EDM (Electric discharge Machining) CUTTING AND MACHINING OF SPECIAL MATERIALS

Scope of work:

- The scope of work includes extraction of blanks (finished or semi-finished products) to the dimension required for machining of given materials as per the drawing using EDM or water jet cutting.
- The samples should be start and made exactly from the location as specified in the drawing.
- Semi-finished blanks to be machined to the given dimensions by means of conventional machining process (milling, turning, thread making, drilling, etc.)
- After machining, the components shall be deburred to remove burr, sharp corners etc.
- The finished specimens shall have no machining marks and the surface finish should strictly match with the drawing specification.

Raw material:

- Raw materials are generally high strength ferritic materials and non-magnetic Ni-rich austenitic materials with strong work hardening characteristics, and it requires proper facilities for cutting and machining like EDM, CNC milling/turning, surface grinding with proper tooling
- These may be in the form of plate, tube, pipes and components with various dimensions supplied in the conditions of as-cast, hardened, and as-welded condition.

Qualifying conditions:

- Vendor must have the EDM facility in his own premises.
- Vendors who are interested in participating must demonstrate their capability by machining at least two numbers of samples according to the drawing & tolerance given by WRI.
- The technical bids of the vendors will be considered only when they are accompanied by the two samples fabricated as per the given drawing. The quality of the machined samples will be the criteria for qualifying technically.
- The cost of machining of the two samples must be totally borne by the vendor including the collection of material from WRI and returning back. Input raw material and detail drawing of the samples can be collected from “In-charge machine shop WRI, BHEL, Trichy”

Inspection and payment details for the actual job:

- Materials will be issued in the lot basis for machining, a lot will be considered as minimum of 5% of the total order value.

- Vendor shall arrange transportation of raw material and finished components from and to WRI. All the expenses related to transportation of material will be borne by the vendor only.
- Vendor has to collect the material within two days of intimation by WRI.
- The total lot has to be completed within 10 days from the date of collection of materials. In case of vendor failing to meet the time schedule without intimation, WRI reserves the right to invoke LD clause for the losses incurred due to not meeting the target.
- Vendor shall transport machined components in suitable packing to avoid any damage or corrosion to finished product during transportation. All the expenses related to packing shall be borne by the vendor.
- The completed sample/ components in the each lot will be inspected for dimensional accuracy, surface finish, etc. at WRI.
- Payment will be made only for the dimensionally acceptable samples/components.
- For Nickel based super alloys, if the rejection level is more than 5% in the given lot, the amount proportionate to the weight of the material or Rs. 500, whichever is higher, shall be deducted per sample from the party's payment.
- Vendor shall maintain the records, preserve the scrap and return it to WRI along with finished goods, with proper identification.
- In case of any clarification required, vendor can visit WRI with prior intimation to the "In-charge machine shop WRI, Trichy".

General Terms and Conditions:

- The required sample drawings will be issued along with issue of raw materials.
- The quote shall be based as per below table. (For the ready reference of the vendors an examples of cost calculation given in the Annexure –I)
    - Cost per sq. mm of EDM wire movement per extraction of blanks.
    - A & C are required to be quoted by vendor based on that the total machining cost will be calculated and payment to be made accordingly.

B = A[(peripherals area of blank) + (wire traveling area to reach the sample location)]*

Total cost (D) = B + C

Thickness of input	Cost per mm^2 of wire movement in EDM, Rs.	Cost of total area of wire movement in mm^2 for extraction of blank, Rs.	Finish machining cost, Rs.	Total machining cost, Rs.
	A	**B**	**C**	**D**
5 & below				
5.1 to 10 mm				
10.1 to 15 mm				
15.1 to 20 mm				
Above 20 mm				

- The vendor should have well established fabrication facility having permanent staff of supervisors and operators.
- The vendor should have internal quality control division to ensure quality during in-process fabrication and after final machining.
- The vendor shall ensure identification of material and its traceability during multiple stages of material preparation as it is mandatory to maintain material identification number for every component till final product.
- The vendor's facilities list along with the equipment capacity should be presented in the Technical bid.

