



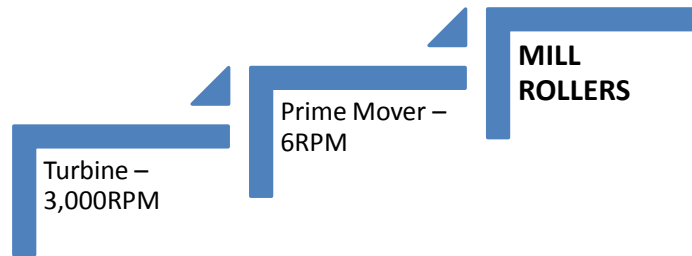
#### MILL DRIVE AND TRANSMISSION

Mill drives and transmission is an important due to –

- **Performance of extraction and moisture reduction**
- **Investment**
- **Maintenance**
- **Energy saving**

## MILL DRIVE AND TRANSMISSION

- Conventional Mill drive mainly consists of **Steam Turbines**.
- Turbines are operated at **3000 to 6000 RPM** to deliver power and torque to gear box which finally transmit the same to Mills below **6 RPM**.



## MILL DRIVE AND TRANSMISSION

- A set of High Speed and Slow Motor Gear Trains is used to achieve the eventual operating speed and the power requirement at the mill.
- These conventional drives are not only cumbersome occupying huge space but also needs high maintenance and operating cost.



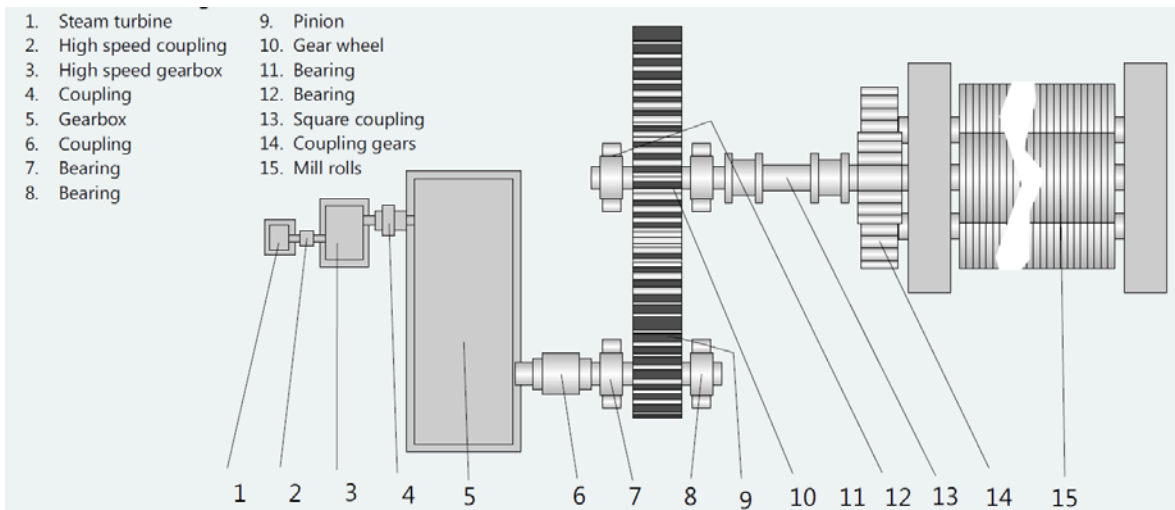
## MILL DRIVE AND TRANSMISSION

Sugar industry is now entering in to a new era where efficient and compact Planetary / Direct drives are now replacing the conventional system with successful results in terms of –

