹. 12,00,000/-	₹. 10,00,000/-	₹. 97,50,000/-
		3 <sup>rd</sup> year NIIST	3 <sup>rd</sup> year CMERI	3 <sup>rd</sup> year VNIT	3 <sup>rd</sup> year JUK	Total
		0	₹. 30,00,000/-	₹. 7,00,000/-	₹. 5,00,000/-	₹. 42,00,000/-
	<b>TOTAL</b>	₹. 1,25,00,000/-	₹. 1,14,00,000/-	₹. 46,00,000/-	₹. 30,00,000/-	₹. 3,15,00,000/-

**Recurring Items (General) (NIIST-Thiruvananthapuram component)**

Sl.No	Item	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> year	Total
1	MANPOWER				
	Research Associate-01 Nos @ ₹. 36,000/-+ 20% HRA	518400	518400	518400	1555200
	JRF – 10 Nos @ Rs. 25,000/- + 20% HRA for the first two years and @ Rs. 28,000/- + 20% HRA for the 3 <sup>rd</sup> year as SRF.	3600000	3600000	4032000	11232000
2	Consumables	800000	800000	800000	2400000
3	Contingency	50000	50000	50000	150000
4	Travel	50000	50000	50000	150000
5.	Other cost	600000	750000	475000	1825000
6	Overhead	1000000	250000	250000	1500000
	Grand Total	<b>6618400</b>	<b>6018400</b>	<b>6175400</b>	<b>18812200</b>

**Recurring Items (General) (CSIR-CMERI-Durgapur component)**

Sl.No	Item	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> year	Total
1	MANPOWER				
	Research Associate-01 Nos @ ₹. 36,000/-+ 20% HRA	518400	518400	518400	1555200
	JRF – 6 Nos @ Rs. 25,000/- + 20% HRA for the first two years and @ Rs. 28,000/- + 20% HRA for the 3 <sup>rd</sup> year as SRF.	2160000	2160000	2419200	6739200
2	Consumables	500000	1000000	1000000	2500000
3	Contingency	50000	50000	50000	150000
4	Travel	50000	50000	50000	150000
5.	Other cost	1400000	2200000	2200000	5800000
6	Overhead	1000000	250000	250000	1500000
	Grand Total	<b>5678400</b>	<b>6228400</b>	<b>6487600</b>	<b>18394400</b>

**Recurring Items (General) (VNIT-Nagpur component)**

Sl.No	Item	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> year	Total
1	MANPOWER				
	Research Associate-01 No @ ₹. 36,000/-+ 20% HRA	518400	518400	518400	1555200
	JRF – 2 Nos @ ₹. 25,000/- + 20% HRA for the first two years and ₹. 28,000/- + 20% HRA for the 3 <sup>rd</sup> year as SRF.	720000	720000	806400	2246400
2	Consumables	650000	450000	250000	1350000
3	Contingency	50000	50000	50000	150000
4	Travel	50000	50000	50000	150000
5.	Other cost	700000	700000	500000	1900000
6	Overhead	1000000	250000	250000	1500000
	Grand Total	<b>3688400</b>	<b>2738400</b>	<b>2424800</b>	<b>8851600</b>

**Recurring Items (General) (Jadavpur University -Kolkata component)**

Sl.No	Item	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> year	Total
1	MANPOWER				
	JRF – 2 Nos @ Rs. 25,000/- + 30% HRA for the first two years and @ Rs. 28,000/- + 30% HRA for the 3 <sup>rd</sup> year as SRF.	780000	780000	873600	2433600
2	Consumables	400000	400000	200000	1000000
3	Contingency	50000	50000	50000	150000
4	Travel	50000	50000	50000	150000
5.	Other cost	200000	200000	100000	500000
6	Overhead	298000	248000	177360	723360
	Grand Total	<b>1778000</b>	<b>1728000</b>	<b>1450960</b>	<b>4956960</b>

3. The overhead expenses are meant for the host Institute towards the cost for providing infrastructural facilities and benefits to the staff employed in the project etc.

4. Sanction of the President is accorded for the payment of ₹. 1,75,50,000/- (Rupees One Crore Seventy Five Lakh Fifty Thousand only) i.e. ₹. 79,50,000/- (Rupees Seventy Nine Lakh Fifty Thousand only) to Director, NIIST-Thiruvananthapuram, ₹. 54,00,000/- (Rupees Fifty Four Lakh only) to Director, CSIR-CMERI-Durgapur, ₹. 27,00,000/- (Rupees Twenty Seven Lakh only) to Director, VNIT-Nagpur and ₹. 15,00,000/- to Registrar, Jadavpur University-Kolkata under the Creation of Capital Assets Head and ₹. 1,77,63,200/- (Rupees One Crore Seventy Seven Lakh Sixty Three Thousand Two Hundred only) i.e. ₹. 66,18,400/- (Rupees Sixty Six Lakh Eighteen Thousand Four Hundred only) to Director, NIIST-Thiruvananthapuram, ₹. 56,78,400/- (Rupees Fifty Six Lakh Seventy Eight Thousand Four Hundred only) to Director, CSIR-CMERI-Durgapur, ₹. 36,88,400/- (Rupees Thirty Six Lakh Eighty Eight Thousand Four Hundred only) to Director, VNIT- Nagpur and ₹. 17,78,000/- (Rupees Seventeen Lakh Seventy Eight Thousand only) to Registrar, Jadavpur University-Kolkata under the Grant-in-Aid General head (Recurring) being the first installment of the grant for the year 2016-17 for implementation of the said research project.

5. The sanction of the grant is subjected to the conditions mentioned in annexure-I.

6. The amount of ₹. 1,77,63,200/- (Rupees One Crore Seventy Seven Lakh Sixty Three Thousand Two Hundred only) will be transferred to the beneficiaries as per the details given under :-

Sl.No.	Organization	Recurring	Bank Name	A/C Number	IFSC Code	Branch
1.	NIIST-Trivandrum	6618400	State bank of Travancore	67047723825	SBTR0000030	Pappanamcode
2.	CMERI-Durgapur	5678400	State Bank of India	30280331299	SBIN0000074	Durgapur
3	VNIT-Nagpur	3688400	Canara Bank	3124201000001	CNRB0003124	VNIT
4	Jadavpur University	1778000	State Bank of India	11079699404	SBIN0000093	Jadavpur University
	Total	17763200				

7. The amount involved is debit to:

Demand No.77	Department of Science & Technology
3425	OTHER SCIENTIFIC RESEARCH (MAJOR HEAD)
60	OTHERS (SUB - MAJOR HEAD)
60.200	ASSISTANCE TO OTHER SCIENTIFIC BODIES (MINOR HEAD)
26	TECHNOLOGY DEVELOPMENT PROGRAMME
26.01	TECHNOLOGY DEVELOPMENT & TRANSFER
26.01.31	GRANTS-IN-AID GENERAL (PLAN) 2016-2017

8. The sanction has been issued under the powers delegated to the Ministries and with the concurrence of the Integrated Finance Division of Department of Science & Technology vide concurrence No. C/2658/IFD/2016-17 dated 17.08.2016 and with the approval of Head (TDT) vide his diary No. P-5241 dated 29.07.2016.

9. It is also certified that this is the **first sanction** for the project and as such the clause related to the submission of the Utilization Certificate to PAO is not applicable.

10. The institute will furnish to the DST, utilization certificate and audited statement of accounts pertaining to the grant immediately after the end of each financial year.

11. All purchases of equipment's etc. would be as per GFR and the disposal of the same would be done with prior approval of DST.

**12. The financial support provided by DST should be duly acknowledged at all the forums and publications and proceedings whenever this work is presented. The Principal Investigator is also requested to place a sticker on the equipment purchased through the grants provided for the project by DST having the name of DST Scheme, Title of the Project, Sanction Number and Date, Date of equipment purchased/commissioned, Cost of the equipment and information on AMC, if any.**

No. DST/TSG/AMT/2015/332(Capital)

Government of India

Ministry of Science & Technology  
Department of Science & Technology

Technology Bhavan  
New Mehrauli Road  
New Delhi- 110 016  
Dated: 17.08.2016

ORDER

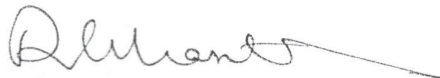
Subject: Financial assistance for the project entitled "SMART Foundry 2020 (SMART=Sustainable Metalcasting using Advanced Research and Technology)." submitted by Dr. S. Savithri, Sr. Principal Scientist, National Institute for Interdisciplinary Science & Technology (NIIST), Pappanamcode Industrial Estate, Thiruvananthapuram- 695 019, Kerala, Dr. Nagahanumaiah, Sr. Principal Scientist & Head, Micro Systems Technology Laboratory, CSIR-Central Mechanical Engineering Research Institute (CMERI), M.G. Avenue, Durgapur- 713 209, West Bengal, Dr. A.M. Kuthe, Professor and Head, Mechanical Engineering Department, Visvesvaraya National Institute of Technology (VNIT), Nagpur- 440 010, Maharashtra and Dr. Goutam Sutradhar, Professor, Mechanical Engineering Department, Jadavpur University, Kolkata-700 032, West Bengal..

With reference to the Sanction Order No. DST/TSG/AMT/2015/332(General) dated 17.08.2016, sanction of the President is accorded for the approval of ₹. 3,15,00,000/- (Rupees Three Crore Fifteen Lakh only) i.e. ₹. 1,25,00,000/- (Rupees One Crore Twenty Five Lakh only) as the share for NIIST-Thiruvananthapuram, ₹. 1,14,00,000/- (Rupees One Crore Fourteen Lakh only) as the share of CSIR-CMERI, ₹. 46,00,000/- (Rupees Forty Six Lakh only) as the share of VNIT-Nagpur and ₹. 30,00,000/- (Rupees Thirty Lakh only) as the share of Jadavpur University-Kolkata towards the purchase of equipment's under the creation of Capital Assets.

2. Sanction of the President is also accorded for the release of ₹. 1,75,50,000/- (Rupees One Crore Seventy Five Lakh Fifty Thousand only) i.e. ₹. 79,50,000/- (Rupees Seventy Nine Lakh Fifty Thousand only) to Director, NIIST-Thiruvananthapuram, ₹. 54,00,000/- (Rupees Fifty Four Lakh only) to Director, CSIR-CMERI-Durgapur, ₹. 27,00,000/- (Rupees Twenty Seven Lakh only) to Director, VNIT- Nagpur and ₹. 15,00,000/- to Registrar, Jadavpur University-Kolkata as per the details given under :-

**Non-recurring (Capital Items)**

	HEAD	1 <sup>st</sup> year NIIST	1 <sup>st</sup> year CMERI	1 <sup>st</sup> year VNIT	1 <sup>st</sup> Year JUK	Total
1.	<b>EQUIPMENTS</b> : High end CPU Cluster Computer, Other casting simulation software for bench marking, Alloy property databases, 25 KVA UPS with 2 hour backup, High end server for cloud based data management & analytics, Server with monitor, 5KVA UPS & Plotter, Software for layout and work flow modelling, Software like Minitab for DOE & Solid works, High end workstations, High end desktops, Table top induction melting furnace capable of melting 2kg Aluminium, Ultrasonic stirring system, 16 Channel thermocouple unit, Data acquisition system, Casting cleaning and fettling unit, Resistance heating furnace and pouring equipment, Micro hardness tester, Inverted	₹. 79,50,000/-	₹. 54,00,000/-	₹. 27,00,000/-	₹. 15,00,000/-	₹. 1,75,50,000/-
		2 <sup>nd</sup> year NIIST	2 <sup>nd</sup> year CMERI	2 <sup>nd</sup> year VNIT	2 <sup>nd</sup> year JUK	Total
		₹. 45,50,000/-	₹. 30,00,000/-	₹. 12,00,000/-	₹. 10,00,000/-	₹. 97,50,000/-
		3 <sup>rd</sup> year NIIST	3 <sup>rd</sup> year CMERI	3 <sup>rd</sup> year VNIT	3 <sup>rd</sup> year JUK	Total
		0	₹. 30,00,000/-	₹. 7,00,000/-	₹. 5,00,000/-	₹. 42,00,000/-



microscope with image analysis software, Ultrasonic flaw detection, Permeability tester (digital) & inverted metallurgical microscope, Controller along with Pneumatic actuators, sensors etc., CAD Software, Hydraulic cylinder of 1 ton capacity along with power pack and accessories, Digital Oscilloscope, Precision motion stages & other automation units, Workstations, Particle reinforcement heating and feeding system, XRF analyser/spectrometer, Vacuum attachment unit with accessories, 3D printing machine accessories, Laser Machine for Micro Machining, Minor equipment like android devices, software, laptops, digital webcam, LED TV etc., and Minor equipment's and accessories costing ₹. 1.00 lakh					
<b>TOTAL</b>	₹. 1,25,00,000/-	₹. 1,14,00,000/-	₹. 46,00,000/-	₹. 30,00,000/-	₹.3,15,00,000/-

