

# **Agitator Design**

Version 1.6  
Excel Program

**PVtools**  
[pvtools.weebly.com](http://pvtools.weebly.com)

## Details

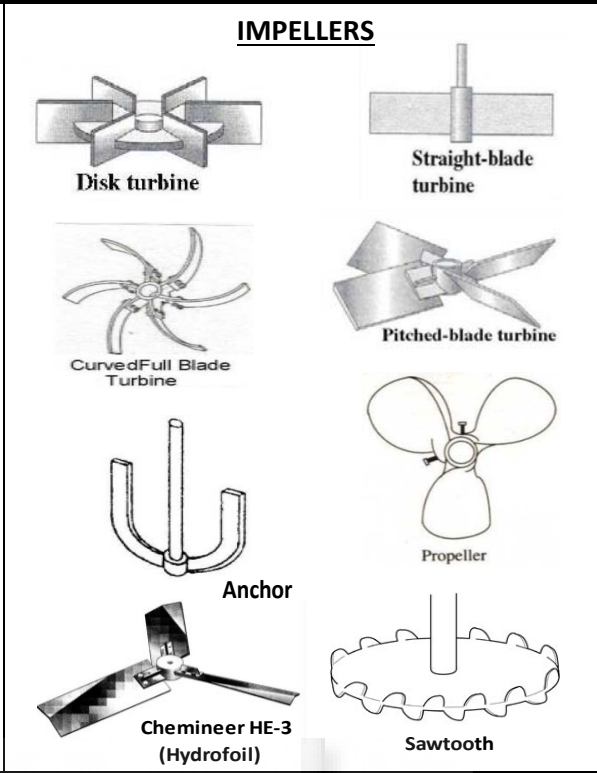
Version : 1.6 Date : 16 March, 2024  
 Release Date : 10 Mar., 2017  
 Software : Excel Size : 3MB  
 Design Type : Mechanical  
 Design Code : EEUA  
 Agitator Type : Top Entry

**Options available :**  
**Motor Position :** Vertical and Horizontal  
**Coupling :** Flexible, HRC, Rigid and Jaw  
**Shaft Seal :** Single & Double Mechanical and Stuffing Box  
**Vessel Type :** With and Without Baffle  
**Material :** SS304, SS304L, SS316, SS316L, C22, CS and Custom to add  
**Bottom Shaft Support :** With and Without

**Calculations available :**  
 Motor HP  
 Solid & Hollow Shaft Diameter  
 Critical Speed  
 Blade Thickness  
 Coupling Selection  
 Bearing Selection

**Output :** Agitator Drawing (N.T.S) in PDF File.  
 Purpose : Pre-Bid/Costing and making fabrication drawing  
 (Not to use for fabrication purpose)

**Note :** Np Graph and User Guide will be provided along with program file.



## Inputs

**Agitator Design**

|                             |       |                   |   |      |         |                |              |
|-----------------------------|-------|-------------------|---|------|---------|----------------|--------------|
| Vessel MOC                  | SS304 | Liquid Density    | p | 1498 | kg/m3   | Motor Position | Vertical     |
| Shell Inside Diameter       | 1830  | Liquid Viscosity  | μ | 12   | CP      | Shaft Seal     | Stuffing Box |
| Top Dish Height             | 388   | Required Rotation | N | 90   | N.s/m2  | Shaft Support  | Required     |
| Shell Height (TL to TL)     | 2700  |                   |   |      | 1.5 RPS |                |              |
| Bottom Dish Height          | 388   | Baffle            |   | No   |         |                |              |
| Bot. Dish to Impeller dist. | 400   |                   |   |      |         |                |              |
| Seal to Bearing Hosg. dist. | 75    |                   |   |      |         |                |              |

| POSITION | IMPELLER TYPE         | Sweep Dia. | Reynolds No. (Nre) | Power No. (Np) | Motor HP Req. | Distance Betwn. Imp. | BLADE |       | DIMENSIONS |        |    | CONNECTION WITH HUB |
|----------|-----------------------|------------|--------------------|----------------|---------------|----------------------|-------|-------|------------|--------|----|---------------------|
|          |                       |            |                    |                |               |                      | QTY   | THK   | h          | hv / l | d1 |                     |
| 3rd      | None                  | 610        | 69675.7            | -              | 0.00          | 1000                 | 6     | 8     | --         | --     | -- | BOLTED              |
| 2nd      | None                  | 610        | 69675.7            | -              | 0.00          | 1000                 | 8     | 8     | --         | --     | -- | BOLTED              |
| 1st      | Pitched blade turbine | 610        | 69675.73           | 1.05           | 0.60          | 1000                 | 4     | 8     | 122        | --     | -- | BOLTED              |
| Bottom   | Anchor                | 1780       | 593282.9           | 0.39           | 47.25         | 2                    | 8     | 213.6 | 1424       | --     | -- | BOLTED              |

|                       |             |                      |       |                           |
|-----------------------|-------------|----------------------|-------|---------------------------|
| Hollow Shaft Diameter |             | Power Loss           | 0.64  |                           |
| Shaft Size            | 200 NB      | Total                | 48.49 | Motor HP                  |
| do = 219.1            | di = 163.87 | Solid Shaft Diameter | 170   | Solid Shaft Diameter Req. |
|                       |             |                      |       | 163.10                    |