- **POWER SAVING**
- **EXTRACTION**
- **LESSER FOOT PRINTS**



## CONVENTIONAL SUGAR MILL DRIVE



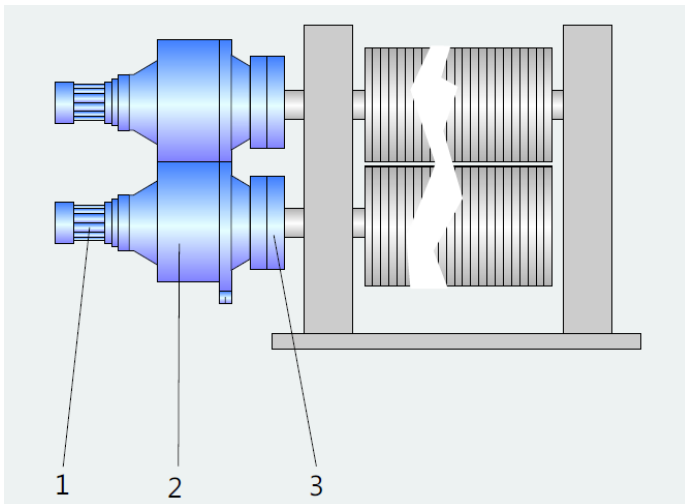
## INCREASE IN MECHANICAL EFFICIENCY

... TO

**INNOVATIVE PINIONLESS MILL DRIVE  
CONSISTING OF SHAFT MOUNTED  
GEARBOXES DIRECTLY ON THE ROLLER SHAFT**



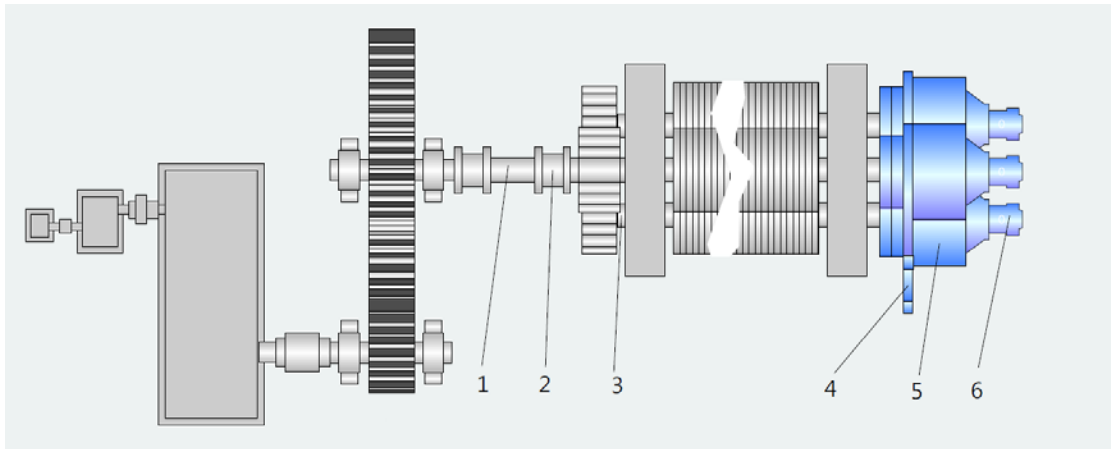
## INDIVIDUAL ROLL DRIVE



**Individual mill roll drives without  
Couplings and Cumbersome  
reduction gears**

1. Electric motor