2. The amount of ₹. 1,75,50,000/- (Rupees One Crore Seventy Five Lakh Fifty Thousand only) will be transferred to the beneficiaries as per the details given under :-

Sl. No.	Organization	Non-recurring	Bank Name	A/C Number	IFSC Code	Branch
1.	NIIST-Trivandrum	7950000	State bank of Travancore	67047723825	SBTR0000030	Pappanamcode
2.	CMERI-Durgapur	5400000	State Bank of India	30280331299	SBIN0000074.	Durgapur
3	VNIT-Nagpur	2700000	Canara Bank	3124201000001	CNRB0003124	VNIT
4	Jadavpur University	1500000	State Bank of India	11079699404	SBIN0000093	Jadavpur University
	Total	17550000				

3.The amount involved is debitale to:

Demand No77	Department of Science & Technology
3425	OTHER SCIENTIFIC RESEARCH (MAJOR HEAD)
60	OTHERS (SUB - MAJOR HEAD)
60.200	ASSISTANCE TO OTHER SCIENTIFIC BODIES (MINOR HEAD)
26.01	TECHNOLOGY DEVELOPMENT & TRANSFER
26.01.35	GRANTS FOR CREATION OF CAPITAL ASSETS (PLAN) 2016-2017 (TSG)

4.The sanction has been issued under the powers delegated to the Ministries and with the concurrence of the Integrated Finance Division of Department of Science & Technology vide concurrence No. C/2659/IFD/2016-17 dated 17.08.2016 and with the approval of Head (TDT) vide his diary No. P-5241 dated 29.07.2016

5.It is also certified that this is the **first sanction** for the project and as such the clause related to the submission of the Utilization Certificate to PAO is not applicable.

6.The institute will furnish to the DST, utilization certificate and audited statement of accounts pertaining to the grant immediately after the end of each financial year.  
All purchases of equipments etc. would be as per GFR and the disposal of the same would be done with prior approval of DST.

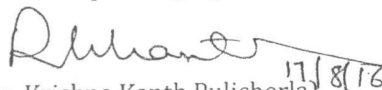


13. "The Institute/Agency will maintain separate audited accounts for the project and would keep the whole of the grant in a Bank Account earning interest, the interest earned should be reported to the DST. The interest thus earned will be treated as a credit to the Institute/Agency to be adjusted towards further installment of the grant".

14. As PER Rule 211 GFRs, the account of the project shall be open to inspection by the sanctioning authority/audit whenever the institution is called upon to do so

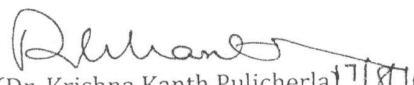
15. As per GFR-39, the sanction has been entered in the grants register maintained by the Technology Development & Transfer (TDT) Division and the serial number assigned in the register for the sanction is 14.

16. It is certified that all the Utilization Certificate in regard of all schemes/programmes/projects, present and previous pertaining to the institute have been received and no UC is pending against the organization as per the details in the PFMS also.

  
(Dr. Krishna Kanth Pulicherla) 17/8/16  
Scientist C

The Pay & Accounts Officer  
Department of Science & Technology  
New Delhi -110 016.

1. Cash Section (3 copies) for preparing the bill and remitting the amount to the above grantee.
2. Accounts Section, DST, New Delhi.
3. IFD, DST, New Delhi.
4. Director of audit (CW&M-II) AGCR Building, IP Estate, New Delhi.
5. Director, National Institute for Interdisciplinary Science & Technology (NIIST), Pappanamcode Industrial Estate, Thiruvananthapuram- 695 019, Kerala.
6. Director, CSIR-Central Mechanical Engineering Research Institute (CMERI), M.G. Avenue, Durgapur- 713 209, West Bengal.
7. Director, Visvesvaraya National Institute of Technology (VNIT), Nagpur- 440 010, Maharashtra.
8. Registrar, Jadavpur University, Kolkata-700 032, West Bengal.
9. Dr. S. Savithri, Sr. Principal Scientist, National Institute for Interdisciplinary Science & Technology (NIIST), Pappanamcode Industrial Estate, Thiruvananthapuram- 695 019, Kerala.
10. Dr. Nagahanumaiah, Sr. Principal Scientist & Head, Micro Systems Technology Laboratory, CSIR-Central Mechanical Engineering Research Institute (CMERI), M.G. Avenue, Durgapur- 713 209, West Bengal.
11. Dr. A.M. Kuthe, Professor and Head, Mechanical Engineering Department, Visvesvaraya National Institute of Technology (VNIT), Nagpur- 440 010, Maharashtra.
12. Dr. Goutam Sutradhar, Professor, Mechanical Engineering Department, Jadavpur University, Kolkata-700 032, West Bengal.
13. Mr. Aakash, Director, M/s Aha 3D Innovations Private Ltd., 166, Janakpur II, Jaipur-302 015, Rajasthan.
14. Mr. Baba Prasad Lanka, Managing Director, M/s 3D Foundry Tech, 507-C, Ecstasy Business Parkm Citi of Joy, J S D Road, Mulund (W), Mumbai-400 080, Maharashtra.
15. Mr. Aditya Kumar, Director, M/s Marco Polo Products P Ltd., Plot No. 75, Udayan Industrial Estate, 3 Pagladanga Road, Kolkata- 700 015, West Bengal.
16. Mr. Dipankar, Founder & Chief Scientist, M/s TREELabs Foundation, 627, 6th Floor, Master Mind IV, Royal Palms Estate, Aarey Milk Colony, Goregaon ( E), Mumbai-400 065, Maharashtra.
17. Mr. Manoj Meena, Director, Ms/ Atomberg Technologies Pvt Ltd, EL-111, Electronic zone, TTC MIDC Industrial Area, Navi Mumbai- 400 710, Maharashtra.
18. Sanction folder (Mr. C. Madhusudhanan, JTA, DST).
19. FICCI Cell, DST.

  
(Dr. Krishna Kanth Pulicherla) 17/8/16  
Scientist-C



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### MEMORANDUM OF UNDERSTANDING (MOU)

This MOU made and entered into on this 28<sup>th</sup> day of November, two thousand and sixteen

BETWEEN

National Institute for Interdisciplinary Science and Technology, Thiruvananthapuram, a constituent laboratory of Council of Scientific and Industrial Research, a society registered under the societies Registration Act (XXI of 1860) having its registered office at Anusandhan Bhavan, 2, Rafi Marg, New Delhi 110001, India (hereinafter called "CSIR-NIIST" which expression shall where the context so admits include its successors and permitted assignees),

AND

Indian Institute of Technology, Powai, Mumbai 400 076, India under ministry of HRD, Government of India, (hereinafter called "IIT-B" which expression shall where the context so admits include its successors and permitted assignees),

AND

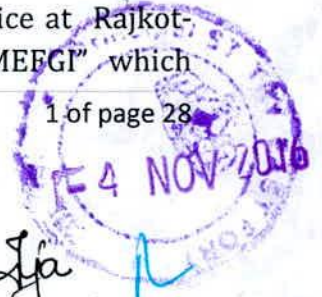
Faculty of Engineering - Marwadi Education Foundation Group of Institutions (MEFGI) Campus, under Marwadi Education Foundation, having its registered office at Rajkot-Morbi Road, Rajkot-360 003 (Gujarat), India., (hereinafter called "MEFGI" which

No: 8865 Value Rs 300/-  
21.11.2016 Issued to

The Director, CSIR-NIIST,  
Pappanamcode

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expression shall where the context so admits include its successors and permitted assignees) of the one part;

AND

Charotar University of Science and Technology, situated at Changa, having address at CHARUSAT Campus, Changa, Taluka Petlad, District Anand-388 421 formed under Gujarat State Act No.8 of 2009, Government of Gujarat and has empowered to award degrees by UGC u/s.22 of UGC Act, 1956 (hereinafter called "CHARUSAT" which expression shall where the context so admits include its successors and permitted assignees) of the other part.

### **Preamble**

Whereas CSIR-NIIST along with three other Institutes (CSIR-Central Mechanical Engineering Research Institute (CSIR-CMERI), Durgapur; Visvesvaraya National Institute of Technology (VNIT Nagpur), Nagpur; Jadavpur University, Kolkata) submitted a project proposal entitled "SMART Foundry 2020" to Advanced Manufacturing Technologies of Technology Systems Development Programme (TSDP) of Department of Science & Technology (DST), Ministry of Science & Technology, for consideration for funding along with the investigators from 6 institutes (IITB, CHARUSAT, MEFGI, College of Engineering, Pune (COE); DKTE TEI, Ichalkaranji; SGGs Institute, Nanded;), and 5 industry partners (3D Foundry Tech, Mumbai; Aha 3D, Jaipur; TREELabs, Mumbai; Marco Polo, Kolkata and Atomberg, Mumbai) (hereinafter called '**TSDP PROJECT on SMART FOUNDRY 2020**'), short summary thereof is attached as Annexure I

And Whereas DST has sanctioned the project vide sanction order no.DST/TSG/AMT/2015/332 (General) dated August 17, 2016 for a total cost of Rs 9.50 crore, including DST contribution of Rs. 8.25 crore and industry contribution of Rs. 1.25 crore. (Annexure II) and has divided its contribution among four PI's of respective institutes, and has released the first instalment of the sanctioned budget, as per the details in their sanction letter. (Annexure II).

And Whereas the four PI's in the respective Institutes (CSIR-NIIST, CSIR-CMERI, VNIT, Nagpur & Jadavpur University) are entrusted to share the funds to their respective academic partners as per the details agreed by all the concerned investigators and charted out in Annexure III.

And Therefore CSIR-NIIST, IITB, MEFGI and CHARUSAT desires to enter into a Memorandum of Understanding (MOU) setting forth the terms and conditions for carrying out the TSDP PROJECT on SMART FOUNDRY 2020.

Handwritten signatures in blue ink, including a circular stamp and several initials.

The MOU details the responsibilities and obligations of each party and other terms and conditions pertaining to the MOU for undertaking the TSDP PROJECT on SMART FOUNDRY 2020.

### **C.1. Responsibilities of CSIR-NIIST**

C.1.1 CSIR-NIIST shall develop error-free code for CFD based multiphysics solver for casting process simulation including 3D Navier Stokes solver for mold filling and 3D heat transfer solver for solidification as part of Work Package (1) in Annexure 1 and benchmark it with commercial CFD code.

C.1.2 CSIR-NIIST shall develop software for process data management and visualization for SMART Foundry 2020 as part of Work Package (5) in Annexure 1, and the work involves consolidating all data generating sub-systems and setting up cloud server, data streaming to the cloud, with basic dashboard displays and software development for on-screen data visualization and Cloud data management.

### **C.2. Responsibilities of IITB**

C.2.1 CSIR-IITB shall develop levelset based free surface algorithm for tracking the free surface during mold filling and assist CSIR-NIIST in integration of multiphysics CFD code with the free surface tracking software code.

### **C.3. Responsibilities of MEFGI**

C.3.1 MEFGI shall develop cloud-based data analytics software and optimize process parameters by analysis of historical data and implement it in cloud based devices

### **C.4. Responsibilities of CHARUSAT**

C.4.1 CHARUSAT shall develop algorithms for feeder design and improving the methods design module in the existing AutoCAST X1 code of 3D Foundry Tech Pvt. Ltd., Mumbai, as part of Work Package 1

C.4.2 CHARUSAT shall develop modular system for manufacturing of Metal Matrix Composites in collaboration with IITB and Jadavpur Univesity, as part of Work Package 4.

### **C.5. Financial Obligations**

C.5.1. The total Project Cost distributed to CSIR-NIIST is ₹ 313.122 Lakh (Rupees Three crore Thirteen Lakh Twelve Thousand Two Hundred only). Details of the total budget

sanctioned to each party for carrying out TSDP PROJECT on SMART FOUNDRY 2020 is as tabulated below:

S N	Institute Item	CSIR- NIIST	IITB	CHARUSAT	MEFGI	Total Cost
1	Equipment	61.00	35.00	19.00	10.00	125.00
2	Manpower	49.248	33.696	22.464	22.464	127.872
3	Consumables	3.00	4.50	15.00	1.50	24.00
4	Contingencies/	1.50	0.0	0.0	0.0	1.5
5	Other costs	7.00	8.5	2.00	0.75	18.25
6	Travel	1.50	0.00	0.0	0.0	1.5
7	Institutional Overhead Charges	5.00	6.5	2.00	1.50	15.0
	<b>Total (₹in lakh)</b>	<b>128.248</b>	<b>88.196</b>	<b>60.464</b>	<b>36.214</b>	<b>313.122</b>

C.5.2 Money will be released to the participating institutes by CSIR-NIIST on signing of MoU

## C.6. Intellectual Property Rights

C.6.1. Any intellectual property rights obtained by parties hereto pertaining to the TSDP PROJECT on SMART FOUNDRY 2020 prior to signing of the agreement shall remain the property of that party.