**Inputs**

- MOC of Vessel / Shaft
- Type of Impeller
- Motor HP (cal. available)
- Sweep Dia. of Impeller
- Shaft Dia. (cal. available)
- Vessel Dimension

**For Shaft Dia. Cal.**

- Vessel MOC
- Output RPM
- Motor HP
- Vessel Dimension
- Sweep Dia. of Impeller

**For Motor HP Cal.**

- Liquid Density
- Liquid Viscosity
- Output RPM
- Baffle/Unbaffle vessel
- Type of Impeller (Np)
- Vessel Diameter
- Sweep Dia. of Impeller

**Inputs shown in colored cells, Other cells are programed and can be edited as per requirement.**

# Sheets Screenshots

### Agitator Design

Vessel MOC: SS304  
 Shaft Inside Diameter: 100  
 Top Disk Height: 300  
 Shaft Height (to T): 200  
 Bottom Disk Height: 300  
 Seal to Bearing Hrg. Dist.: 75

Liquid Density  $\rho$ : 9800 kg/m<sup>3</sup>  
 Viscosity  $\mu$ : 0.012 dyne/cm<sup>2</sup>  
 Required Rotation  $N$ : 1.5 RPM  
 Shaft Support: ROTORSHIP  
 Motor Position: Vertical  
 Shaft Seal: Sealing Box  
 Shaft Support: Required

| POSITION | IMPELLER TYPE | Sweep | Reynolds | Power | Motor | Shaft | BLADE | QTY | TYP | TS  | TSZ | TSI | CONNECTION |
|----------|---------------|-------|----------|-------|-------|-------|-------|-----|-----|-----|-----|-----|------------|
| Top      | None          | 0     | 49575.7  | 0.00  | 0.00  | 2000  | 6     | 8   | --- | --- | --- | --- | BOULDED    |
| Mid      | None          | 0     | 49575.7  | 0.00  | 0.00  | 2000  | 6     | 8   | --- | --- | --- | --- | BOULDED    |
| Bottom   | Anchor        | 100   | 19225.71 | 1.00  | 0.80  | 2000  | 4     | 8   | 172 | --- | --- | --- | BOULDED    |

Motor HP: 0.84  
 Motor Size: 200 kW  
 Solid Shaft Diameter: 100  
 Solid Shaft Diameter Req: 100.33

VERSION 1.6. 2024  
 DESIGN CODE: ISIA  
 CREATED BY: PRADIP NAYAK FROM COMBIVIL INDIA

## INPUTS

**SHAFT SEAL**

**BEARING HOUSING**

**LANTERN STOOL**

**SHAFT**

| ITEM | DESCRIPTION                 | QTY | UNIT |
|------|-----------------------------|-----|------|
| 1    | MOTOR                       | 1   | PC   |
| 2    | GEAR BOX                    | 1   | PC   |
| 3    | COUPLING                    | 1   | PC   |
| 4    | SHAFT                       | 1   | PC   |
| 5    | IMPELLER                    | 1   | PC   |
| 6    | IMPELLER FOR INTERNAL CIRC. | 1   | PC   |
| 7    | FLANGE FOR INTERNAL CIRC.   | 1   | PC   |
| 8    | IMPELLER FOR INTERNAL CIRC. | 1   | PC   |
| 9    | FLANGE FOR INTERNAL CIRC.   | 1   | PC   |
| 10   | BOLT 1/2" X 1/2"            | 20  | PC   |
| 11   | LOCK WASHER                 | 20  | PC   |
| 12   | LOCK NUT                    | 20  | PC   |
| 13   | IMPELLER                    | 1   | PC   |
| 14   | IMPELLER FOR INTERNAL CIRC. | 1   | PC   |
| 15   | FLANGE FOR INTERNAL CIRC.   | 1   | PC   |
| 16   | IMPELLER FOR INTERNAL CIRC. | 1   | PC   |
| 17   | FLANGE FOR INTERNAL CIRC.   | 1   | PC   |
| 18   | IMPELLER FOR INTERNAL CIRC. | 1   | PC   |
| 19   | FLANGE FOR INTERNAL CIRC.   | 1   | PC   |
| 20   | IMPELLER FOR INTERNAL CIRC. | 1   | PC   |
| 21   | FLANGE FOR INTERNAL CIRC.   | 1   | PC   |