2. Planetary Gearbox
3. Special flange connection

## MEASURING POINTS



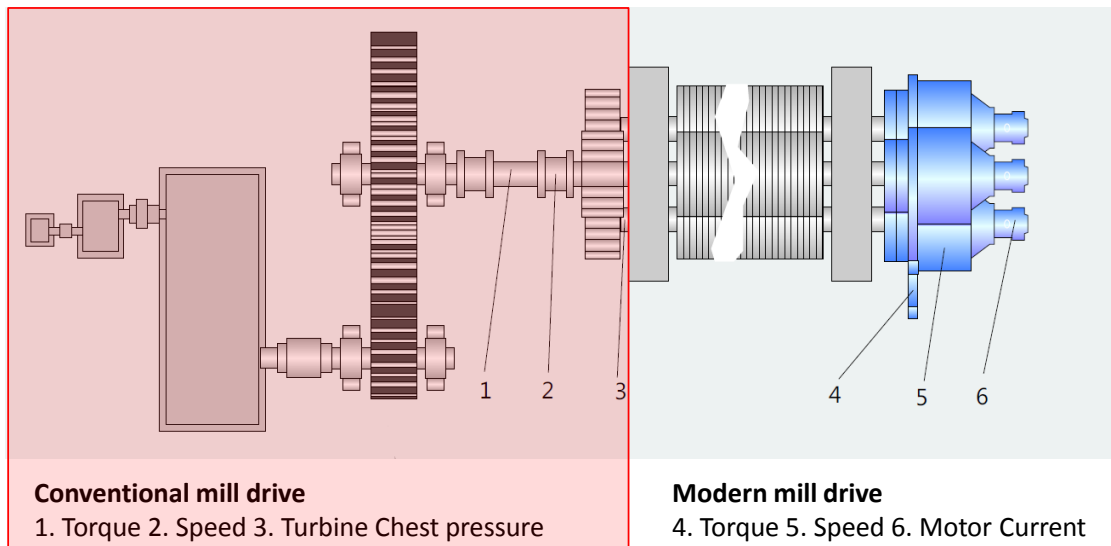
### Conventional mill drive

1. Torque 2. Speed 3. Turbine Chest pressure

### Modern mill drive

4. Torque 5. Speed 6. Motor Current

## MEASURING POINTS



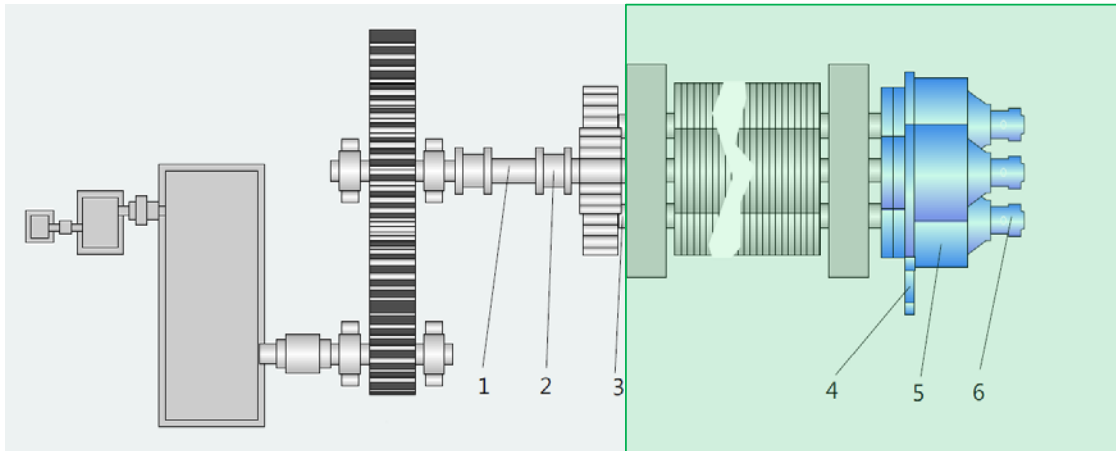
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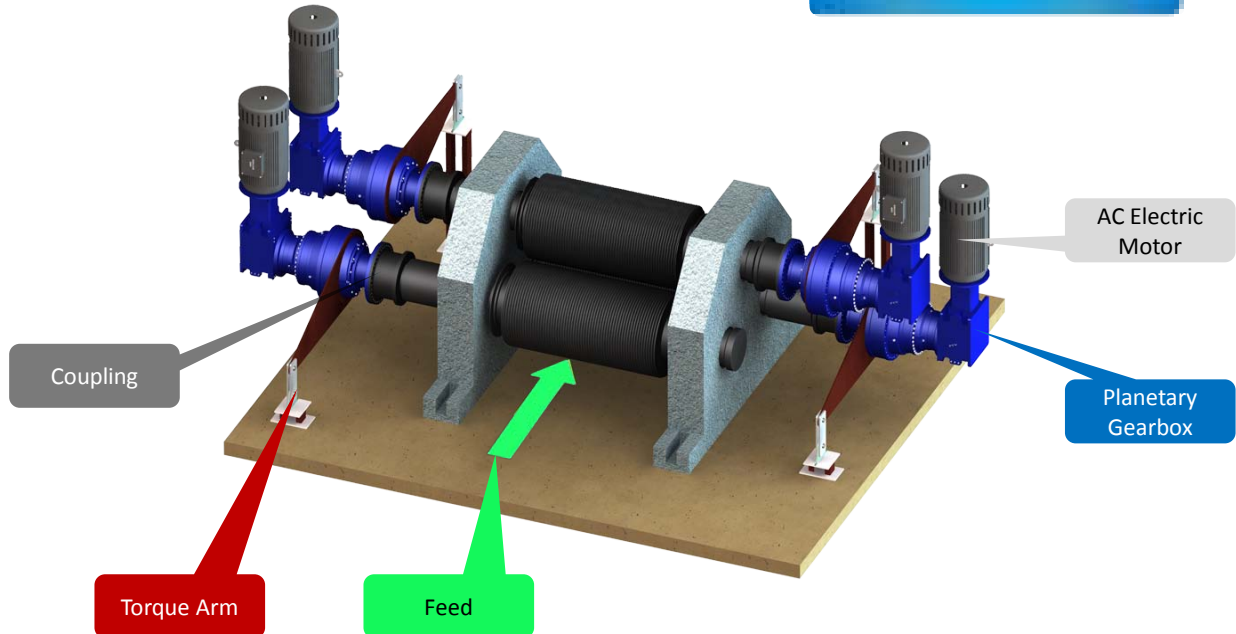
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## INDIVIDUAL ROLL DRIVE