C.6.2. Any intellectual property rights arising from the TSDP PROJECT on SMART FOUNDRY 2020 will be jointly owned by all parties.

C.6.3. The procedural formalities for securing and maintaining the intellectual property rights shall be the responsibility of CSIR-NIIST and the expenditure incurred thereof shall be borne by all the parties in equal proportion. The question of whether or not intellectual property right should be secured and the territory where these shall be secured shall be decided unaniMoUsly by Heads of the institutes of all the parties.

C.6.4. The parties shall consult each other for any publication in respect of the PROJECT.

## **7. Utilisation of Intellectual Property Rights**

7.1. All parties shall have the right to license the intellectual property generated in the TSDP PROJECT on SMART FOUNDRY 2020 to third parties, subject to approval from all other parties. The terms and conditions for such licensing shall be settled mutually between all parties. The premia or royalty accrued from licensing of the intellectual property to other parties shall be shared equally among all parties.

## **8. General terms**

All parties are free to sign MOU / agreement with any other parties in India or overseas for similar projects at their own discretion by taking consent from other parties.

## **9. Confidentiality**

During the tenure of the MOU and thereafter, all the parties undertake on their behalf and on behalf of their subcontractors/ employees / representatives / associates to maintain strict confidentiality and prevent disclosure thereof, of all the information and data exchanged/generated pertaining to project work under this MOU for any purposes other than in accordance with this MOU.

## **10. Force Majeure**

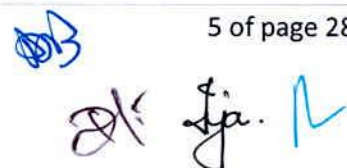
Neither party shall be held responsible for non-fulfillment of their respective obligations under this MOU due to the exigency of one or more of the force majeure events such as but not limited to acts of God, war, flood earthquakes, strike, lockouts epidemics, riots, civil commotion, etc., provided on the occurrence and cessation of any such events, the party affected thereby shall give a notice in writing to the other party within one month of such occurrence or cessation. If the force-majeure condition continues beyond six months, the parties shall then mutually decide about the future course of action.

## **11. Effective date, duration, termination of the MOU**

11.1. The MOU shall be effective from the date of signing and shall remain in force for the period of three years.

11.2. The MoU shall terminate on the expiry of the period, as in clause 12.1 unless extended by the parties.

11.3. During the tenure of the MoU, parties hereto can terminate the MOU either for breach of any of the terms and conditions of this MOU or otherwise by giving 3 months notice in writing to the defaulting party. Failure of any party to terminate the



MOU on account of breach or default by the other shall not constitute a waiver of that party's right to terminate this MoU.

11.4. In the event of termination of the MoU vide 12.3 the rights and obligations of the parties, thereto shall be settled by mutual discussion.

## **12. Notices**

All notices and other communications required to be served on each party under the terms of this MOU shall be considered to be duly served if the same shall have been delivered to, left with or posted by registered mail to that party at its last known address of business.

## **13. Amendments to the MoU**

No amendment or modification of this MoU shall be valid, unless the same is made in writing by all the parties or their authorized representatives and specifically stating the same to be an amendment of this MoU. The modifications/changes shall be effective from the date on which they are made/executed, unless otherwise agreed to.

## **14. Assignment of MoU**

The rights and/or liabilities arising to any party to this MoU shall not be assigned except with the written consent of the other party and subject to such terms and conditions as may be mutually agreed upon.

## **15. Arbitration**

Any dispute arising out of this Agreement, the same shall be dealt with under the provisions of Indian Arbitration and Conciliation Act, 1996. The venue of arbitration shall be at New Delhi.

In witness whereof, the parties hereto have signed this MoU on the day, month and year mentioned herein before.

Signing Page Follows:

For and on behalf of  
CSIR-NIIST

Signature

Name: ~~Dr. Jose James~~

Designation: Chief Scientist & Head,

RPBD Division डॉ. ए. सुन्दरेशन

Seal

Dr. A. SUNDARESAN



प्रधान, अनुसंधान योजना एवं व्यवसाय विकास प्रभाग  
Head, Research Planning & Business Development Division  
सी एस आई आर- राष्ट्रीय अन्तर्विषयी विज्ञान तथा प्रौद्योगिकी संस्थान  
(सी एस आई आर-एनआईआईएमटी), भारत सरकार  
CSIR-National Institute for Interdisciplinary  
Research and Technology, (CSIR-NIIST, Govt. of India)  
इंडस्ट्रियल एस्टेट पी ओ, तिरुवनन्तपुरम-695 019

Witnesses: (Name & Address)

1) S. Savithri  
Principal Scientist  
CSIR-NIIST, Thiruvananthapuram

2) Chandrasekhar C.K.  
Principal Scientist  
CSIR-NIIST, Thiruvananthapuram

For and on behalf of

MEFGI

Signature

Name: Prof. (Dr.) R. B. Jadeja

Designation:

Seal

Dean - Faculty of Engineering  
Marwadi Education Foundation's  
Group of Institutions, Rajkot

Witnesses: (Name & Address)

1) Amit V. Sata  
Mechanical Engg. Dept, Faculty  
of Engg. MEFGI, At Gauraldad.  
Rajkot - 360003

2) CDR R.L. INALA  
DEAN - Faculty of Technology  
MEFGI, At : Gauraldad,  
RAJKOT - 360003.

For and on behalf of  
IITB

Signature

Name: Prof. P. V. BAJAJI

Designation: PROFESSOR & DEAN (R&D)

Seal

संकायाध्यक्ष, शोध एवं विकास  
Dean, Research and Development  
कृते निदेशक, आय आय टी मुंबई  
For Director, IIT Bombay

Witnesses (Name & Address)

1) S. Karagadde  
Dept. of Mechanical Engg.  
IIT Bombay

2) Padma Satish  
Office of the Dean (R&D)  
IIT Bombay

For and on behalf of

CHARUSAT

Signature

Name: Devang Joshi

Designation: Registrar

Seal



Witnesses (Name & Address)

1) Manjiv Surtania  
Mechanical Engg. Department -  
CHARUSAT campus, Changa  
Anand - 388421

2) Vijay Chaudhary  
Mechanical Engg. Dept.  
CHARUSAT - Changa, Anand.



## Annexure I

### SMART Foundry 2020

(SMART=Sustainable Metalcasting using Advanced Research and Technology)

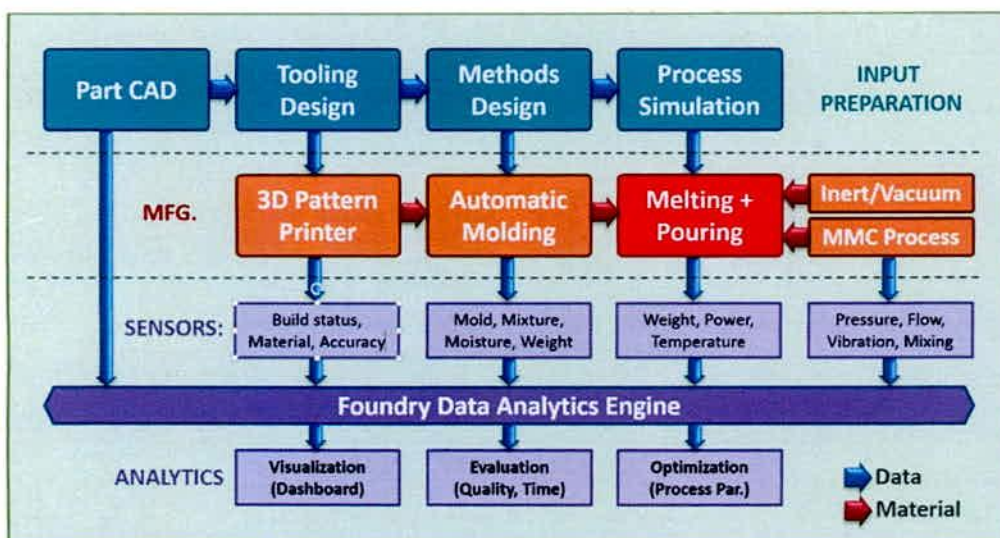
File No: File No.: DST/TSG/AMT/2015/332

**Smart manufacturing or Industry 4.0** leverages information & communications technologies to democratize production and make it more sustainable. India, with its large base of SMEs, human resources and IT infrastructure can adopt this paradigm to meet challenges of employability, employment and entrepreneurship. Relevant technologies like 3D CAD, process simulation, 3D printing, rapid tooling, and process data analytics can be readily applied to metal casting – the mother industry that feeds all other sectors.

**SMART** (Sustainable Metalcasting using Advanced Research and Technology) Foundry 2020 is a collaborative initiative by a national network of researchers and entrepreneurs. The system will enable rapid manufacture of small size intricate metal parts with better quality (than conventional sand casting) and lower cost (compared to machining or 3D metal printing). Applications include rapid prototypes for testing, replacement parts for valuable equipment, and high-value components for art, medical and defence.

#### Objective of TSDP PROJECT

The proposed SMART Foundry will be a miniaturized, easy-to-use, low-cost, semi-automatic foundry, which can be set up and used by entrepreneurs to rapidly create small intricate metal parts in a range of materials including Al, and MMCs, for applications that are not covered by conventional casting process or 3D metal printing. As mentioned earlier, the system comprises five modules: (1) Casting design and simulation, (2) Automatic mold fabrication, (3) Efficient melting and direct pouring, (4) Metal matrix processing, and (5) Data sensing, analytics and optimization and is schematically depicted in Figure 1. The detailed work packages and deliverables as agreed by all the partners are given below:



**Fig. 1: Architecture of the proposed SMART Foundry**

The whole team will demonstrate Version 1 and Version 2 of SMART FOUNDRY at 18 and 36 months. The first version will be displayed at VNIT, Nagpur at the end of 18 months and version 2 of the SMART FOUNDRY will be displayed at two other locations towards the end of the project.

### The Research Team

Sl.	Name, Designation, Affiliation	Phone and E-Mail	Responsibility
1	Dr. S. Savithri, Sr. Principal Scientist NIIST, Thiruvananthapuram	+91 9446183238 <a href="mailto:sivakumarsavi@gmail.com">sivakumarsavi@gmail.com</a> <a href="mailto:ssavithri@niist.res.in">ssavithri@niist.res.in</a>	Overall project coordinator & PI of WP-1
2	Dr. Nagahanumaiah, Sr. Principal Scientist, CMERI, Durgapur	+91 9434181360 <a href="mailto:naga@cmeri.res.in">naga@cmeri.res.in</a>	Co- project coordinator & PI of WP-2 and lead role in demonstration of SMART FOUNDRY Version 1 & 2
3	Dr. A.M. Kuthe, Professor, Mechanical Engg. VNIT Nagpur	+91 9423685194 <a href="mailto:amkme2002@yahoo.com">amkme2002@yahoo.com</a>	PI of WP-3
4	Dr. GoutamSutradhar, Professor Jadavpur University, Kolkata	+91 9830342891 <a href="mailto:cast_1963@rediffmail.com">cast_1963@rediffmail.com</a>	PI of WP-4
5	Dr. Atul Sharma, Professor, Mechanical Engg., IIT Bombay, Mumbai	+91 9819806255 <a href="mailto:atulsharma.iitb@gmail.com">atulsharma.iitb@gmail.com</a>	Team member of WP1
6	Dr. MayurSutaria,	+91 9426371641	Team member of