**GEARBOX & MOTOR**

**COMPANY NAME**

CLIENT: XYZ  
 TITLE: AGITATOR  
 DRAWING NO: 100  
 DATE: 10/10/2024  
 ENQUIRY NO: 100

| SL. NO. | ITEM                        | QTY | SIZE                        | THK  | MATERIAL     | WT IN KGS |
|---------|-----------------------------|-----|-----------------------------|------|--------------|-----------|
| 1       | MOTOR                       | 1   | 50 HP x 2000 RPM            | ---  | SS304        | 543       |
| 2       | GEAR BOX                    | 1   | 1/2" BATIO                  | ---  | SS304        | 204       |
| 3       | COUPLING                    | 1   | FLEXIBLE TYPE, VERICAL SIZE | ---  | SS304        | 19        |
| 4       | SHAFT                       | 1   | 170 Dia x 2000 lg           | ---  | SS304        | 543       |
| 5       | IMPELLER                    | 1   | 170 Dia x 100 lg            | ---  | SS304        | 204       |
| 6       | IMPELLER FOR INTERNAL CIRC. | 1   | 210 OD x 170 lg             | 22.5 | SS304        | 19        |
| 7       | FLANGE FOR INTERNAL CIRC.   | 1   | 240 OD x 200 lg             | 80   | SS304        | 39        |
| 8       | IMPELLER FOR INTERNAL CIRC. | 1   | 210 OD x 100 lg             | 22.5 | SS304        | 19        |
| 9       | FLANGE FOR INTERNAL CIRC.   | 1   | 240 OD x 200 lg             | 80   | SS304        | 39        |
| 10      | BOLT 1/2" X 1/2"            | 20  | 1/2" x 100 lg               | ---  | SS304        | 3         |
| 11      | LOCK WASHER                 | 20  | ---                         | ---  | ---          | ---       |
| 12      | LOCK NUT                    | 20  | ---                         | ---  | ---          | ---       |
| 13      | IMPELLER                    | 1   | 16 W                        | 0    | SS304        | ---       |
| 14      | IMPELLER FOR INTERNAL CIRC. | 1   | 125 lg                      | ---  | SS304        | 3         |
| 15      | FLANGE FOR INTERNAL CIRC.   | 1   | 210 Dia                     | 10   | SS304        | 19        |
| 16      | IMPELLER FOR INTERNAL CIRC. | 1   | 170 lg                      | ---  | SS304        | 6.8       |
| 17      | IMPELLER FOR INTERNAL CIRC. | 1   | 65 x 200                    | 4    | CARBON STEEL | 8.3       |
| 18      | IMPELLER FOR INTERNAL CIRC. | 1   | 70 x 170                    | 3    | CARBON STEEL | 3.8       |
| 19      | IMPELLER FOR INTERNAL CIRC. | 1   | 180 OD x 185 ID             | 20   | CARBON STEEL | 13.8      |
| 20      | IMPELLER FOR INTERNAL CIRC. | 1   | 110 OD x 215 ID             | 20   | CARBON STEEL | 8.4       |
| 21      | IMPELLER FOR INTERNAL CIRC. | 1   | 80 OD x 25 lg               | 18   | PTFE         | ---       |
| 22      | IMPELLER FOR INTERNAL CIRC. | 1   | 110 OD x 100 lg             | ---  | ---          | ---       |

**BOM**

**DRAWING**

**CALCULATION**

IMPELLER TYPE: ANCHOR  
 IMPELLER TYPE: NONE  
 IMPELLER TYPE: SCRAPE  
 IMPELLER TYPE: TURBINE  
 IMPELLER TYPE: DISC  
 IMPELLER TYPE: PADDLE  
 IMPELLER TYPE: OTHER

IMPELLER TYPE: ANCHOR  
 IMPELLER TYPE: NONE  
 IMPELLER TYPE: SCRAPE  
 IMPELLER TYPE: TURBINE  
 IMPELLER TYPE: DISC  
 IMPELLER TYPE: PADDLE  
 IMPELLER TYPE: OTHER

