

SCOPE OF WORK FOR 3D IMPELLER ROUGH TURNING & VANE MILLING

**ANNEXURE-1**

Dt: 21/04/2022

CUSTOMER: IOCL BAROUNI RFCCU

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**DESCRIPTION: 3D IMPELLER ROUGH TURNING & VANE MILLING**

S.No	Impeller Name	Impeller Drawing	Impeller		Actual Impeller Scope of work	Mock Up Piece Drawing	Mock up piece		Mock up piece Scope of work
			Gross Weight	Scrap Weight			Gross Weight	Scrap Weight	
1	<b>IMPELLER DIA.700-N9- CCW</b>	<b>13321001075-01</b>	471	154	1. Rough Turning of the profile on the Disc of the N9 – CCW impeller: 13321001075-01  2. Vane milling of all the vanes on the N9 – CCW impeller: 13321001075-01.  3. Inspection of vane profile of 3 vanes, 120 degrees apart, on 3D CMM and submission of the inspection report to BHEL	<a href="#">33321000037-00</a>	553	148	1. Rough Turning of the profile on the mock up piece for N9 – CCW impeller: 33321000037-00.  2. Vane milling of 3 vanes on the mock up piece for N9 – CCW impeller: 33321000037-00.  3. Inspection of the vane profile on 3D CMM and approval from BHEL.
2	<b>IMPELLER DIA.700-N5- CCW</b>	<b>13321001074-01</b>	560	191	1. Rough Turning of the profile on the Disc of the N5 – CCW impeller: 13321001074-01  2. Vane milling of all the vanes on the N5 – CCW impeller: 13321001074-01.  3. Inspection of vane profile of 3 vanes, 120 degrees apart, on 3D CMM and submission of the inspection report to BHEL	<a href="#">33321000036-00</a>	553	153	1. Rough Turning of the profile on the mock up piece for N5 – CCW impeller: 33321000036-00.  2. Vane milling of 3 vanes on the mock up piece for N5 – CCW impeller: 33321000036-00.  3. Inspection of the vane profile on 3D CMM and approval from BHEL.

**Facilities required for Rough turning and Vane milling of 3D impellers:**

**1. CNC VTL required for profile machining on the disc of the impeller.**

- a. Table dia.:  $\phi$  800 mm (min.)
- b. Load carrying capacity: 2 tons (min.)

**2. 5 Axis CNC machining center: (Brief specification to be submitted)**

- a. Pallet size: 800 X 800 mm (min).
- b. Load carrying capacity: 2 tons (min).

**3. 3D CMM for inspection of the impeller vane after vane milling: (Brief specification to be submitted)**

- a. Diameter of the job that can be inspected: 800 mm (min).
- b. Height of the job that can be inspected: 190 mm (min).
- c. The weight of the finished job to be inspected: 350 kg (min).

**4. Facilities for machining the 85 X 5 mm slot before mounting on the 5 axis machine for vane milling.**

- 5. CAM software for CNC programming: (Details to be submitted).
- 6. Inspection software for 3D CMM: (Details to be submitted).

**CUTTING TOOLS:**

For roughing: Bull nose cutters or end mills

For finishing: Taper ball nose cutters, R10 & R8, Centering and Clamping fixtures.

CAD model	BHEL scope
CNC Programming	Vendor scope
All tooling & fixtures	
Inspection on 3D CMM	

1. Machine the test ring as shown of the actual impeller. The respective test ring of each impeller has to be preserved and has to be returned back to BHEL works along with that actual impeller after vane milling. The test ring will be used for future heat treatment

2. The test rings of any two impellers shall in no case be interchanged, even though, they are of the same drawing number.

3. The inspection on 3D CMM may be outsourced. Relevant documents of the tie up have to be submitted.

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