	Associate Professor, Mechanical Engg., CHARUSAT, Anand	<a href="mailto:mayursutaria@gmail.com">mayursutaria@gmail.com</a>	WP1 & WP4
7	Dr. Arati V. Mulay, Associate Professor, Production Dept., College of Engg., Pune	+91 9763214820 <a href="mailto:avm.prod@coep.ac.in">avm.prod@coep.ac.in</a>	Team member of WP-2
8	Dr. VasudevShinde, Professor, Mech. Engg., DKTE TEI, Ichalkaranji	+91 9422590926 <a href="mailto:vasu.metal@gmail.com">vasu.metal@gmail.com</a>	Team member of WP2 WP3
9	Dr. J.V.L. Venkatesh, Professor, Production Engg., SGGS Inst., Nanded	+91 9657720072 <a href="mailto:jlvvenkatesh@snggs.ac.in">jlvvenkatesh@snggs.ac.in</a>	Team member of WP3 & WP5
10	Dr. ShyamKaragadde, Asst. Professor, Mechanical Engg., IIT Bombay, Mumbai	+91 7506937398 <a href="mailto:s.karagadde@iitb.ac.in">s.karagadde@iitb.ac.in</a>	Team member of WP1, WP4
11	Dr. Elizabeth Jacob, Chief Scientist NIIST, Thiruvananthapuram	+91 9495124564 <a href="mailto:liz.csir@gmail.com">liz.csir@gmail.com</a>	PI of WP5
12	(Dr.) Amit Sata, Associate Professor, Faculty of Engineering - Marwadi Education Foundation Group of Institutions (MEFGI) Campus, Rajkot	+91 9825217702 <a href="mailto:ameetsata2000@gmail.com">ameetsata2000@gmail.com</a>	Team member of WP5
<b>Industry partners:</b>			

13	3D Foundry Tech Pvt Ltd., Mulund, Mumbai – <b>Shri. BabaPrasad Lanka</b>	+91 9892100072 <a href="mailto:babaprasad.lanka@hotmail.com">babaprasad.lanka@hotmail.com</a>	Industrial Partner & Team member WP1
14	Aha 3D Innovations, 166, Janakpuri II ImlyPhatak Jaipur 302015 Rajasthan INDIA	+91 9929904445 <a href="mailto:aakash@aha3d.in">aakash@aha3d.in</a>	Industrial Partner & Team member WP2
15	TREELabs Foundation, Bandra-Kurla, Mumbai, <b>Shri. Dipankar</b>	+91 912225723001 <a href="mailto:dips.treelabs@gmail.com">dips.treelabs@gmail.com</a>	Industrial Partner & Team member WP3
16	Marcopolo Products Pvt. Ltd., Kolkata, <b>Shri. Aditya Kumar</b>	+91 9830089023 <a href="mailto:aditya.kumar@marcopolo.co.in">aditya.kumar@marcopolo.co.in</a>	Industrial Partner & Team member WP4
17	Atomberg Technologies Pvt. Ltd., Ghatkopar, Mumbai, <b>Shri. ManojMeena,</b>	+91 9619139662 <a href="mailto:manoj.atomberg@gmail.com">manoj.atomberg@gmail.com</a>	Industrial Partner & Team member WP5



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## Details of different work packages

**Table 1.a :WP-1**

Title of WP-1	Casting Design and Simulation
Investigations	Advanced software technology units which includes (a) Intelligent design of tooling and methods (b) Multi-physics CFD-based casting process simulation for mold filling & solidification for prediction of defects
WP-1 Leader	Dr. S. Savithri (CSIR-NIIST)
Research team	<b>NIIST Trivandrum (Dr. S. Savithri)</b> - IITB, Mumbai (Prof.Atul Sharma, &Prof.Shyamprasad K ) - CUST, Anand (Dr.MayurSutaria)  - <i>3D Foundry Tech, Mumbai</i> (Mr. B. Lanka) – <b>Industrial Partner</b>
Expected Outcome	2 technical software products (a) for design - tooling design module, methods design module (b) CFD based multiphysics solver code for casting process simulation
Duration	From: October 2016 To: September 2019

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**Table 1.b: Tasks under WP-1**

Sl	Task	Lead Agency	Support Agencies	Duration (Months)
1.1	Tooling Design Program	3DFT	IITB, CUST	12 months from start of project for version 0 of the software code – error free running software code  12-18 months for beta testing & benchmarking - version -1  18-24 months for final version & packaging – version 2  24-36 months for demonstrating & commercialization
1.2	Methods Design Program	CUST	3DFT, NIIST, IITB	12 months from start of project for version 0 of the software code – error free running software code  12-18 months for beta testing & benchmarking - version -1  18-24 months for final version & packaging – version 2  24-36 months for demonstrating & commercialization of the software code
1.3	Process Simulation (CFD) Program	NIIST	3DFT, IITB	18 months from start of project for version 0 of the software code – error free running software code  18-24 months for beta testing & benchmarking - version -1  24- 30 months for final version & packaging – version 2  30-36 months for demonstrating & commercialization

**Table 2.a :WP-2**

<b>Title of WP-2</b>	<b>Automatic Mold Fabrication</b>
Investigations	Development of Automatic Mold Fabrication unit which will be driven by 3D printing technology for creating a plastic pattern, around which recycled silica sand mixed with chemicals will be packed automatically to create the mold.  Selection of sensors and integration to Version2 of SMART Foundry
WP-2 Leader	Dr.Nagahanumaiah (CSIR-CMERI)
Research team	<b>CMERI, Durgapur (Dr.Nagahanumaiah)</b> - COEP, Pune (Dr.Arati V. Mulay) - DKTE, Ichalkaranji (Dr.VasudevShinde) - <i>SoftTact Technology, Mumbai</i> (Mr.Rasik Patel) - Aha 3D Innovations Pvt. Ltd., Jaipur (Mr.Aakash)
Expected Outcome	<b>Demonstrable Prototypes (Hardware Units)</b> - 3D Printing machine for plastic patterns making ( <b>COEP + SoftTact+Aha 3D</b> ) - Automatic mold fabrication machine for silica sand molds( <b>CSIR-CMERI</b> ) - Automatic shaker and sand reclaiming unit ( <b>DKTE</b> ) - Integrated SMART Foundry – Version I ( <b>All teams</b> ) - Semi-automatic SMART Foundry – Version 2 ( <b>CMERI + rest</b> )
Duration	From: October 2016 To: September 2019

**Table 2.b: Tasks under WP-2**

Sl Task	Lead Agency	Support Agencies	Duration (Months)
2.1 The design and development of automatic molding machine	CMERI	DKTE	<b>M1 – M15:</b> Design, development and demonstration of sand molds manufacturing using patterns produced by 3D Printing unit developed at 2.2 task  <b>M 19 – M25:</b> Testing and design modification and final prototype.
2.2 Development of 3D plastic pattern printing unit	COEP	CMERI	<b>M1 – M15:</b> Design, development and demonstration of plastic patterns to use in automatic molding machine developed at 2.1



Sl	Task	Lead Agency	Support Agencies	Duration (Months)
				task. <b>M 19 - M25:</b> Testing and design modification and final prototype.
2.3	Sand reclaimer system	DKTE	CMERI	<b>M1 - M15:</b> Design, development and demonstration of sand reclaimer after shaking out of sand molds produced at 2.1 task. <b>M 19 - M25:</b> Testing and design modification and final prototype.
2.4	Integration and demonstration of version 2 of SMART FOUNDRY	CMERI	Rest of the team	<b>M16 - M18:</b> Demonstration SMART Foundry - V(1) <b>M19 - M22:</b> Testing and performance evaluation of subunits of SMART Foundry - V(1) <b>M19 - M25:</b> Sensor data acquisition and processing algorithms and controller system development <b>M26 - M32:</b> System Integration and demonstration of Semi-automatic SMART Foundry -V2.
2.5	Quality testing of castings manufactured	DKTE	Rest of the team	<b>M 32 - M36:</b> Testing of quality of casting produced in Semi-automatic SMART Foundry System <b>M32 - M36:</b> Outreach program for demonstration and training of practicing engineers and youths at different regions of the country.

**Table 3.a : WP-3**

<b>Title of WP-3</b>	<b>Efficient Melting and Direct Casting Unit</b>	
Investigations	Development of a system for melting and direct pouring of the molten metal into the mold in such a way that the casting process is carried out with high energy efficiency, safety and quality of the cast part	
WP-3 Leader	Dr. A.M. Kuthe	
Research team	<ul style="list-style-type: none"> <li>- VNIT Nagpur (Dr. A.M. Kuthe)</li> <li>- DKTE, Ichalkaranji (Dr.VasudevShinde)</li> <li>- SGGS, Nanded (Prof. J.V.L. Venkatesh)</li> <li>- TREELabs Foundation, Mumbai (Dr.Dipankar)</li> </ul>	
Expected Outcome	Sensor embedded advanced melting & pouring unit with a provision for attachment units like Vacuum / Inert Gas Unit & Metal Matrix Composite Unit	
Duration	From: October 2016	To: September 2019

**Table 3.b: Tasks under WP-3**

Sl	Task	Lead Agency	Support Agencies	Duration (Months)
3.1	Development of melting & pouring unit	VNIT	DKTE, SGGS	1-12 months
3.2	Development of vacuum/inert gas unit	VNIT	DKTE, SGGS	1-24 months
3.3	Development of sand reclaimer unit	DKTE	VNIT, SGGS	1-24 months

**Table 4.a :WP-4**

<b>Title of WP-4</b>	<b><i>Metal Matrix Composite Processing</i></b>
Investigations	To develop a compact and modular sub-system for manufacturing Metal Matrix Composite (MMC) parts for industrial applications. It includes facilities to impart mechanical stirring, ultrasonic vibrations, and particle heating and feeding
WP-4 Leader	-Dr.GoutamSutradhar, Jadavpur University
Research team	- <b>Jadavpur University (Dr.GoutamSutradhar)</b> -CUST, Anand (Dr.MayurSutaria) - IITB, Mumbai (Prof.Shyamprasad K.) - Marco Polo, Kolkata (Mr. Aditya Kumar)
Expected Outcome	Mechanical stirring system & Ultrasonic stirring system -  For synthesis of metal matrix composites and micro/nano composites with optimization of process parameters to eliminate segregation
Duration	From: October 2016 To: September 2019

**Table 4.b: Tasks under WP-4**

Sl	Task	Lead Agency	Support Agencies	Duration (Months)
4.1	MMC Preparation & Casting Unit	Jadavpur University	CUST, IITB	12 months from start of project for Design and fabrication of system: version- 0  12-18 months for beta testing & improvements: version -1  18-30 months for integrating it with ultrasonic stirring system: version 2  30-36 months for demonstration
4.2	Design and Development of	CUST	Jadavpur University,	06 months from start of project for Design and finalization of specifications




Sl	Task	Lead Agency	Support Agencies	Duration (Months)
	Ultrasonic Stirrer		IITB	06-12 months for development and fabrication of system: version- 0 12-18 months for beta testing & improvements: version -1 18-30 months to integrating it with vacuum and inert gas unit developed in WP-3: version 2 30-36 months for demonstration
4.3	Optimization of process parameters for MMC	IITB	CUST, Jadavpur University	Modelling and analysis for optimization of process parameters

**Table 5.a :WP-5**

Title of WP-5	Data Sensing and Analytics
Investigations	Development of product and process data schema and layout, work flow model of the SMART FOUNDRY  Collection & streaming of data to the cloud which will be enabled by various sensors which are placed in automatic molding unit, melting & pouring unit etc. (for temperature, pressure, moisture, weight, vibration, etc.) which will be picked by analytics software for real-time monitoring of the entire operation (visual dashboard) through smart phones, as well as for process optimization
WP-5 Leader	Dr. Elizabeth Jacob (CSIR-NIIST)
Research team	<b>NIIST Trivandrum (Dr. Elizabeth Jacob)</b> - MEFGI, Rajkot (Dr. Amit Sata) - SGGS, Nanded (Prof. J.V.L. Venkatesh) - <i>Atomberg, Mumbai</i> (Mr. Manoj Meena)
Expected Outcome	Data analytics software & cloud services

<b>Title of WP-5</b>	<b>Data Sensing and Analytics</b>	
<b>Duration</b>	From: October 2016	To: September 2019

**Table 5.b: Tasks under WP-5**

Sl Task	Lead Agency	Support Agencies	Duration (Months)
5.1 Layout and workflow modelling of SMART FOUNDRY	SGGS	NIIST, MEFGI & the whole research team	12 months from start of project for modeling the layout and workflow based on initial version of the SMART Foundry system. 13-24 months for upgrading the system's layout and workflow models by incorporating details based on developments of various subsystems of the system. 25-36 months for demonstration of the full system with all subsystems included in the layout and workflow design.
5.2 Cloud Application Development	NIIST	SGGS, MEFGI	1-6 Sensor data acquisition by consolidating all data generating sub-systems and setting up cloud server. 7-18 months for data streaming to the cloud, with basic dashboard displays. 19-24 months for software development for on-screen data visualization and Cloud data management. 25-36 months for demonstration of Product and Process Data Management for SMART Foundry
5.3 Development of data analytics engine	MEFGI	NIIST, SGGS	1-12 months - Development of dashboard view for representing data collected from various modules 13-24 months - Development of cloud-based data analytics software and optimization of process parameters by analysis of historical data and its implementation in cloud based devices - defect data analysis 25-36 months - testing of process monitoring system on cloud based devices and demonstration of Product and Process Data Management for SMART Foundry