**DATABASE**

| ITEM | DESCRIPTION                 | QTY | UNIT | PRICE | TOTAL |
|------|-----------------------------|-----|------|-------|-------|
| 1    | MOTOR                       | 1   | PC   | 543   | 543   |
| 2    | GEAR BOX                    | 1   | PC   | 204   | 204   |
| 3    | COUPLING                    | 1   | PC   | 19    | 19    |
| 4    | SHAFT                       | 1   | PC   | 543   | 543   |
| 5    | IMPELLER                    | 1   | PC   | 204   | 204   |
| 6    | IMPELLER FOR INTERNAL CIRC. | 1   | PC   | 19    | 19    |
| 7    | FLANGE FOR INTERNAL CIRC.   | 1   | PC   | 39    | 39    |
| 8    | IMPELLER FOR INTERNAL CIRC. | 1   | PC   | 19    | 19    |
| 9    | FLANGE FOR INTERNAL CIRC.   | 1   | PC   | 39    | 39    |
| 10   | BOLT 1/2" X 1/2"            | 20  | PC   | 3     | 60    |
| 11   | LOCK WASHER                 | 20  | PC   | ---   | ---   |
| 12   | LOCK NUT                    | 20  | PC   | ---   | ---   |
| 13   | IMPELLER                    | 1   | PC   | ---   | ---   |
| 14   | IMPELLER FOR INTERNAL CIRC. | 1   | PC   | 3     | 3     |
| 15   | FLANGE FOR INTERNAL CIRC.   | 1   | PC   | 19    | 19    |
| 16   | IMPELLER FOR INTERNAL CIRC. | 1   | PC   | 6.8   | 6.8   |
| 17   | IMPELLER FOR INTERNAL CIRC. | 1   | PC   | 8.3   | 8.3   |
| 18   | IMPELLER FOR INTERNAL CIRC. | 1   | PC   | 3.8   | 3.8   |
| 19   | IMPELLER FOR INTERNAL CIRC. | 1   | PC   | 13.8  | 13.8  |
| 20   | IMPELLER FOR INTERNAL CIRC. | 1   | PC   | 8.4   | 8.4   |
| 21   | IMPELLER FOR INTERNAL CIRC. | 1   | PC   | ---   | ---   |
| 22   | IMPELLER FOR INTERNAL CIRC. | 1   | PC   | ---   | ---   |

# Output

**ELEVATION**

| POSITION | IMPELLER TYPE | IMPELLER DIMENSIONS      | CONNECTION |
|----------|---------------|--------------------------|------------|
| Top      | None          | 2" DIA. x 1" H. x 1" D.  | WITH HUB   |
| Mid      | None          | 6" DIA. x 1" H. x 1" D.  | BOLTED     |
| Mid      | None          | 8" DIA. x 1" H. x 1" D.  | BOLTED     |
| Mid      | None          | 10" DIA. x 1" H. x 1" D. | BOLTED     |
| Bottom   | None          | 2" DIA. x 1" H. x 1" D.  | BOLTED     |

**IMPELLER DETAIL**

**SHAFT DETAIL**

**DETAIL OF LANTERN STROOL**

**DETAIL OF BEARING HOUSING**

**DETAIL OF STUFFING BOX**

**DETAIL OF BEARING HOUSING**

**DETAIL OF LANTERN STROOL**

**DETAIL OF BEARING HOUSING**

**DETAIL OF STUFFING BOX**

**DETAIL OF BEARING HOUSING**

**DETAIL OF LANTERN STROOL**

**DETAIL OF BEARING HOUSING**

**DETAIL OF STUFFING BOX**

**DETAIL OF BEARING HOUSING**

| ITEM NO. | ITEM            | SIZE               | QTY | MATERIAL     | THK | WT IN LBS |
|----------|-----------------|--------------------|-----|--------------|-----|-----------|
| 1        | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 2        | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 3        | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 4        | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 5        | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 6        | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 7        | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 8        | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 9        | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 10       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 11       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 12       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 13       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 14       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 15       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 16       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 17       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 18       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 19       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 20       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 21       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 22       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 23       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 24       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 25       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 26       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 27       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 28       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 29       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 30       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 31       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 32       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 33       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 34       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 35       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 36       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 37       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 38       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 39       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 40       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 41       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 42       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 43       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 44       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 45       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 46       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 47       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 48       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 49       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 50       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 51       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 52       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
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| 63       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 64       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
| 65       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |
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| 78       | 1/2" DIA. SHAFT | 1/2" DIA. x 100.00 | 1   | CARBON STEEL |     | 0.00      |

**NOTES:**  
 1. ALL DIMENSIONS ARE IN INCH UNLESS OTHERWISE SPECIFIED.

**COMPANY NAME**  
 INZ  
 ESTD 1980

**CLIENT**  
 DATE: 10/10/2010  
 DRAWING NO.

## Purchase

|                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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## Demo Video

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## Contact

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| <p>Pradeep Nayak<br/>                 Mobile : +91 9594313398<br/>                 Email: pvtools.weebly@gmail.com</p> |
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## Buyers

| Domestic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | International                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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