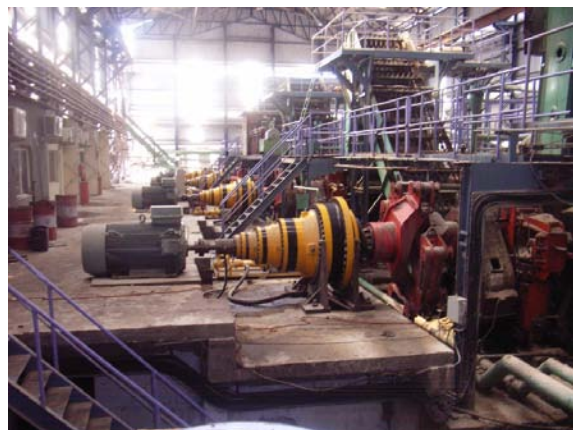


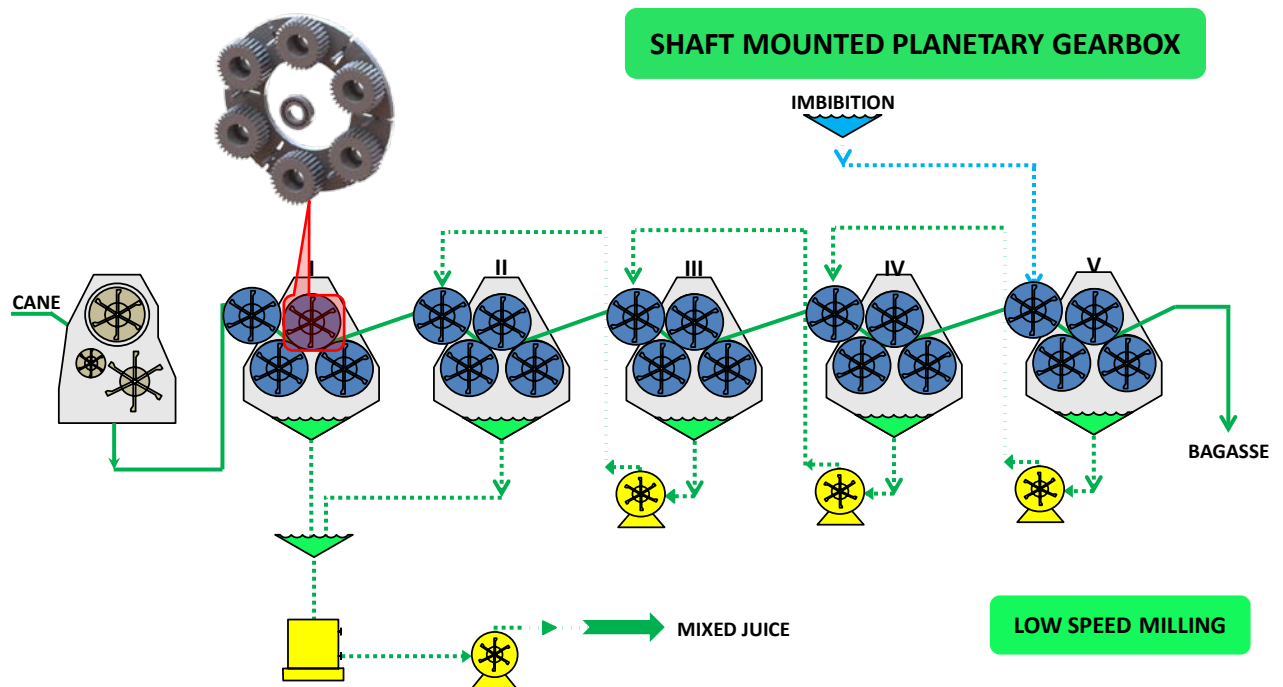
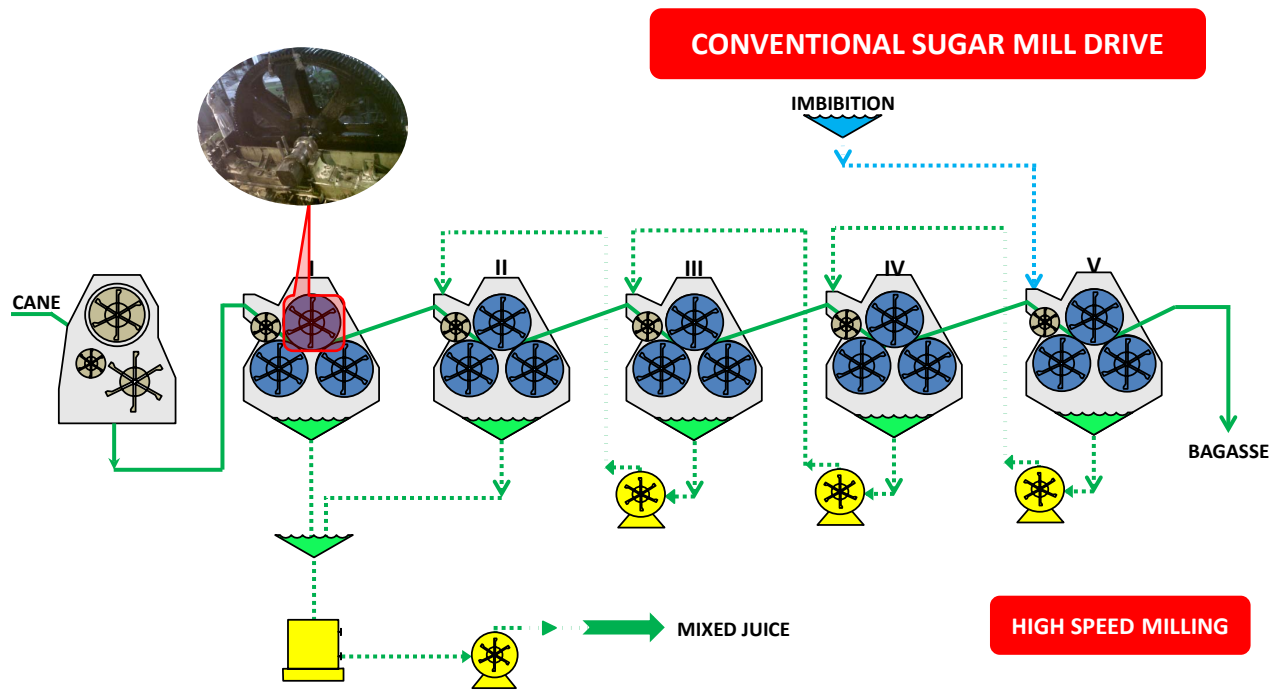
## INDIVIDUAL ROLL DRIVE



## ASSIST DRIVE SYSTEM

Electric Motors directly mounted on roll shaft (no tail bar in between) and controlled by VFD