*OB*  
*D/V* *Jja*

# Annexure

## II

No. DST/TSG/AMT/2015/332(General)

Government of India

Ministry of Science & Technology

Department of Science & Technology

Technology Bhavan

New Mehrauli Road

New Delhi- 110 016

Dated: 17.08.2016

### ORDER

Subject: **Financial assistance for the project entitled "SMART Foundry 2020 (SMART=Sustainable Metalcasting using Advanced Research and Technology)." submitted by Dr. S. Savithri, Sr. Principal Scientist, National Institute for Interdisciplinary Science & Technology (NIIST), Pappanamcode Industrial Estate, Thiruvananthapuram- 695 019, Kerala, Dr. Nagahanumaiah, Sr. Principal Scientist & Head, Micro Systems Technology Laboratory, CSIR-Central Mechanical Engineering Research Institute (CMERI), M.G. Avenue, Durgapur- 713 209, West Bengal, Dr. A.M. Kuthe, Professor and Head, Mechanical Engineering Department, Visvesvaraya National Institute of Technology (VNIT), Nagpur- 440 010, Maharashtra and Dr. Goutam Sutradhar, Professor, Mechanical Engineering Department, Jadavpur University, Kolkata-700 032, West Bengal.**

Sanction of the President is conveyed for the sanction of ₹. 9,50,15,160/- (Rupees Nine Crore Fifty Lakh Fifteen Thousand One Hundred Sixty only) i.e ₹. 8,25,15,160/- (Rupees Eight Crore Twenty Five Lakh Fifteen Thousand One Hundred Sixty only) as the contribution of DST and ₹. 1,25,00,000/- (Rupees One Crore Twenty Five Lakh only) as the contribution of five Industrial Collaborators viz. M/s Aha 3D Innovations Private Ltd, M/s 3D Foundry Tech Pvt. Ltd, M/s Marco Polo Products Pvt. Ltd, M/s Treelabs Foundations and M/s Atomberg Technologies Pvt. Ltd with contribution of ₹. 25,00,000/- (Rupees Twenty Five Lakh only) each.

2. Out of the DST's contribution of ₹. 8,25,15,160/- (Rupees Eight Crore Twenty Five Lakh Fifteen Thousand One Hundred Sixty only) the break up of ₹. 3,13,12,200/- (Rupees Three Crore Thirteen Lakh Twelve Thousand Two Hundred only) will be the share for National Institute for Interdisciplinary Science & Technology (NIIST)-Thiruvananthapuram, ₹. 2,97,94,400/- (Rupees Two Crore Ninety Seven Lakh Ninety Four Thousand Four Hundred only) will be the share for CSIR-Central Mechanical Engineering Research Institute (CMERI)- Durgapur, ₹. 1,34,51,600/- (Rupees One Crore Thirty Four Lakh Fifty One Thousand Six Hundred only) will be the share for Visvesvaraya National Institute of Technology (VNIT)-Nagpur and ₹. 79,56,960/- (Rupees Seventy Nine Lakh Fifty Six Thousand Nine Hundred Sixty only) will be the share for Jadavpur University-Kolkata.

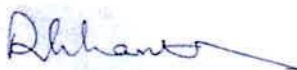
3. Out of the share of ₹. 3,13,12,200/- (Rupees Three Crore Thirteen Lakh Twelve Thousand Two Hundred only) in respect of NIIST-Thiruvananthapuram, the break-up of ₹. 1,25,00,000/- (Rupees One Crore Twenty Five Lakh only) would be for the Capital head and ₹. 1,88,12,200/- (Rupees One Crore Eighty Eight Lakh Twelve Thousand Two Hundred only) will be under the Grant in Aid General head.

4. Out of the share of ₹. 2,97,94,400/- (Rupees Two Crore Ninety Seven Lakh Ninety Four Thousand Four Hundred only) in respect of CSIR-CMERI-Durgapur, the break-up of ₹. 1,14,00,000/- (Rupees One Crore Fourteen Lakh only) would be towards the creation of Capital Assets and ₹. 1,83,94,400/- (Rupees One Crore Eighty Three Lakh Ninety Four Thousand Four Hundred only) would be towards the recurring budget head Grant-in-Aid General.

5. Out of the share of ₹. 1,34,51,600/- (Rupees One Crore Thirty Four Lakh Fifty One Thousand Six Hundred only) in respect of VNIT-Nagpur, the break-up of ₹. 46,00,000/- (Rupees Forty Six Lakh only) would be towards the creation of Capital Assets and ₹. 88,51,600/- (Rupees Eighty Eight Lakh Fifty One Thousand Six Hundred only) would be towards the recurring budget head Grant-in-Aid General.

6. Out of the share of ₹. 79,56,960/- (Rupees Seventy Nine Lakh Fifty Six Thousand Nine Hundred Sixty only) in respect of Jadavpur University-Kolkata, the break-up of ₹. 30,00,000/- (Rupees Thirty Lakh only) would be towards the creation of Capital Assets and ₹. 49,56,960/- (Rupees Forty Nine Lakh Fifty Six Thousand Nine Hundred Sixty only) would be towards the recurring budget head Grant-in-Aid General.

P.T.O.



5. The Item of expenditure for which the total allocation of ₹. 9,50,15,160/- has been approved for a period of 36 months are given below.

**Non-recurring (Capital Items)**

	HEAD	1 <sup>st</sup> year NIIST	1 <sup>st</sup> year CMERI	1 <sup>st</sup> year VNIT	1 <sup>st</sup> Year JUK	Total
1.	<b>EQUIPMENTS</b> : High end CPU Cluster Computer, Other casting simulation software for bench marking, Alloy property databases, 25 KVA UPS with 2 hour backup, High end server for cloud based data management & analytics, Server with monitor, 5KVA UPS & Plotter, Software for layout and work flow modelling, Software like Minitab for DOE & Solid works, High end workstations, High end desktops, Table top induction melting furnace capable of melting 2kg Aluminium, Ultrasonic stirring system, 16 Channel thermocouple unit, Data acquisition system, Casting cleaning and fettling unit, Resistance heating furnace and pouring equipment, Micro hardness tester, Inverted microscope with image analysis software, Ultrasonic flaw detection, Permeability tester (digital) & inverted metallurgical microscope, Controller along with Pneumatic actuators, sensors etc., CAD Software, Hydraulic cylinder of 1 ton capacity along with power pack and accessories, Digital Oscilloscope, Precision motion stages & other automation units, Workstations, Particle reinforcement heating and feeding system, XRF analyser/spectrometer, Vacuum attachment unit with accessories, 3D printing machine accessories, Laser Machine for Micro Machining, Minor equipment like android devices, software, laptops, digital webcam, LED TV etc., and Minor equipment's and accessories costing ₹. 1.00 lakh	₹. 79,50,000/-	₹. 54,00,000/-	₹. 27,00,000/-	₹. 15,00,000/-	₹. 1,75,50,000/-
		2 <sup>nd</sup> year NIIST	2 <sup>nd</sup> year CMERI	2 <sup>nd</sup> year VNIT	2 <sup>nd</sup> year JUK	Total
		₹. 45,50,000/-	₹. 30,00,000/-	₹. 12,00,000/-	₹. 10,00,000/-	₹. 97,50,000/-
		3 <sup>rd</sup> year NIIST	3 <sup>rd</sup> year CMERI	3 <sup>rd</sup> year VNIT	3 <sup>rd</sup> year JUK	Total
		0	₹. 30,00,000/-	₹. 7,00,000/-	₹. 5,00,000/-	₹. 42,00,000/-
	<b>TOTAL</b>	₹. 1,25,00,000/-	₹. 1,14,00,000/-	₹. 46,00,000/-	₹. 30,00,000/-	₹. 3,15,00,000/-

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**Recurring Items (General) (NIIST-Thiruvananthapuram component)**

Sl.No	Item	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> year	Total
1	MANPOWER				
	Research Associate-01 Nos @ ₹. 36,000/- + 20% HRA	518400	518400	518400	1555200
	JRF - 10 Nos @ Rs. 25,000/- + 20% HRA for the first two years and @ Rs. 28,000/- + 20% HRA for the 3 <sup>rd</sup> year as SRF.	3600000	3600000	4032000	11232000
2	Consumables	800000	800000	800000	2400000
3	Contingency	50000	50000	50000	150000
4	Travel	50000	50000	50000	150000
5.	Other cost	600000	750000	475000	1825000
6	Overhead	1000000	250000	250000	1500000
	Grand Total	6618400	6018400	6175400	18812200

**Recurring Items (General) (CSIR-CMERI-Durgapur component)**

Sl.No	Item	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> year	Total
1	MANPOWER				
	Research Associate-01 Nos @ ₹. 36,000/- + 20% HRA	518400	518400	518400	1555200
	JRF - 6 Nos @ Rs. 25,000/- + 20% HRA for the first two years and @ Rs. 28,000/- + 20% HRA for the 3 <sup>rd</sup> year as SRF.	2160000	2160000	2419200	6739200
2	Consumables	500000	1000000	1000000	2500000
3	Contingency	50000	50000	50000	150000
4	Travel	50000	50000	50000	150000
5.	Other cost	1400000	2200000	2200000	5800000
6	Overhead	1000000	250000	250000	1500000
	Grand Total	5678400	6228400	6487600	18394400

**Recurring Items (General) (VNIT-Nagpur component)**

Sl.No	Item	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> year	Total
1	MANPOWER				
	Research Associate-01 No @ ₹. 36,000/- + 20% HRA	518400	518400	518400	1555200
	JRF - 2 Nos @ ₹. 25,000/- + 20% HRA for the first two years and ₹. 28,000/- + 20% HRA for the 3 <sup>rd</sup> year as SRF.	720000	720000	806400	2246400
2	Consumables	650000	450000	250000	1350000
3	Contingency	50000	50000	50000	150000
4	Travel	50000	50000	50000	150000
5.	Other cost	700000	700000	500000	1900000
6	Overhead	1000000	250000	250000	1500000
	Grand Total	3688400	2738400	2424800	8851600

**Recurring Items (General) (Jadavpur University -Kolkata component)**

Sl.No	Item	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> year	Total
1	MANPOWER				
	JRF - 2 Nos @ Rs. 25,000/- + 30% HRA for the first two years and @ Rs. 28,000/- + 30% HRA for the 3 <sup>rd</sup> year as SRF.	780000	780000	873600	2433600
2	Consumables	400000	400000	200000	1000000
3	Contingency	50000	50000	50000	150000
4	Travel	50000	50000	50000	150000
5.	Other cost	200000	200000	100000	500000
6	Overhead	298000	248000	177360	723360
	Grand Total	1778000	1728000	1450960	4956960

3. The overhead expenses are meant for the host Institute towards the cost for providing infrastructural facilities and benefits to the staff employed in the project etc.

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4. Sanction of the President is accorded for the payment of ₹. 1,75,50,000/- (Rupees One Crore Seventy Five Lakh Fifty Thousand only) i.e. ₹. 79,50,000/- (Rupees Seventy Nine Lakh Fifty Thousand only) to Director, NIIST-Thiruvananthapuram, ₹. 54,00,000/- (Rupees Fifty Four Lakh only) to Director, CSIR-CMERI-Durgapur, ₹. 27,00,000/- (Rupees Twenty Seven Lakh only) to Director, VNIT-Nagpur and ₹. 15,00,000/- to Registrar, Jadavpur University-Kolkata under the Creation of Capital Assets Head and ₹. 1,77,63,200/- (Rupees One Crore Seventy Seven Lakh Sixty Three Thousand Two Hundred only) i.e. ₹. 66,18,400/- (Rupees Sixty Six Lakh Eighteen Thousand Four Hundred only) to Director, NIIST-Thiruvananthapuram, ₹. 56,78,400/- (Rupees Fifty Six Lakh Seventy Eight Thousand Four Hundred only) to Director, CSIR-CMERI-Durgapur, ₹. 36,88,400/- (Rupees Thirty Six Lakh Eighty Eight Thousand Four Hundred only) to Director, VNIT- Nagpur and ₹. 17,78,000/- (Rupees Seventeen Lakh Seventy Eight Thousand only) to Registrar, Jadavpur University-Kolkata under the Grant-in-Aid General head (Recurring) being the first installment of the grant for the year 2016-17 for implementation of the said research project.