Annexure –I

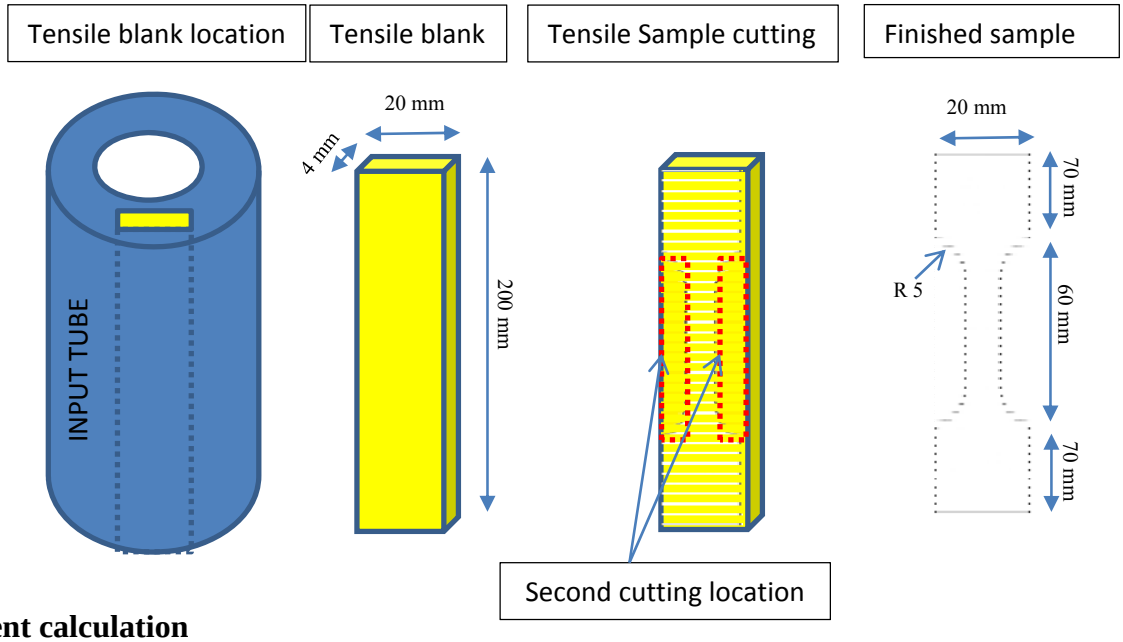
Example -1

Input material

Material – Inconel 617

Product form - Tube

Dimension – 35mm OD x 12 mm x 200 mm



Payment calculation

B = A[(peripherals area of blank) + (wire traveling area to reach the sample location)]*
Total cost (D) = B + C

Thickness of input	Cost per mm^2 of wire movement in EDM, Rs.
	A
10.1 to 15 mm	0.10
Less than 5mm	0.30

Blank extraction

Peripherals area of blank = (Perimeter X length) = [(20+4) X 2] X 200 = 9600 mm^2

Wire traveling area to reach the sample location = [4 X 200] = 800 mm^2

B_1 = 0.1 X (9600 + 800) =1400

D_1 = 1000 + 0 = 1400

Final sample extraction

Peripherals area of blank = 2 X [((3.14x50))+50 X 4] = 525.6 mm^2

B_2 = [0.3 X 525.6] = 157.6

D_2 = 157.6 + 0 = 157.6

Total cost of sample (D) = $D_1 + D_2$ = 1400 + 158 = 1558

Thickness of input	**Cost per mm^2 of wire movement in EDM,Rs.**	**Cost of total area of wire movement in mm^2 for extraction of blank, Rs.**	**Finish machining cost, Rs.**	**Total machining cost, Rs.**
	A	B	C	D
10.1 to 15 mm	0.10	1400	---	1400
Less than 5mm	0.30	157.6	--	158
Total				**1558**

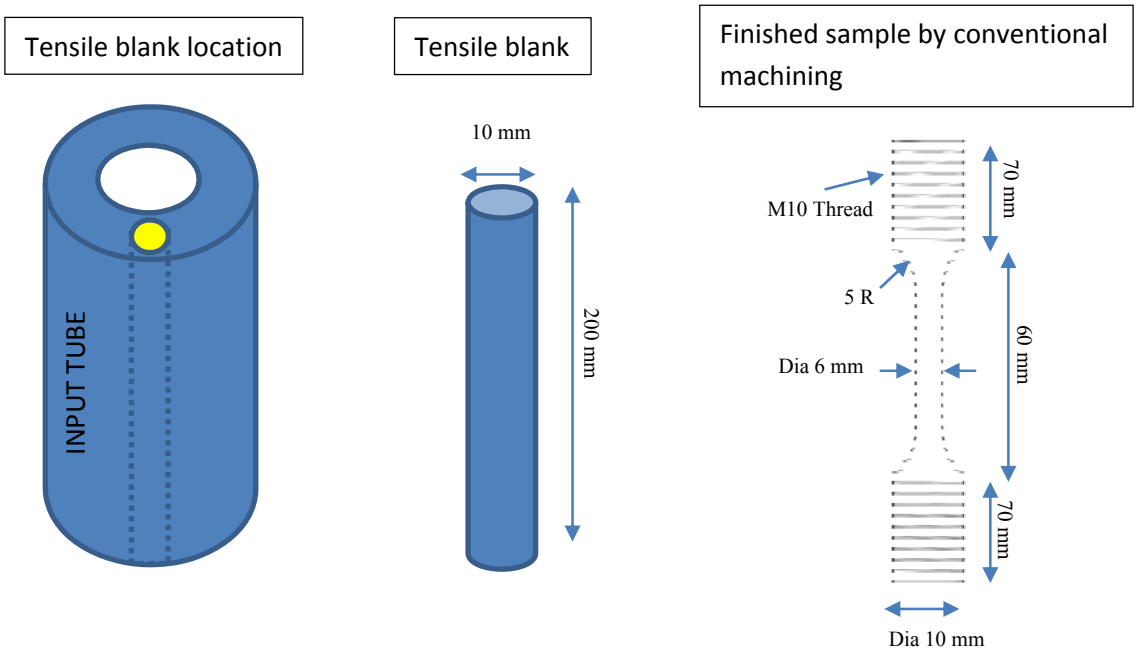
Example -2

Input material

Material – Inconel 617

Product form - Tube

Dimension – 35mm OD X 12 mm X 200 mm



Payment calculation

B = A ((peripherals area of blank) + length to reach the sample location)*
Total cost (D) = B + C
Assuming

Thickness of input	**Cost per mm^2 of wire movement in EDM, Rs.**	**Finish machining cost, Rs.**
	A	C
10.1 to 15 mm	0.10	50

Blank extraction

Peripherals area of blank = (perimeter X length) = π X 10 X 200 = 6280 mm^2

traveling area to reach the sample location = [2 X 200] = 400 mm^2

B = 0.1 X(6280 + 400) = 668

D = 668 + 50 = 718

Total cost of sample = D = 678

Thickness of input	**Cost per mm^2 of wire movement in EDM, Rs.**	**Cost of total area of wire movement in mm^2 for extraction of blank, Rs.**	**Finish machining cost, Rs.**	**Total machining cost, Rs.**
	A	B	C	D
10.1 to 15 mm	0.10	668	50	718
Total				**718**