## POWER / TORQUE TRANSMISSION

Power / Torque Transmission	Power [kW]	Efficiency [%]	Power Transmitted [kW]	Ratio [i]	Output Speed	Torque Transmitted [Nm]
Stage 1 - Electric Motor – 980 RPM	800	95%	760	1	980	7,409
Stage 2 - Enclosed Reduction Gear	760	96%	730	24	41	170,709
Stage 3 - Open Gearing / Plummer Block Bearings	730	82%	598	7	6	909,876
Stage 4 - Tail Bar and Other Frictional Losses	598	98%	586	1	6	891,679
Stage 5 - Crown Pinion	586	92%	539	1	6	820,345

## CONVENTIONAL

## POWER / TORQUE TRANSMISSION

	Power [kW]	Efficiency [%]	Power Transmitted [kW]	Ratio	Output Speed	Torque Transmitted [Nm]
Stage 1 - Electric Motor – 980 RPM	800	95%	760	1	980	7,409

### Output RPM – 6 – High Speed Milling

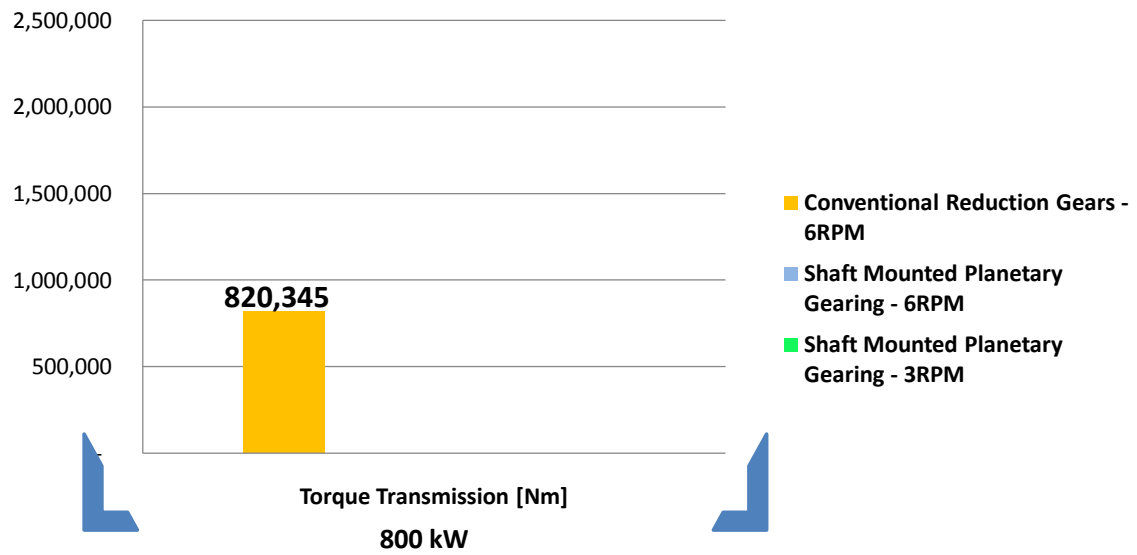
Stage 2 - Shaft Mounted Planetary Gearbox	760	96%	730	163	6	1,161,766
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### Output RPM – 3 – Slow Speed Milling

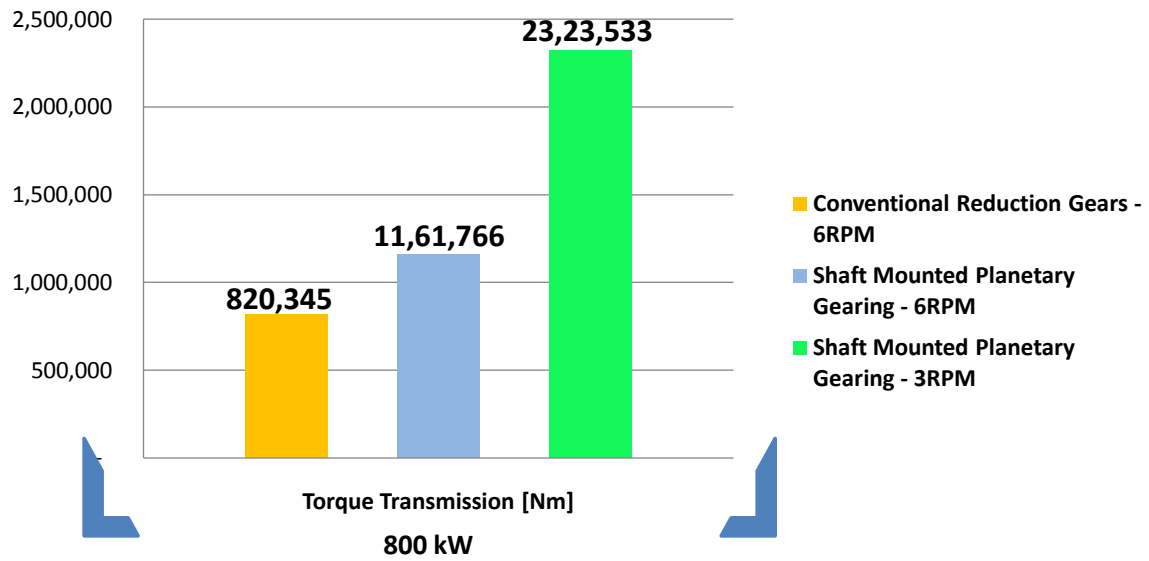
Stage 2 - Shaft Mounted Planetary Gearbox	760	96%	730	327	3	<b>2,323,533</b>
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## SHAFT MOUNTED PLANETARY GEARBOX