5. The sanction of the grant is subjected to the conditions mentioned in annexure-I.

6. The amount of ₹. 1,77,63,200/- (Rupees One Crore Seventy Seven Lakh Sixty Three Thousand Two Hundred only) will be transferred to the beneficiaries as per the details given under :-

Sl.No.	Organization	Recurring	Bank Name	A/C Number	IFSC Code	Branch
1.	NIIST-Trivandrum	6618400	State bank of Travancore	67047723825	SBTR0000030	Pappanamcode
2.	CMERI-Durgapur	5678400	State Bank of India	30280331299	SBIN0000074	Durgapur
3	VNIT-Nagpur	3688400	Canara Bank	3124201000001	CNRB0003124	VNIT
4	Jadavpur University	1778000	State Bank of India	11079699404	SBIN0000093	Jadavpur University
	Total	17763200				

7. The amount involved is debitible to:

Demand No.77	Department of Science & Technology
3425	OTHER SCIENTIFIC RESEARCH (MAJOR HEAD)
60	OTHERS (SUB - MAJOR HEAD)
60.200	ASSISTANCE TO OTHER SCIENTIFIC BODIES (MINOR HEAD)
26	TECHNOLOGY DEVELOPMENT PROGRAMME
26.01	TECHNOLOGY DEVELOPMENT & TRANSFER
26.01.31	GRANTS-IN-AID GENERAL (PLAN) 2016-2017

8. The sanction has been issued under the powers delegated to the Ministries and with the concurrence of the Integrated Finance Division of Department of Science & Technology vide concurrence No. C/2658/IFD/2016-17 dated 17.08.2016 and with the approval of Head (TDT) vide his diary No. P-5241 dated 29.07.2016.

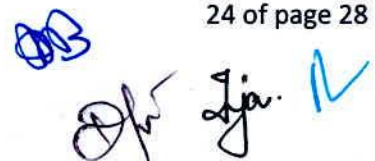
9. It is also certified that this is the **first sanction** for the project and as such the clause related to the submission of the Utilization Certificate to PAO is not applicable.

10. The institute will furnish to the DST, utilization certificate and audited statement of accounts pertaining to the grant immediately after the end of each financial year.

11. All purchases of equipment's etc. would be as per GFR and the disposal of the same would be done with prior approval of DST.

**12. The financial support provided by DST should be duly acknowledged at all the forums and publications and proceedings whenever this work is presented. The Principal Investigator is also requested to place a sticker on the equipment purchased through the grants provided for the project by DST having the name of DST Scheme, Title of the Project, Sanction Number and Date, Date of equipment purchased/commissioned, Cost of the equipment and information on AMC, if any.**

Cont'd.5/-



No. DST/TSG/AMT/2015/332(Capital)  
Government of India  
Ministry of Science & Technology  
Department of Science & Technology

Technology Bhavan  
New Mehrauli Road  
New Delhi- 110 016  
Dated: 17.08.2016

**ORDER**

Subject: Financial assistance for the project entitled "SMART Foundry 2020 (SMART=Sustainable Metalcasting using Advanced Research and Technology)." submitted by Dr. S. Savithri, Sr. Principal Scientist, National Institute for Interdisciplinary Science & Technology (NIIST), Pappanamcode Industrial Estate, Thiruvananthapuram- 695 019, Kerala, Dr. Nagahanumaiah, Sr. Principal Scientist & Head, Micro Systems Technology Laboratory, CSIR-Central Mechanical Engineering Research Institute (CMERI), M.G. Avenue, Durgapur- 713 209, West Bengal, Dr. A.M. Kuthe, Professor and Head, Mechanical Engineering Department, Visvesvaraya National Institute of Technology (VNIT), Nagpur- 440 010, Maharashtra and Dr. Goutam Sutradhar, Professor, Mechanical Engineering Department, Jadavpur University, Kolkata-700 032, West Bengal..

With reference to the Sanction Order No. DST/TSG/AMT/2015/332(General) dated 17.08.2016, sanction of the President is accorded for the approval of ₹. 3,15,00,000/- (Rupees Three Crore Fifteen Lakh only) i.e. ₹. 1,25,00,000/- (Rupees One Crore Twenty Five Lakh only) as the share for NIIST-Thiruvananthapuram, ₹. 1,14,00,000/- (Rupees One Crore Fourteen Lakh only) as the share of CSIR-CMERI, ₹. 46,00,000/- (Rupees Forty Six Lakh only) as the share of VNIT-Nagpur and ₹. 30,00,000/- (Rupees Thirty Lakh only) as the share of Jadavpur University-Kolkata towards the purchase of equipment's under the creation of Capital Assets.

2. Sanction of the President is also accorded for the release of ₹. 1,75,50,000/- (Rupees One Crore Seventy Five Lakh Fifty Thousand only) i.e. ₹. 79,50,000/- (Rupees Seventy Nine Lakh Fifty Thousand only) to Director, NIIST-Thiruvananthapuram, ₹. 54,00,000/- (Rupees Fifty Four Lakh only) to Director, CSIR-CMERI-Durgapur, ₹. 27,00,000/- (Rupees Twenty Seven Lakh only) to Director, VNIT- Nagpur and ₹. 15,00,000/- to Registrar, Jadavpur University-Kolkata as per the details given under :-

**Non-recurring (Capital Items)**

	HEAD	1 <sup>st</sup> year NIIST	1 <sup>st</sup> year CMERI	1 <sup>st</sup> year VNIT	1 <sup>st</sup> Year JUK	Total
1.	<b>EQUIPMENTS</b> : High end CPU Cluster Computer, Other casting simulation software for bench marking, Alloy property databases, 25 KVA UPS with 2 hour backup, High end server for cloud based data management & analytics, Server with monitor, 5KVA UPS & Plotter, Software for layout and work flow modelling, Software like Minitab for DOE & Solid works, High end workstations, High end desktops, Table top induction melting furnace capable of melting 2kg Aluminium, Ultrasonic stirring system, 16 Channel thermocouple unit, Data acquisition system, Casting cleaning and fettling unit, Resistance heating furnace and pouring equipment, Micro hardness tester, Inverted	₹. 79,50,000/-	₹. 54,00,000/-	₹. 27,00,000/-	₹. 15,00,000/-	₹. 1,75,50,000/-
		2 <sup>nd</sup> year NIIST	2 <sup>nd</sup> year CMERI	2 <sup>nd</sup> year VNIT	2 <sup>nd</sup> year JUK	Total
		₹. 45,50,000/-	₹. 30,00,000/-	₹. 12,00,000/-	₹. 10,00,000/-	₹. 97,50,000/-
		3 <sup>rd</sup> year NIIST	3 <sup>rd</sup> year CMERI	3 <sup>rd</sup> year VNIT	3 <sup>rd</sup> year JUK	Total
	0	₹. 30,00,000/-	₹. 7,00,000/-	₹. 5,00,000/-	₹. 42,00,000/-	

*Aliment*

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*D/v J. N.*

microscope with image analysis software, Ultrasonic flaw detection, Permeability tester (digital) & inverted metallurgical microscope, Controller along with Pneumatic actuators, sensors etc., CAD Software, Hydraulic cylinder of 1 ton capacity along with power pack and accessories, Digital Oscilloscope, Precision motion stages & other automation units, Workstations, Particle reinforcement heating and feeding system, XRF analyser/spectrometer, Vacuum attachment unit with accessories, 3D printing machine accessories, Laser Machine for Micro Machining, Minor equipment like android devices, software, laptops, digital webcam, LED TV etc., and Minor equipment's and accessories costing ₹. 1.00 lakh					
<b>TOTAL</b>	₹. 1,25,00,000/-	₹. 1,14,00,000/-	₹. 46,00,000/-	₹. 30,00,000/-	₹. 3,15,00,000/-

2. The amount of ₹. 1,75,50,000/- (Rupees One Crore Seventy Five Lakh Fifty Thousand only) will be transferred to the beneficiaries as per the details given under :-

Sl. No.	Organization	Non-recurring	Bank Name	A/C Number	IFSC Code	Branch
1.	NIIST-Trivandrum	7950000	State bank of Travancore	67047723825	SBTR0000030	Pappanamcode
2.	CMERI-Durgapur	5400000	State Bank of India	30280331299	SBIN0000074	Durgapur
3	VNIT-Nagpur	2700000	Canara Bank	3124201000001	CNRB0003124	VNIT
4	Jadavpur University	1500000	State Bank of India	11079699404	SBIN0000093	Jadavpur University
	Total	17550000				

3. The amount involved is debit to:

Demand No 77	Department of Science & Technology
3425	OTHER SCIENTIFIC RESEARCH (MAJOR HEAD)
60	OTHERS (SUB - MAJOR HEAD)
60.200	ASSISTANCE TO OTHER SCIENTIFIC BODIES (MINOR HEAD)
26.01	TECHNOLOGY DEVELOPMENT & TRANSFER
26.01.35	GRANTS FOR CREATION OF CAPITAL ASSETS (PLAN) 2016-2017 (TSG)

4. The sanction has been issued under the powers delegated to the Ministries and with the concurrence of the Integrated Finance Division of Department of Science & Technology vide concurrence No. C/2659/IFD/2016-17 dated 17.08.2016 and with the approval of Head (TDT) vide his diary No. P-5241 dated 29.07.2016

5. It is also certified that this is the **first sanction** for the project and as such the clause related to the submission of the Utilization Certificate to PAO is not applicable.

6. The institute will furnish to the DST, utilization certificate and audited statement of accounts pertaining to the grant immediately after the end of each financial year.  
All purchases of equipments etc. would be as per GFR and the disposal of the same would be done with prior approval of DST.

OB

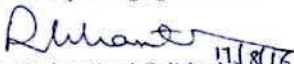
Dr. J. J.

13. "The Institute/Agency will maintain separate audited accounts for the project and would keep the whole of the grant in a Bank Account earning interest, the interest earned should be reported to the DST. The interest thus earned will be treated as a credit to the Institute/Agency to be adjusted towards further installment of the grant".

14. As PER Rule 211 GFRs, the account of the project shall be open to inspection by the sanctioning authority/audit whenever the institution is called upon to do so

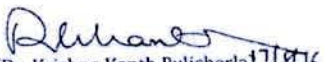
15. As per GFR-39, the sanction has been entered in the grants register maintained by the Technology Development & Transfer (TDT) Division and the serial number assigned in the register for the sanction is 14.

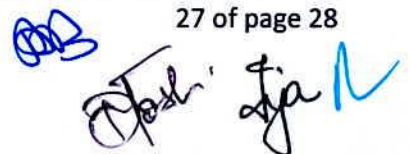
16. It is certified that all the Utilization Certificate in regard of all schemes/programmes/projects, present and previous pertaining to the institute have been received and no UC is pending against the organization as per the details in the PFMS also.

  
(Dr. Krishna Kanth Pulicherla) 17/8/16  
Scientist C

The Pay & Accounts Officer  
Department of Science & Technology  
New Delhi -110 016.

1. Cash Section (3 copies) for preparing the bill and remitting the amount to the above grantee.
2. Accounts Section, DST, New Delhi.
3. IFD, DST, New Delhi.
4. Director of audit (CW&M-II) AGCR Building, IP Estate, New Delhi.
5. Director, National Institute for Interdisciplinary Science & Technology (NIIST), Pappanamcode Industrial Estate, Thiruvananthapuram- 695 019, Kerala.
6. Director, CSIR-Central Mechanical Engineering Research Institute (CMERI), M.G. Avenue, Durgapur- 713 209, West Bengal.
7. Director, Visvesvaraya National Institute of Technology (VNIT), Nagpur- 440 010, Maharashtra.
8. Registrar, Jadavpur University, Kolkata-700 032, West Bengal.
9. Dr. S. Savithri, Sr. Principal Scientist, National Institute for Interdisciplinary Science & Technology (NIIST), Pappanamcode Industrial Estate, Thiruvananthapuram- 695 019, Kerala.
10. Dr. Nagahanumaiah, Sr. Principal Scientist & Head, Micro Systems Technology Laboratory, CSIR-Central Mechanical Engineering Research Institute (CMERI), M.G. Avenue, Durgapur- 713 209, West Bengal.
11. Dr. A.M. Kuthe, Professor and Head, Mechanical Engineering Department, Visvesvaraya National Institute of Technology (VNIT), Nagpur- 440 010, Maharashtra.
12. Dr. Goutam Sutradhar, Professor, Mechanical Engineering Department, Jadavpur University, Kolkata-700 032, West Bengal.
13. Mr. Aakash, Director, M/s Aha 3D Innovations Private Ltd., 166, Janakpur II, Jaipur-302 015, Rajasthan.
14. Mr. Baba Prasad Lanka, Managing Director, M/s 3D Foundry Tech, 507-C, Ecstasy Business Parkm Citi of Joy, J S D Road, Mulund (W), Mumbai-400 080, Maharashtra.
15. Mr. Aditya Kumar, Director, M/s Marco Polo Products P Ltd., Plot No. 75, Udayan Industrial Estate, 3 Pagladanga Road, Kolkata- 700 015, West Bengal.
16. Mr. Dipankar, Founder & Chief Scientist, M/s TREE Labs Foundation, 627, 6th Floor, Master Mind IV, Royal Palms Estate, Aarey Milk Colony, Goregaon (E), Mumbai-400 065, Maharashtra.
17. Mr. Manoj Meena, Director, Ms/ Atomberg Technologies Pvt Ltd, EL-111, Electronic zone, TTC MIDC Industrial Area, Navi Mumbai- 400 710, Maharashtra.
18. Sanction folder (Mr. C. Madhusudhanan, JTA, DST).
19. FICCI Cell, DST.

