

# Productivity-Cam Shaft Grinding

**Valve Tappet & Cam Shaft Manufacturer from  
Central India**

**Fortuna Grinder  
Camshaft Grinding with *r.rhenus* TS 30 PT**



Commitment stems from Belief.....

## And we believe.....

- Coolant is a ‘Powerful Tool’ at the point of Machining.
- Contribution of Coolant is 2 times that of the Tool .
- Together with the Tool & Machine Tool, Coolant strikes the ‘Synergy’.
- Unhealthy Coolant - Cascading detrimental effect on Productivity, Quality, Health & Environment

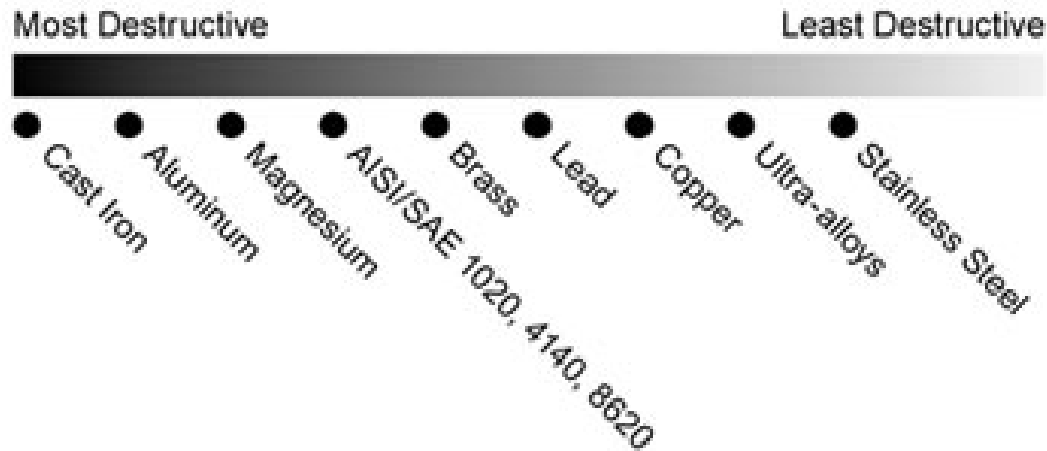
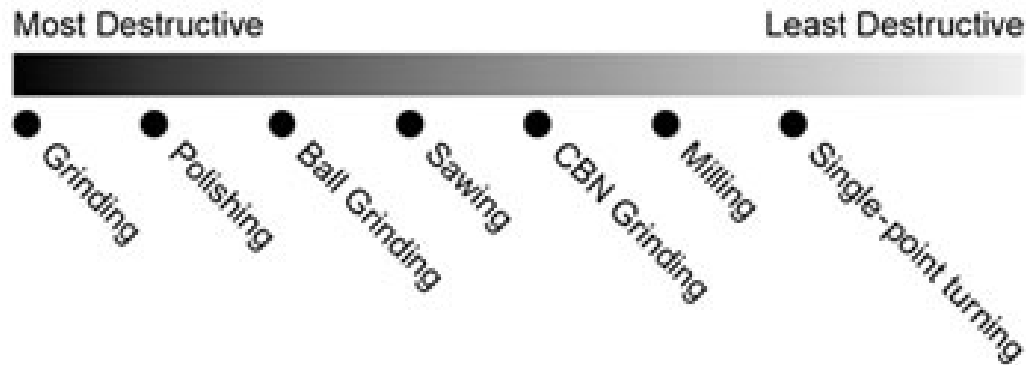


# Key Results Area

- **Tool Life & Cost**
  - **Consumables**
  - **Energy**
  - **Machine Up-time**
  - **Process & Productivity**
  - **Cost Per Component**
- Health & Environment**
  - House Keeping**
  - Floor Space Utilization**



# Grinding – Most Demanding



# Grinding – Energy Intensive

- Grinding .. Removal of large number of minute particles ...result .. High Specific Energy requirement.
- High Frictional loss of Energy.
- Consequentially, Energy consumption much higher than other metal working.



