

Gearing Up for High Efficiency



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- *BS Industrial Engineering*
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- *2.5 years specializing in power transmission components (Dodge)*

Dollars and Sense

Choosing the Correct Gearing

Presenter:

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Why Efficiencies Matter

- Energy Costs
- Premium Efficiency Motors
- Payback on Projects

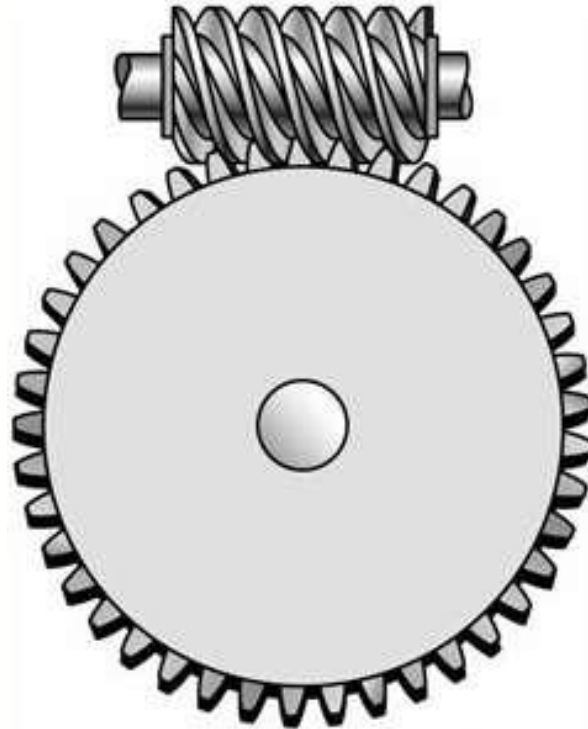
Types of Gearboxes

- Shaft Mount
 - CEMA (screw conveyor drives)
- Inline
- Right Angle
- Offset Parallel