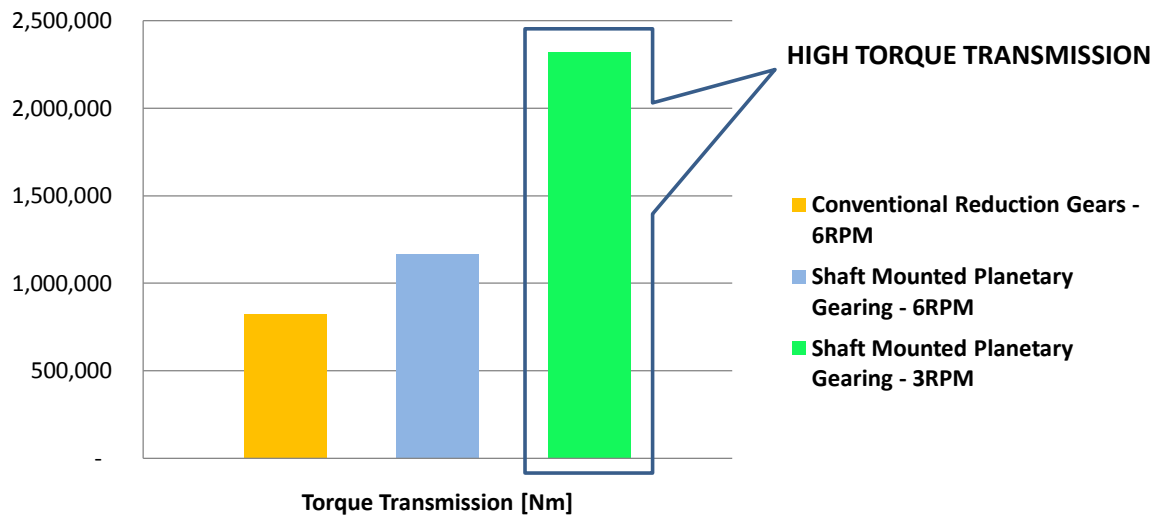
## POWER / TORQUE TRANSMISSION



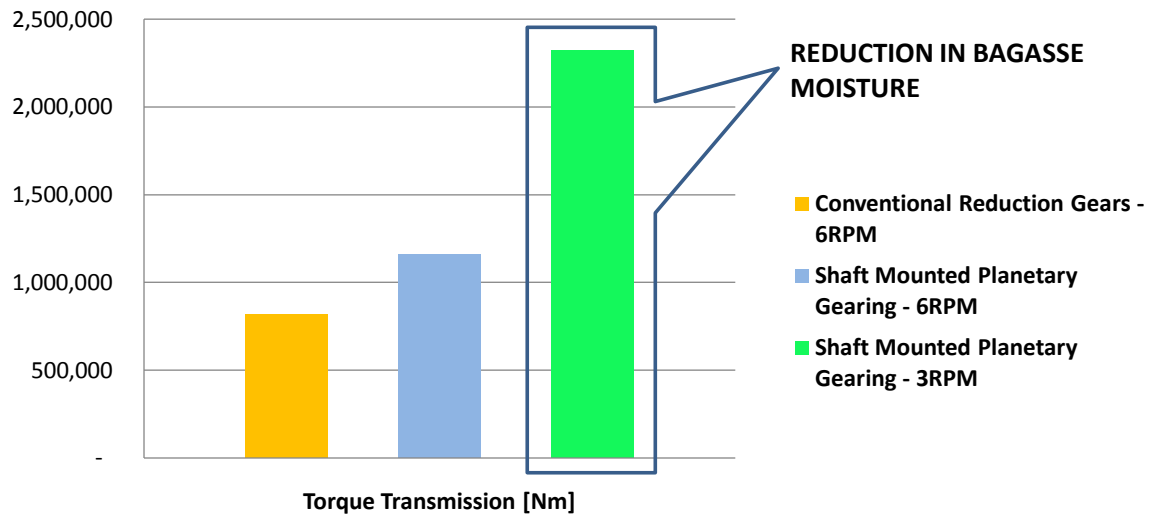
## POWER / TORQUE TRANSMISSION



## POWER / TORQUE TRANSMISSION



## POWER / TORQUE TRANSMISSION



**ECONOMY – SHAFT MOUNTED  
PLANETARY DRIVE**



**QUANTITY OF  
LUBRICANT USED**

**20 NOS.  
PLANETARY  
GEARBOXES**

**140 LITERS x  
20 NOS.**

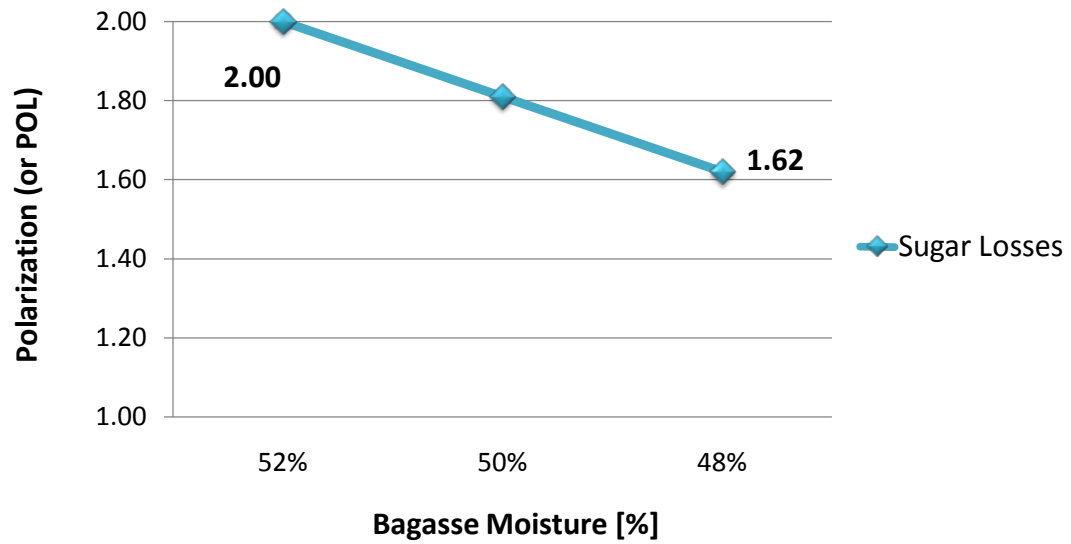
**ECONOMY – SHAFT MOUNTED  
PLANETARY DRIVE**

**AFTER ONE CRUSHING SEASON, THE LUBRICANT TO BE USED SHALL  
BE 3 – 4 LITERS PER GEARBOX**