# Where is the power and heat taken up?

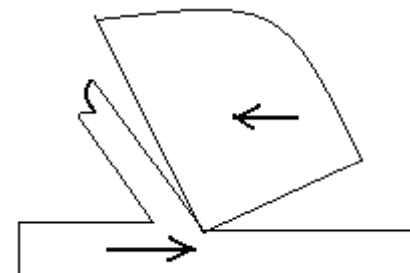
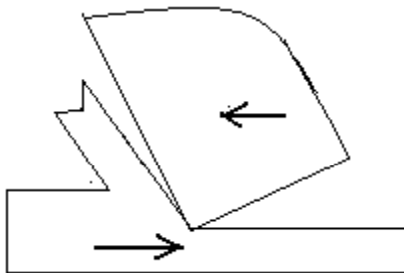
	Sharp wheel	Dull wheel
• Chip formation:	3 kW	3kW
• Plowing:	3 kW	6kW
• Rubbing:	<u>6 kW</u>	<u>27kW</u>
	12 kW	36 kW



# How does material-removal rate effect power

Higher material removal rates mean more aggressive grinding and deeper penetration of the grits into the work piece. This results in :

- More cutting and less rubbing, therefore less power and heat
- Higher forces on each grit, meaning more wheel wear
- Better self-sharpening of the wheel (grit and bond fracture), meaning a sharper wheel and less heat and power
- Less rubbing and plowing, therefore a rougher surface finish





# Grinding – Energy Intensive

- Cutting Efficiency of the Grinding wheel ..... In practical terms “the ratio of material removal rate to the power consumed”
- Cutting Efficiency decreases ‘exponentially’ between the dressing of the wheel because of ‘glazed’ wheel.
- ... more so for precision grinding where Dressing is an independent process step.



# FLUID ADVANTECH Energy Optimization

- Decrease in Cutting Efficiency results in Increase in force to be applied for cutting since feed is constant.
- Increase in applied force for Cutting amounts to increased power consumption.
- Increase in applied force can cause ‘Deflection’ problem of Surface finish.
- Coolant favorably alters the Surface Chemistry.
- RHENUS - High Performance Coolant, RESY & LOHMAN ..Efficient Filtration ensures against frequent clogging of the pores.
- Wetting & detergency of Coolant helps in keeping the pores clean.
- Low frictional loss, Sustained Cutting Efficiency ..... Optimum power utilization.



# Grinding Wheel & Dressing

- Grinding wheel cost - major factor in overall grinding cost.
- Wheel wear in dressing is substantially more than in grinding.
- Select applications, Dressing cycle is generally longer than the Grinding cycle.
- Dressing though essential is a 'non productive' & 'erosive' step.
- Important aspect – Dressing – can be modified to alter the cutting efficiency of the wheel & improve the surface finish

# Coolant Data

## Before 'Fluid ADVANTECH'

Annual consumption of Cimcool for 4 Fortuna Grinders = 6150 Liter

Monthly Consumption of Cimcool for 4 Fortuna Grinders = 510 Liter

Monthly Consumption of Cimcool per Fortuna Grinder = 130 Liter

## Upon 'Fluid ADVANTECH'

Date of Commencement of 'Fluid ADVANTECH': 3rd March 2008

Position as on 30th June 2008:

### Coolant Data:

No. of Drums supplied = 14 Nos.

No. of Drums unused in stock = 4 Nos.

No. of drums still in circulation = 2 Nos. (considering Filter Plant III and Plant II)

No. of drums used in 4 months = 8 Nos. = 1552 Liter

- **Amount of r rhenus TS 30PT left over during the shifting of machine = 80 Ltrs**
- **Loss of r. rhenus TS 30PT due to overflow -----**
- **Loss of r. rhenus TS 30PT due to leakage s in the machine -----**
- **Loss of r. rhenus TS 30PT due to extreme water hardness -----**
- **Loss of r. rhenus TS 30PT due to Tramp Oil -----**

Amount of r. rhenus TS 30PT consumed till date = 1472 Ltrs (Approx)

Consumption of r. rhenus TS 30PT per Month = 368 Ltrs (Approx)

Consumption of r. rhenus TS 30PT per month per machine = 92 Ltrs.

**Actual consumption observed for a monitored period of 10 days in Plant 3 = 27.5 Ltrs per machine**

**Therefore consumption of r. rhenus TS 30PT per month per machine = 71.5 ltrs**



Customer: Valve Tappet & Cam Shaft Mfg.	Average Production	210/Day
Machine: Fortuna Cam Grinder - 3 & 5	Average production per Month	5500
Operation: Finish & Rough Grinding	Component	Cam Shaft Lob
Filter Plant II	Date of commencement of Fluid ADVANTECH:	13th May 2008
Coolant Volume: 4200 Liter	Associate Fee per Month per Filter Plant in Rs:	10000

Particulars	Qty.	Rate	Before Fluid ADVANTECH	After Fluid ADVANTECH
Initial Charge				
a) Cimcool Coolant (Ltrs)	200	120	24000	
b) Rhenus R Uni (Ltrs)	160	360		57600
Cleaning and rinsing (Ltrs)	32	360		11520
Biocides (Ltr)	2	1562		3124
Conditioner (Kg)	NIL	500		
System Cleaner (Ltr)	8	655		5240
Labour		400/ 8 Hr.	800	400
Machine Down Time		1000/Hr.	16000	8000
Sub Total			40800	85884
Sump Life in months			2	36
Initial Charge cost per Month			20400	2386
Cost per Piece				<b>3.71</b>
				<b>0.43</b>