  
(Dr. Krishna Kanth Pulicherla) 17/8/16  
Scientist-C



**Annexure III - SMART FOUNDRY 2020 ( Sanction letter DST/TSG/AMT/2015/332 dated 17-08-2016)**

**Responsibility and Budget Mapping Among Networking Partner Institutes**

Sl.	Networking Institute	PI	Co-PI	Deliverables	Budget in Rs. Lakh							
					Manpower	Consumables	Contingency	Other Cost	Travel	Equipment	Overhead	Total
1	CSIR-NIIST, Trivandrum	Dr. S. Savithri	Dr. Elizabeth J	CFD Based Multi-Physics Solver for Casting Process	27	1.5	0.75	3	0.75	36	2.5	<b>71.3</b>
		Dr. Elizabeth J	Dr.S.Savithri	Cloud Based Data Product and Process Data Storage, Analysis and Visualization	22	1.5	0.75	4	0.75	25	2.5	<b>57</b>
2	CSIR-CMERI, Durgapur	Dr.Nagahanumaiah	Dr.Sudip Kr. Samanta, Dr. A.K. Loahar	(1) Design and development of Automatic molding machine (2) Selection of sensors, integration to V-2 System	38	16	1.5	42	1.5	56	7	<b>162</b>
3	VNIT, Nagpur	Prof. A. M. Kuthe	Dr. K.M. Asthankar Dr. V.D. Ghuge	Design and development of Vacuum Melting and Pouring Unit	27	3	1.5	13	1.5	30	8.5	<b>84.3</b>
4	Jadavpur Univ. Kolkata	Prof. G. Sutradhar	Dr.ArunavaChanda	MMC Preparation and Casting Unit	24	10	1.5	5	1.5	30	7.23	<b>79.6</b>
5	IIT Bombay	Prof.Atul Sharma	Prof.Shyamprasad K.	Level Set Based Modelling and Simulation of Casting	11	3	0	3	0	20	3.5	<b>40.7</b>
		Prof.Shyamprasad K.	Prof.Atul Sharma	Process Optimization and Modeling of MMC	22	1.5	0	5.5	0	15	3	<b>47.5</b>
6	COEP, Pune	Dr.AratiMulay	Mr. Sandeep Ansane, Dr.BhagwanSonawane	Design and Development of 3D Plastic Pattern Printing Machine	22	3		5.5	0	18	3.5	<b>52.5</b>
7	DKTE, Kolhapur	Prof.VasudevShinde	Prof.P.N.Gore	(1) Development of Sand reclaimer (2) Melting & Pouring Unit and Quality Testing	22	6	0	11	0	40	4.5	<b>84</b>
8	SGGS, Nanded	Prof. JVL Venkatesh	Dr. B.M. Dabade	(1) Product & Process Data Schema, (2) Layout and Workflow Modelling	11	10.5	0	6	0	16	6.5	<b>50.2</b>
9	CUST, Anand	Prof.Mayur K. Sutaria	Mr. Vijay Chaudhary	(1) Methods Design (2) Design and Development of Ultrasonic Stirrer	22	1.5	0	2	0	19	2	<b>60.5</b>
10	MEFGI,Rajkot	Prof. Amit Sata	Dr. B Jadeja	Process Monitoring & Data Analytics	22	1.5	0	0.8	0	10	1.5	<b>36.2</b>
				<b>Total</b>	<b>273</b>	<b>72.5</b>	<b>6</b>	<b>100</b>	<b>6</b>	<b>315</b>	<b>52.2</b>	<b>825</b>

*Savithri*

(Dr.S. Savithri)

*Nagahanumaiah*

(Dr.Nagahanumaiah)

*A.M. Kuthe*

(Dr. A.M. Kuthe)

*G. Sutradhar*

(Dr. G. Sutradhar)

*Arati Mulay*

(Dr.Arati V. Mulay)

*Elizabeth Jacob*

(Dr. Elizabeth Jacob)

*J.V.L. Venkatesh*

(Dr. J.V.L. Venkatesh)

*Atul Sharma*

(Dr.Atul Sharma)

*Amit Sata*

(Dr. Amit Sata)

*Mayur Sutaria*

(Dr.MayurSutaria)

*Shyam Karagadde*

(Dr.ShyamKaragadde)

*Vasudev Shinde*

(Dr.VasudevShinde)

*[Handwritten signatures]*



Since 1979

# The Centre for Entrepreneurship Development

(A Government of Gujarat Organization)

ઉદ્યોગસાહસિકતા વિકાસ સંસ્થાન

(ગુજરાત સરકાર દ્વારા સંચાલિત)

**Dr. R. N. Prasad**  
M. Tech, MBA, Ph.D  
**Director**

CED/5SLIC/SCH2/Jyoti/MKP/NC/332

19<sup>th</sup> June, 2017

22/4

To,  
Mr. Parakramsinh Jadeja,  
Chairman and Managing Director,  
Jyoti CNC Automation Limited,  
G-506, Lodhika GIDC,  
Village : Metoda,  
Rajkot - 360 021

**Subject: Assistance for Setting up Skill Development Center**

**Reference:**

1. Government G.R No.CED-112015-54553-I dated 01.04.2015
2. Your Application dated 17.03.2017.
3. Minutes of the 5<sup>th</sup> State Level Implementation Committee Meeting dated 11<sup>th</sup> April, 2017.

Dear Sir,

Kindly refer to your proposal for Government Assistance *for setting up Short-term Bridge Courses* under the Scheme for Enhancement of Technical Competence and Manpower, Gujarat Industrial Policy, 2015.

The State Level Implementation Committee (SLIC) constituted for the Scheme for Enhancement of Technical Competence and Manpower by Government under the Gujarat Industrial Policy 2015, Government of Gujarat vides GR no. CED-112015-24553-I, dated 01.04.2015, in its 5<sup>th</sup> meeting held on dated 11<sup>th</sup> April, 2017 approved your proposal for Government support of maximum **Rs. 100.00 lacs (Rupees One hundred lacs only) subject to expert view of Gujarat Technological University** under the scheme no. 2 "*Short-term Bridge Courses by Industries/Institute*" in the area of **Foundry Sector** at **Marwadi University, Rajkot Morbi Highway, Gauridad, Rajkot 360003** (Host Institute) to generate skilled and trained manpower.

1. **JYOTI CNC AUTOMATION LIMITED (Applicant)** has to follow the guidelines given in the G.R. no. CED-112015-24553-I, dated 1<sup>st</sup> April, 2015 and its amendments/modification, if any, time to time. Applicant has also to follow the directives given by State Level Implementation Committee, time to time.

**"EMPOWERING INDUSTRY THROUGH SKILL AND ENTREPRENEURSHIP DEVELOPMENT....."**

**H. O. :** Block No.1, 9th Floor, Udyog Bhavan, Sector-11, Gandhinagar-382017

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**Campus :** Plot No. 87&88, Naroda GIDC, Nr. Samrat Namkeen, Reliance Road, Naroda, Ahmedabad-382330

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Regional Offices: **Ahmedabad:** [ahd-ced@gujarat.gov.in](mailto:ahd-ced@gujarat.gov.in) **Vadodara:** [brd-ced@gujarat.gov.in](mailto:brd-ced@gujarat.gov.in) **Surat:** [srt-ced@gujarat.gov.in](mailto:srt-ced@gujarat.gov.in)

**Rajkot:** [rjt-ced@gujarat.gov.in](mailto:rjt-ced@gujarat.gov.in) **Bhavnagar:** [bhv-ced@gujarat.gov.in](mailto:bhv-ced@gujarat.gov.in)

2. The estimated cost of project and means of finance will be as under:

Amount Rupees in Lacs

Sr. No.	Details of Cost (Annexure-1)	Proposed Amount	Eligible Amount
1	Cost of New Machinery & Equipment	130.88097	130.88097
2	Cost of Tools	0.50000	0.50000
3	Cost of Furniture and Fixture	3.00000	3.00000
4	Cost of Electrification	2.95340	2.95340
	<b>Total</b>	<b>137.33437</b>	<b>137.33437</b>

**Means of Finance:**

- Applicant Contribution: Rs. 137.33 lacs x 25% = Rs. 34.34 lacs but applicant contribution is **Rs. 37.33 lacs**
- Government Support: Rs. 137.333 lacs x 75%= \*Rs. 103.00 Lacs but maximum Government support is **Rs. 100.00 lacs**  
*\*Maximum support under the Scheme-2 is limited up to Rs. 100.00 lacs*

3. Courses/Skill initiative as proposed/indicated at Annexure-2 (Prescribed by NSDC/MES-NCVT/GCVT/SSC or Other authorized body only).
4. The release of Government support shall be on pro rata basis and subject to submission of Chartered Accountant Certificate.
5. **The Terms and Condition for the said assistance will be as per the G.R. & as specified below:**

**5.1 Role of Industry Partner**

- I. A separate bank account is to be opened for the training purpose/center in name of Skill training Center.
- II. To Contribute minimum 25% of the cost of machinery & equipment including classroom furniture & fixture and cost of refurbishing of building.
- III. Industry Partner shall have to sponsor minimum of 25% intake capacity of course and provide employment at least 75% of sponsored trainees.
- IV. Industry Partner shall have to train the faculty of the Host Institution for capacity building.
- V. Industry Partner shall have to facilitate for in plant practical training to the trainees.
- VI. Industry partner shall have to carry out 3<sup>rd</sup> Party Skill Assessment on completion of the course through empaneled body/Experts under NSDC/NCVT/GCVT/SSC and others National & International body as approved by SLIC.



## **5.2 Role of Host Institute:**

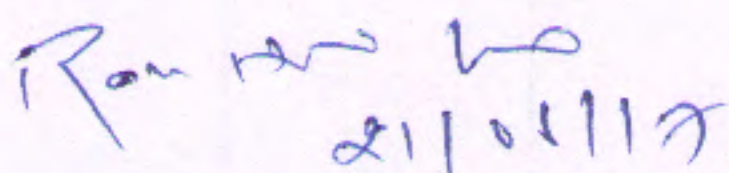
- I. The role of Host Institute is to provide all appropriate infrastructure and environment to run training activity.
- II. The Host Institute has to provide dedicated staff/faculty for running skill development activities.

## **Other Terms and Conditions**

- I. The attendance record should be maintained through an electronic/biometric attendance system/MIS as prescribed by CED, time to time.
- II. Applicant cannot take benefit for Training activities from any other Government/Government bodies for the same purpose.
- III. The assistance granted should only be used for the purpose for which it has been sanctioned.
- IV. Applicant has to submit progress reports in details as per the schedule prescribed by CED, time to time.
- V. Minimum placement/self-employment criteria should be of 75% of total trainees trained/skill assessed. A placement criterion is excluded in case of up skilling for existing employees. Up skilling candidates are allowed maximum up to 30% of total trainees trained.
- VI. Applicant must provide copy of appointment letter as a proof of placement of trainees trained. In case of self-employment candidates should submit required proof of document like registration certificate for EM part-1/Udyog Aadhaar/Shop & Establishment /Proprietorship/Partnership etc. Further in case of up skilling of existing employees a proof of employment record is to be provided.  
**Placement criteria are defined by CED and are attached herewith.**
- VII. Applicant is also eligible for Scheme no. 7 "Assistance for Tuitions fees for Enhancement of Skill" subject to fulfilling above G.R. criteria and availability of necessary infrastructure. For this purpose, prior intimation form CED/Industries Commissionerate is required.
- VIII. Project completion certificate, once implemented, should be submitted within one month of time, duly endorsed by Chartered Accountant.
- IX. Failure in implementation this project by next 6 months, without any justification, will be treated as invalid.