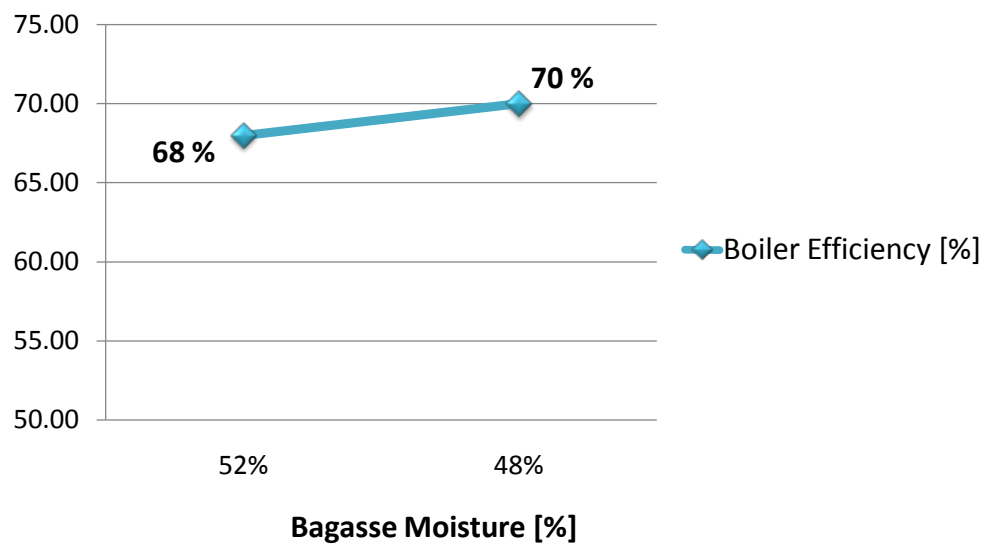
**THEREFORE, THE COST INCURRED SHALL BE NEGLIGIBLE**



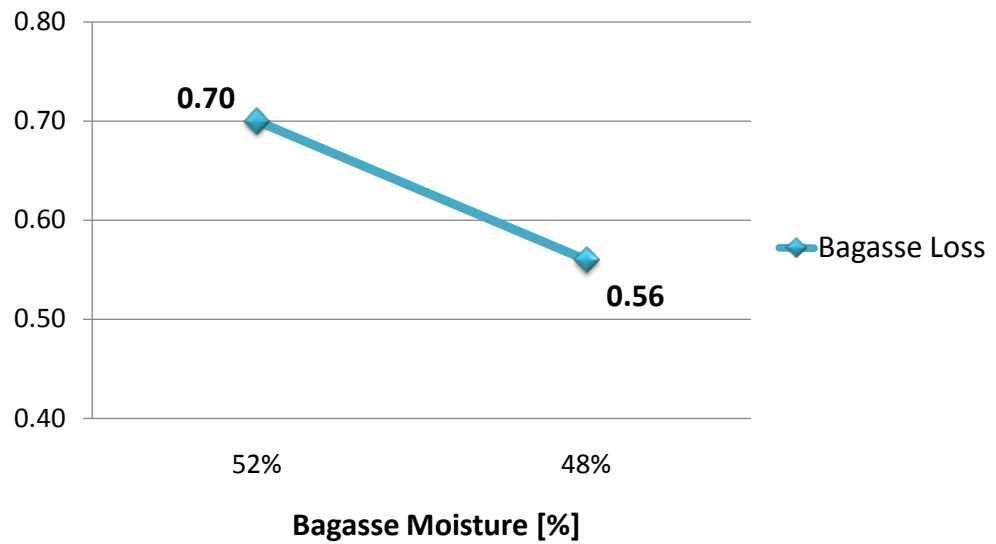
### REDUCED SUGAR LOSSES



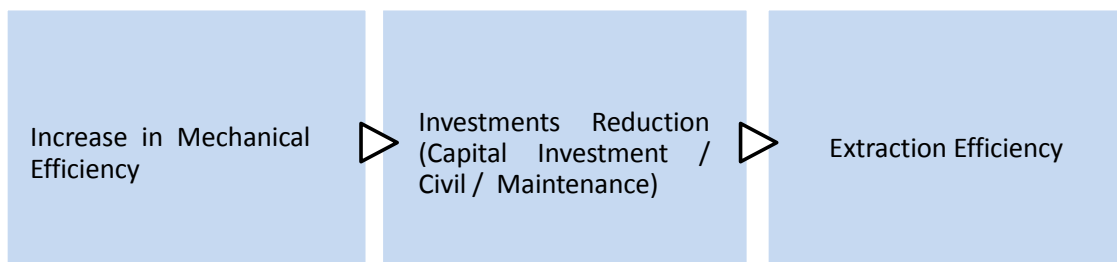
### INCREASED BOILER EFFICIENCY



### REDUCED BAGASSE LOSSES



### ADVANTAGES – SHAFT MOUNTED PLANETARY GEARBOX



## ADVANTAGES – SHAFT MOUNTED PLANETARY GEARBOX



## CONCLUSION

Pinionless Mills with Shaft mounted Planetary Gearboxes are working satisfactorily for Years