Particulars	Qty.	Rate	Before Fluid ADVANTECH	After Fluid ADVANTECH
Top Up per Month Cimcool	170	120	20400	
Rhenus R Uni	144	360		51840
Cost per Piece				<b>3.71</b>
				<b>9.43</b>

Particulars	Qty.	Rate	Before Fluid ADVANTECH	After Fluid ADVANTECH
Additives				
Conditioner (Kg)	2	500		1000
Cost per Piece				<b>NIL</b>
				<b>0.18</b>

Particulars	Before Fluid ADVANTECH	After Fluid ADVANTECH
<b>Toal Cost Per Component on account of Coolant and Additives</b>	<b>7.42</b>	<b>10.04</b>



Particulars	Qty.	Rate	Before Fluid ADVANTECH		After Fluid ADVANTECH	
Wheel Life for Rough	1	10250	500		1000	
Cost per Piece				20.5		10.25
Wheel Life for Finish	1	11050	500		1000	
Cost per Piece				22.1		11.05

Particulars	Qty.	Rate	Before Fluid ADVANTECH		After Fluid ADVANTECH	
Depth of Dressing			0.060 mm - Rough		0.040 mm - Rough	
			0.040 - Finish		0.020 mm - Finish	
No. of Dressers consumed pm/mc.			10		4	
		1136	11360		4544	
Dressing cost per piece				2.07		0.83

Particulars	Before Fluid ADVANTECH	After Fluid ADVANTECH
<b>Total Cost Per Component on account of Grinding Wheel &amp; Dresser</b>	<b>44.67</b>	<b>22.13</b>

Particulars	After Fluid ADVANTECH
<b>Total Cost Saving per Component on account of Grinding Wheel &amp; Dresser</b>	<b>22.54</b>



Particulars	Qty.	Rate	Before Fluid ADVANTECH	After Fluid ADVANTECH
Filter Media Cost				
Paramoll N260/100 - 50 mtrs.	2	17500		35000
OL 50 - 100 mtrs.	2	15200	30400	
Cost per Piece			5.53	6.36

Parameters	Before Fluid ADVANTECH	After Fluid ADVANTECH
Total Cost per Piece (Intial Charge + Top Up + Additives + Wheel Cost + Dresser Cost + Filter Media)	57.61	38.53
Savings per Piece		19.08

Savings per Month

Rs. 104940

Savings per Year	Rs. 1259284
Energy Saving per Year	Rs. 104640
<b>Total</b>	<b>Rs. 1363924</b>

Associate Fee per Year / Filter Plant

Rs. 120000

**Total Saving on Filter Plant III Per Year**

**Rs. 1243924**



# Power Savings

<b>Customer: Valve/Tappet &amp; Cam Shaft Mfg.</b>
Component: Cam Shaft Lob
Material of Component: Chilled Cast Iron
Machine Description: 1. Fortuna 3 - Rough & Finish Grinding
2. Fortuna 4 - Finish Grinding
3. Fortuna 5 - Rough Grinding

## Power Consumption of Grinding Spindle motor on Fortuna Grinders:

Machine Description	Idle	Before Fluid Advantech (X)	After Fluid Advantech (Y)
<b>Peak Power in KW</b>			
Fortuna - 3	2.28	22.3	20.1
Fortuna - 4	3.01	15.4	12.77
Fortuna - 5	2.85	29.43	20.1

**Total Saving on Filter Plant III ( Fortuna 3 + Fortuna 5) = Rs.8720/- Per Month**

**Total Saving on Filter Plant III ( Fortuna 3 + Fortuna 5) = Rs.104640/- Per Year**





# Productivity & Quality Benefits

Additional Productivity	
1. Due to Tank Cleaning	80 Cams
2. Due to Extended Wheel Life	50 Cams
<b>Total additional marginal production</b>	<b>130 Cams</b>

Quality & Maintenance Parameters	
1. Surface Finish Required	0.5 $\mu$ Ra
With ' <b>Fluid Advantech</b> ' Surface Finish achieved	<b>Within the Limit</b>
2. House Keeping	<b>Good</b>
3. Sump Odour	<b>Healthy Condition</b>
4. Operator Health & Safety	<b>Healthy Condition</b>
5. Spent Emulsion Disposal	<b>Healthy Condition</b>



*Thank you for sparing your valuable time !!*