For The Centre for Entrepreneurship Development

Accepted by

  
Director

Authorized Signatory  
(With Seal)





Proposed Project CostCost of New Equipment & Machineries:

Sr. No.	Name	Specification	Supplier / Brand	Quantity	Cost per item	Total Cost in Rs.
1	3D Printer	ProtoCentre 999 Dual Extruder 3D printer Build volume ( XYZ ) 230 X 230 X 230 mm cube Printing material: ABS PLA HIPS Nylon PC	Aha 3d	1	199675	199675
2	3d Scanner with turn table	David (HP) SLS3 with turn table scan accuracy: up to 0.05mm Scan resolution: up to 0.05mm scan size 60 to 500mm	Think 3D	1	587000	587000
3	Data tracker	USB memory for easy data & program transfer. Dual Channel Isolation Technology. 2x Serial 'Smart Sensor' ports User Definable allocation of memory size & mode. Web Interface. FTP for automatic data transfer .Modbus for sensors and SCADA connection. SDI-12 (multiple networks). Up to 48 Analog ( $\pm 30V$ ) sensor inputs .Expandable to 800 analog inputs .12 Flexible Digital channels	Aimil ltd instrumentatin and technologies.	1	293500	293500
4	VMC	MODEL: MTE 4040H	Maheer technologies	1	840000	840000



Sr. No.	Name	Specification	Supplier / Brand	Quantity	Cost per item	Total Cost in Rs.
		POWER 5.5 KW (WATER COOLED) MAXIMUM SPEED 24000 RPM X AXIS:400 MM Y AXIS:400 MM Z AXIS:300 MM				
5	Auto Cast	<ul style="list-style-type: none"> <li>• 3D modeling of primitive parts</li> <li>import of complex parts (.STL file)</li> <li>• MODULES: PART MOLD FEED GATE FLOW+ REPORT</li> <li>• DATABASES: All major metal families processes molds sleeves</li> </ul>	3D Foundry Tech Pvt. Ltd.	1	1590000	1590000
6	Sieve analysis	<p>USE: To find out AFS (Fineness No. – Average Grain Size) of sand</p> <p>SPECS: Vibrator with Motor - 1/8 Hp Single Phase Sieve Set as per ISS No 53 75 106 150 212 300 425 600 850 1700 Micron. Dia. 200 mm with LID &amp; PAN OR (Sieves As Per Requirement) Timer 0-15 Min.</p>	MADRAS METALLURGICAL SERVICES PVT LTD	1	41400	41400
7	PERMEABILITY TESTER	<p>USE: To determine porosity in Raw sand Green No-bake sand.</p> <p>SPECS: With Air Tank Water Tank Manometer Unit Permeability Chart 2 Orifices And Syphon Unit</p>	MADRAS METALLURGICAL SERVICES PVT LTD	1	21275	21275



Sr. No.	Name	Specification	Supplier / Brand	Quantity	Cost per item	Total Cost in Rs.
8	ALLUMINIUM MOLDING BOX	20 x 20 x 4.5	Kelsons engineers and fabricators	1	20550	20550
9	Core sand Mixer	50KG capacity	Kelsons engineers and fabricators		90000	90000
10	MATCH PLATE with Pattern	20*20 size	Kelsons engineers and fabricators	1	15000	15000
11	MOULD HARDNESS TESTER (DIGITAL) ('B' SCALE)	USE: To determine surface hardness of Green Mould. SPECS: Digital Dial Indicator To Measure Hardness of Mould 0 - 100 No	MADRAS METALLURGICAL SERVICES PVT LTD	1	11500	11500
12	Induction Furnace	15 KW Advance Highly efficient designs IGBT based digital controlled power unit. Crusible:- 5 Kg Digital energy monitoring system	R A Induction	1	682500	682500
13	Bottom pouring Type stir casting machine with vacuum squeeze & rotary centrifugal casting attachments & accessories for MMC in Aluminum & Magnesium	Max. capacity of melting pot -0.8 to 2 kg of Aluminium or Magnesium Continuous operating temp. - 950 440v 3-phase variable stirrer speed 100 to 1500 rpm	Swan Equip.	1	1954575	1954575
14	UNIVERSAL TESTING MACHINE MODEL SE UTE-1000 KN	Test capacity:- 1000 KN	MADRAS METALLURGICAL SERVICES PVT LTD	1	1118950	1118950
15	ROCKWELL HARDNESS TESTER MODEL SE RASN - DIGITAL	Preliminary test force: 98.07 N Additional test force: 490.3 882.6 1373N (50 90 140 kgf)	MADRAS METALLURGICAL SERVICES PVT LTD	1	201250	201250



Sr. No.	Name	Specification	Supplier / Brand	Quantity	Cost per item	Total Cost in Rs.
16	Vicker hardness tester	Test Loads : 510203050 kg Magnification of optical projection : 70x Max.Test Height (mm) : 200 Scale least count (mm) : 0.001 Depth of throat (mm) : 133 Dimensions of Machine (mm) : L595 x W 290 x H 860 Weight (Approx) : 73 kg Power Supply : 220V AC 50 Hz 1 – phase	MADRAS METALLURGICAL SERVICES PVT LTD	1	207000	207000
17	Impact test [Izod]	Pendulum Effective Weight (Kg.) 21300 Striking Velocity of Pendulum (m/Sec):- 3.994	Gujarat Metco	1	504000	504000
18	Metallurgical Microscope	CO-AXIAL TRINOCULAR RESEARCH METALLURGICAL MICROSCOPE MODEL VISION PLUS 5000 TMM AS per the catalogue attached.	MADRAS METALLURGICAL SERVICES PVT LTD	1	258750	258750
19	Double Disc Polishing Machine	RPM : 2000 RPM Variable RPM Controller Model : G-1313	Gujarat Metco	1	37470	37470
20	Spectrometer	Spectral Range:7800 to 350cm <sup>-1</sup> Resolution: Better than 0.85 cm <sup>-1</sup> Wave number Precision : ±0.01CM <sup>-1</sup> Scanning Speed: 5-	LABTRONICS	1	1008000	1008000



Sr. No.	Name	Specification	Supplier / Brand	Quantity	Cost per item	Total Cost in Rs.
		step adjustable for different				
21	Hand held XRF Alloy Analyzer	4W X-ray tube <145 eV FWHM @ 5.95 keV Mn line Calibration sample 316 stainless steel Large area silicon drift detector	Lab India	1	1800000	1800000
22	UT [Ultrasonic testing]	Single ray pulse. Einstine-II	Gujarat Metco- ModSonic	1	175123	175123
23	MpT [Magnetic Particle testing]	440mm x 330mm x 125 mm pole spacing: 0 to 200nm duty cycle: 50% on 5 minute Test process: Dry or wet	Gujarat Metco	1	18400	18400
24	LPT [Liquid pentrant testing]	3 bottle [cleaner pentrant and devloper]	Gujarat Metco	1	900	900
25	Digital Vernier Calipar	0-150 mm	Marck Instruments	1	3360	3360
26	Digital Micrometer	0-25 mm	Marck Instruments	1	5670	5670
27	Digital Height gauge	0-300 mm	Marck Instruments	1	19110	19110
28	Plunger Type Dial gauge	0.01 mm	Marck Instruments	1	2415	2415
29	Digital Thermometer	Temp. measurement	Marck Instruments	1	1155	1155
30	Arduino Mega Processor	Mega 2560 R3 board + USB cable	Arduino	4	3150	12600
31	Air compressor for VMC [10 bar]	RPM: 1000, Presser in PSIG 17, Mounting: F Tank- 150 Ltr, Starter Type: DOL, 3 HP Motor	P. Prabhudas Engg. Pvt. Ltd.	1	68500	68500
32	3d Printing Filament		Raiyaraj enterprise	1	1200	1200
33	Square Wood [4'' 3'']		Local Market	20	300	6000
34	Moulding Box		Local Market	1	3000	3000
35	Green Sand		Western Minerals	200 Kg	100	2000



Sr. No.	Name	Specification	Supplier / Brand	Quantity	Cost per item	Total Cost in Rs.
		step adjustable for different				
21	Hand held XRF Alloy Analyzer	4W X-ray tube <145 eV FWHM @ 5.95 keV Mn line Calibration sample 316 stainless steel Large area silicon drift detector	Lab India	1	1800000	1800000
22	UT [Ultrasonic testing]	Single ray pulse. Einstine-II	Gujarat Metco- ModSonic	1	175123	175123
23	MpT [Magnetic Particle testing]	440mm x 330mm x 125 mm pole spacing: 0 to 200nm duty cycle: 50% on 5 minute Test process: Dry or wet	Gujarat Metco	1	18400	18400
24	LPT [Liquid pentrant testing]	3 bottle [cleaner pentrant and devloper]	Gujarat Metco	1	900	900
25	Digital Vernier Calipar	0-150 mm	Marck Instruments	1	3360	3360
26	Digital Micrometer	0-25 mm	Marck Instruments	1	5670	5670
27	Digital Height gauge	0-300 mm	Marck Instruments	1	19110	19110
28	Plunger Type Dial gauge	0.01 mm	Marck Instruments	1	2415	2415
29	Digital Thermometer	Temp. measurement	Marck Instruments	1	1155	1155
30	Arduino Mega Processor	Mega 2560 R3 board + USB cable	Arduino	4	3150	12600
31	Air compressor for VMC [10 bar]	RPM: 1000, Presser in PSIG 17, Mounting: F Tank- 150 Ltr, Starter Type: DOL, 3 HP Motor	P. Prabhudas Engg. Pvt. Ltd.	1	68500	68500
32	3d Printing Filament		Raiyaraj enterprise	1	1200	1200
33	Square Wood [4'' 3'']		Local Market	20	300	6000
34	Moulding Box		Local Market	1	3000	3000
35	Green Sand		Western Minerals	200 Kg	100	2000



Sr. No.	Name	Specification	Supplier / Brand	Quantity	Cost per item	Total Cost in Rs.
36	Dry Sand		Western Minerals	50 Kg	100	1000
37	Dry silica sand [Resin coated]		Western Minerals	50 Kg	50	2500
38	Core-set oil		Western Minerals	10 Lr.	200	2000
39	3-part binder Garset-A [40 Kg] Garset-B [4 Kg] Garset-C[400 gm]		Shah brothers rajkot	45 Kg	150	6750
40	Sensor	For Data Acquisition system [Temperature humidity RPM]	Local supplier		50000	50000
41	Lm-6 Ingot		Local Market	10 Kg	250	2500
42	Miscellaneous	Foundry safety VMC tool Rammer other foundry material like plunger chaplet etc.	Local Market		50000	50000
43	Desktop PC	Lenovo (C 40-30) All in One Desktop (Core i5 3rd Generation/1 TB/4 GB/21.5 inch screen/Windows 8.1)	Lenovo	20	46261	925220
44	Laptop	Lenovo- 500 14 Intel Core i5 Processor (6th Gen) 4 GB DDR3 RAM 64 bit Windows 10 Operating System 1 TB HDD 14 inch Touchscreen Display	Lenovo	2	57000	114000
45	Printer	Canon imageCLASS MF621Cn 3 in 1 Color Print-Copy & Scan 600 x 600dpi	Canon	1	43999	43999



**Cost of Furniture & Fixture :**

Sr. No.	Name	Description	Supplier / Brand	Quantity	Cost per item	Total Cost in Rs.
1	Classroom & Lab furniture	Customize Table Chair Partition work etc.	local	Labor cost with material	300000	300000
<b>Grand Total Cost</b>						<b>300000</b>

**Cost of Electrification :**

Sr. No.	Description	Quantity	Cost per item	Total Cost in Rs.
1	Computer lab and Foundry lab (Metal Casting) wiring (material with labor cost)	600 sq. ft.	170 per sq. ft.	102000
2	Earthing	1	8000	8000
3	Air conditioner for computer lab & Foundry Lab	6	30890	185340
<b>Grand Total Cost</b>				<b>295340</b>





**Proposed Course Details:**

Sr No	Name of Subject	Duration of course In Hrs.	Batches per year	No of Trainees per batch	Fees per trainee in Rs.	Certification	Min. Qualification/ Age
1	Rapid Casting: (Tooling; Methoding; Automation & Simulation)	126	4	20	15000	GTU/ Marwadi University	12 <sup>th</sup> & ITI /18
2	Rapid Tooling in Metal Casting	42	3	20	5000	GTU/ Marwadi University	12 <sup>th</sup> & ITI /18
3	Rapid Methoding in Casting	42	3	20	5000	GTU/ Marwadi University	12 <sup>th</sup> & ITI /18
4	Rapid Casting – Automation & Simulation	42	5	20	5000	GTU/ Marwadi University	12 <sup>th</sup> & ITI /18
5	Inspection & Quality Control in Metal Casting	42	5	20	5000	GTU/ Marwadi University	Diploma/18
6	*Need based customized courses as per industry requirement	42 to 126	7	20	5000 to 15000	Marwadi University	8 <sup>th</sup> pass, min 5 year exp./18

\*Course Curriculum will be prepare/modified as per the demand of industry.