Types of Gearing

- Helical
- Helical-Bevel (rolling)
- Worm (sliding)
- Planetary

Worm Gearing



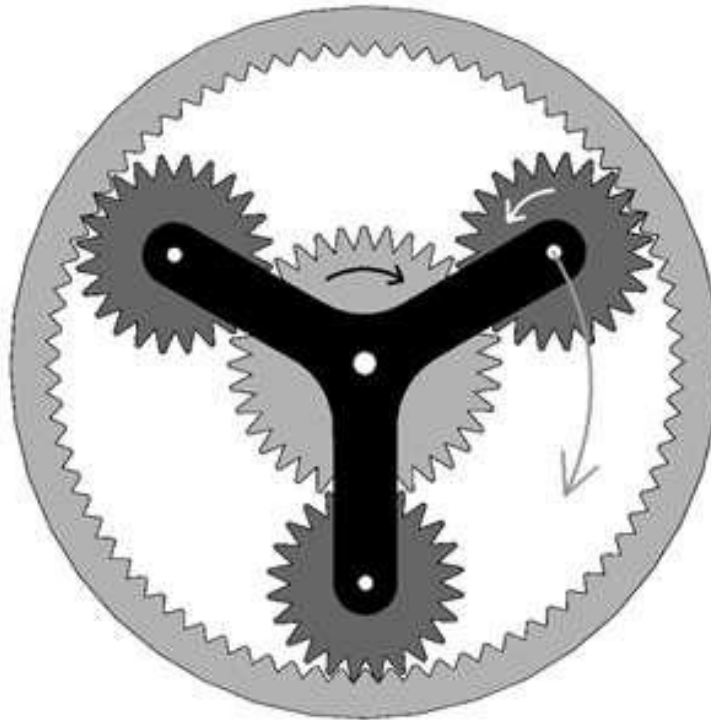
Helical Bevel



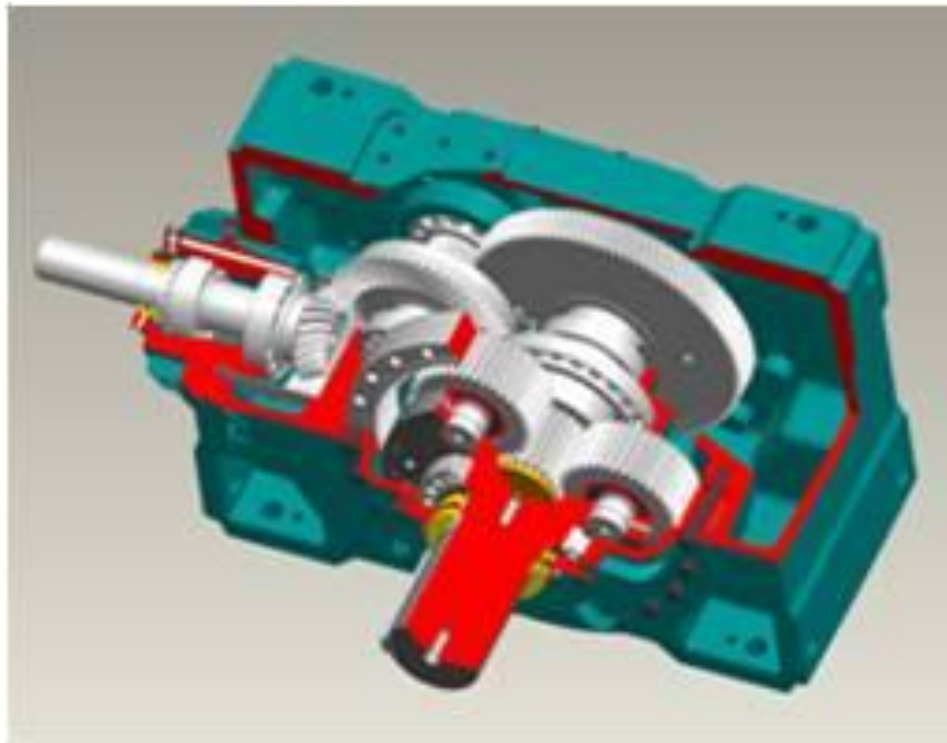
Helical Gearing



Planetary Gearing



Combo (Helical, HB, Planetary)



Gearbox Efficiencies

- Worm: 60% (low end)
- Helical Bevel: 95%
- Helical (Inline): 98%
- Double reduction gearing would be more efficient than triple reduction gearing
- Each stage efficiency is multiplied to get overall efficiency of gearbox

Gearing Efficiency Chart

Selections based on 1.0 service factor
1750 rpm input

kw/hr rate	\$0.06
hrs/day	10
days/yr	250
Payback(yrs)	1

Power saved (watts) = 746 x HP in [1/eff. Higher - 1/eff. Lower]

Ratio	Motor Horsepower										
	0.5	0.75	1	1.5	2	3	5	7.5	10	15	20
5	TIGEAR-2 13Q	TIGEAR-2 13Q	TIGEAR-2 13Q	TIGEAR-2 15Q	TIGEAR-2 17Q	TIGEAR-2 20Q	TIGEAR-2 23Q	TIGEAR-2 30Q	TIGEAR-2 30Q	TIGEAR-2 35Q	TIGEAR-2 40Q
10	TIGEAR-2 13Q	TIGEAR-2 13Q	TIGEAR-2 15Q	TIGEAR-2 17Q	TIGEAR-2 20Q	TIGEAR-2 23Q	TIGEAR-2 30Q	TIGEAR-2 35Q	TIGEAR-2 35Q	Quantis 88C	Quantis 88C
15	TIGEAR-2 13Q	TIGEAR-2 15Q	TIGEAR-2 17Q	TIGEAR-2 20Q	TIGEAR-2 23Q	TIGEAR-2 26Q	TIGEAR-2 30Q	Quantis 68C	Quantis 68C	Quantis 88C	Quantis 88C
20	TIGEAR-2 13Q	TIGEAR-2 17Q	TIGEAR-2 17Q	TIGEAR-2 23Q	TIGEAR-2 23Q	TIGEAR-2 30Q	TIGEAR-2 35Q	Quantis 68C	Quantis 88C	Quantis 88C	Quantis 1083C
25	TIGEAR-2 15Q	TIGEAR-2 17Q	TIGEAR-2 20Q	TIGEAR-2 23Q	TIGEAR-2 26Q	TIGEAR-2 30Q	Quantis 68C	Quantis 68C	Quantis 88C	Quantis 88C	Quantis 1083C
30	TIGEAR-2 15Q	TIGEAR-2 17Q	TIGEAR-2 23Q	TIGEAR-2 26Q	TIGEAR-2 26Q	TIGEAR-2 35Q	Quantis 68C	Quantis 88C	Quantis 88C	Quantis 1083C	Quantis 1283C
40	TIGEAR-2 17Q	TIGEAR-2 20Q	TIGEAR-2 23Q	TIGEAR-2 26Q	TIGEAR-2 30Q	TIGEAR-2 35Q	Quantis 68C	Quantis 88C	Quantis 1083C	Quantis 1083C	Quantis 1283C
50	TIGEAR-2 17Q	TIGEAR-2 23Q	TIGEAR-2 26Q	TIGEAR-2 30Q	TIGEAR-2 35Q	Quantis 68C	Quantis 88C	Quantis 88C	Quantis 1083C	Quantis 1283C	Quantis 1283C
60	TIGEAR-2 20Q	TIGEAR-2 23Q	TIGEAR-2 26Q	TIGEAR-2 30Q	TIGEAR-2 35Q	Quantis 68C	Quantis 88C	Quantis 1083C	Quantis 1083C	Quantis 1283C	Quantis 1483C

Making the Input Efficient

- Gearmotors and C-face
 - Motors are directly connected to gearbox
- Belted/chain input
 - Sheaves/sprockets

Belted Gearing

- Standard belts (V-belts, etc)
 - Eff = Typical 93%
- Synchronous belts (Timing belts)
 - Eff = Typical 98% eff
- Standard is less efficient due to slippage

Summary

- Conscious of energy costs/efficiency when selecting gearboxes
- Don't forget about the high-speed side (C-face, belt type, etc.)
- Rebate avail from your power company
- Don't be afraid to ask for help

Conclusions

- Be aware of the cost of energy when selecting gearboxes
- Match motor, gearbox, and load to maximize efficiency
- Follow the manufacturers recommendation for the correct lubricant
- Consider coupling the output shaft of the reducer to the driven shaft
- Most power companies provide custom rebates to convert to energy efficient gearboxes
- Please contact us or your account manager for assistance