## CONCLUSION



Shaft Mounted Planetary Milling Train is an efficient and economical solution and consumes only **1kW-hr / Ton of Cane / Mill** and has capability to expand Plant capacity up to 100%

## OPERATING RESULTS

Crush Rate	250 TPH
Energy Consumption	Only 1.1 kW-hr / Ton of Cane / Mill
Bagasse Moisture	49% with 3 mills in operation

Negligible wear on mill roll journals and bearing liners even after completion of 4 crops

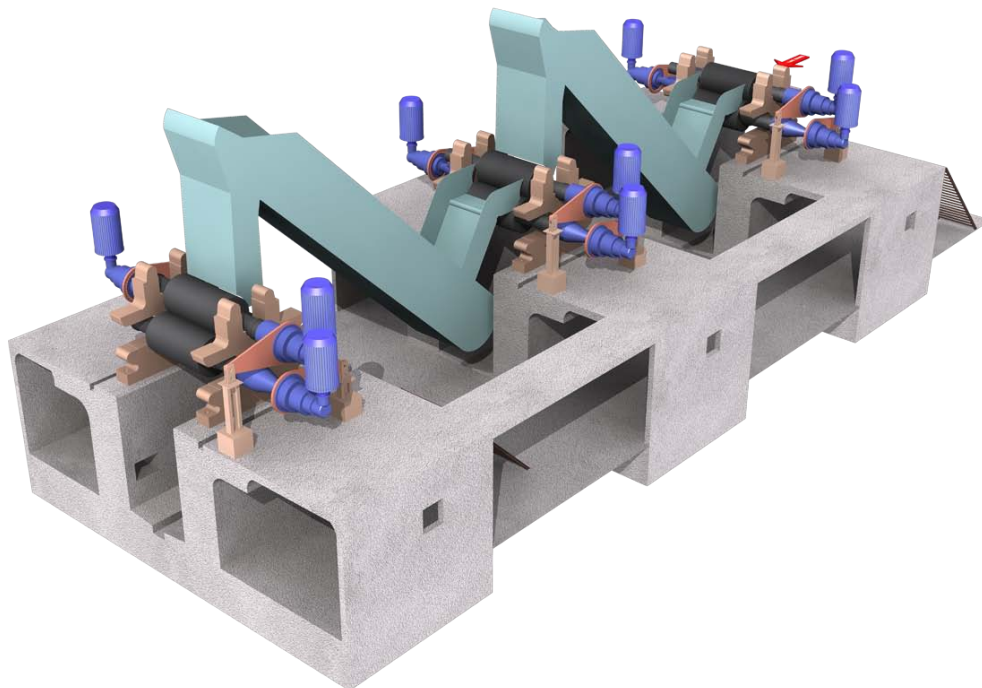
Paper presented at:

## SHAFT MOUNTED PLANETARY DRIVES



42" x 84", 4 ROLL MILL: JAY MAHESH SUGAR, INDIA

Paper presented at:



**THANKS FOR YOUR VALUABLE TIME**