Extruder Roll and Belt Upgrade
Reeves Moto Drive Replacement

Baldor Super-E Motors
Dodge Quantis ILH Reducers

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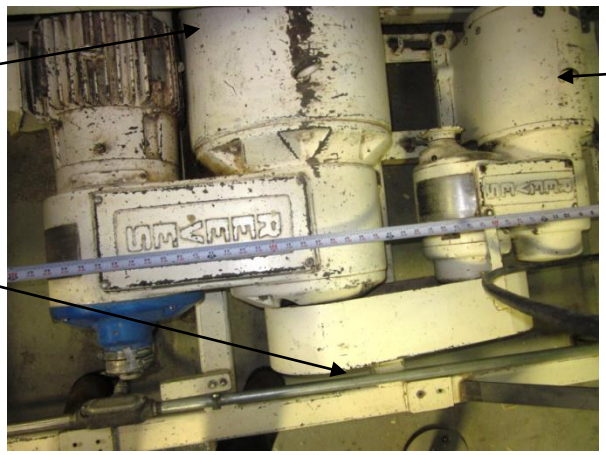
Introduction

This facility produces flour-based snack products. The plant runs 5 days a week, 16 hours a day.

Application Review

The application is an extruder roll and conveyor belt that had Reeves Moto Drives that were connected together. The customer was not using the full speed range capabilities of Reeves units.



Opportunity

The Reeves mechanical drives on the extruder and the conveyor roll were outdated. The customer had no spares, very long lead times, and very high prices for replacements. The customer was very concerned about the possibility of extensive unplanned downtime.

Solution

The customer purchased a package through Baldor's System-1 group that provided a tighter speed range and allowed them to minimize upgrading to a larger HP solution. The solution is more energy efficient, more cost effective, and as an added bonus, the customer can separately control the conveyor belt speed and the extruder roll speed.

Contact Baldor•Dodge Inside Sales or Customer Order Engineering for assistance with Reeves Moto Drive conversions. Baldor engineers will calculate the motor and reducer requirements. A sample spreadsheet is included below showing some of the calculations.

Required information is: horsepower, size, ratio, speed range, & mounting configuration.

It is important to determine the customer's actual speed requirements. Usually a higher horsepower motor is required to replace a Reeves drive, but if the customer is not using the full speed range, this can sometimes be avoided, as in this case.

MOTODRIVE TORQUE VALUES AND MOTOR / INVERTER HP REPLACEMENT REQUIREMENT SELECTION

Torque values for Reeves Motodrive: 7.5 HP size 343, 47.1:1 ratio, 89 /8.9 RPM

(Customer has requested a speed range from 18.5 - 6.2 RPM (60 - 20 Hz.)

Based on running torque

Motor Base RPM (Hz)	Output Torque lb-in	Output rpm	Calculated Ratio	Use Reducer Ratio	Reducer Efficiency	Motor rpm	Hz	Motor RPM % of Base	Speed Factor	Motor Torque Required lb-in	Motor HP Required	Use Motor hp
1750	10906	18.5	94.6	88.46	0.94	1637	56.1	93.5	1.00	131.2	3.64	5
60	10906	6.2		88.46	0.94	548	18.8	31.3	1.00	131.2	3.64	
(1)	10906	6.2		88.46	0.94	548	18.8	31.3	1.00	131.2	3.64	

Based on starting torque

Motor Base RPM (Hz)	Output Torque lb-in	Output rpm	Calculated Ratio	Use Reducer Ratio	Reducer Efficiency	Motor rpm	Hz	Motor RPM % of Base	Speed Factor	Motor Torque Required lb-in	Motor HP Required	Use Motor hp
1750	18177	18.5	94.6	88.46	0.94	1637	56.1	93.5	1.00	218.6	6.07	7.5
60	18177	6.2		88.46	0.94	548	18.8	31.3	1.00	218.6	6.07	
(1)	18177	6.2		88.46	0.94	548	18.8	31.3	1.00	218.6	6.07	

The starting output torque value is the running torque x 2.5 (250% - motodrive starting capability) divided by 1.5 (150% - inverter starting capability)

Documented Savings

SAVINGS POTENTIAL	DATA	Variable	NOTES
DOWNTIME (UNPLANNED)			
Cost of Unplanned Downtime ($/hr) or ($/min)		C_{UD}	Extruder Line / Oven
Number of Unplanned Downtime Failures (X/yr)		N_{UD}	Operates: 5 days 16 hours
Time Spent on Failure Replacement (hr) or (min)		T_R	Potential Unplanned
Number of Dodge Downtime Failures (X/yr)	0	F_{DODGE}	$20,000 / Day
Time Spent on Dodge Replacement (hr or min)	0	T_{DODGE}	
DOWNTIME SAVINGS SUB-TOTAL	**$20,000.00**		Unplanned Downtime

*Downtime Savings = $C_{UD}*((N_{UD}*T_R)-(F_{DODGE}-T_{DODGE}))$

LABOR			
Labor Rate ($/hr) or ($/min)	$0.00	C_L	
Number of Total Failures (X/yr)	$0.00	F	
Time Spent on Failure Replacement (hr) or (min)	$0.00	T_R	
Number of Total Dodge Failures (X/yr)	$0.00	F_{DODGE}	
Time Spent on Dodge Replacement (hr or min)	$0.00	T_{DODGE}	
LABOR SAVINGS SUB-TOTAL	**$0.00**		

*Labor Savings = $C_L*((N_F*T_R)-(F_{DODGE}-T_{DODGE}))$

MATERIALS			
Cost of Replaced Product ($ each)	$30,000.00	C_{COMP}	Replacement: Reeves
Number of Total Failures/Replacements (X/yr)	1	F_{COMP}	Unplanned failure
Cost of Dodge Product ($ each)	$10,000.00	C_{DODGE}	Proposed package
Number of Dodge Failures/Replacements (X/yr)	1	F_{DODGE}	Intitial Purchase 1 x cost
Cost of Other Materials - Shafting, etc. ($ each)		C_{MAT}	
Replacements of Other Materials - Shafting, etc. (X/yr)	0	R_{COMP}	
Replacements of Other Materials - Dodge/Reliance (X/yr)	0	R_{DODGE}	
MATERIAL SAVINGS SUB-TOTAL	**$20,000.00**		

*Material Savings = $(C_{Comp}*N_{Comp})-(C_{DODGE}*N_{DODGE})+C_{Mat}*(R_{Comp}-R_{DODGE})$

ENERGY EFFICIENCY			
Existing System (Motor/Gearbox) Efficiency (%)	0.835	ε_{Comp}	7.5 HP Reeves Motor
Dodge System (Motor/Gearbox) Efficiency (%)	0.917	ε_{DODGE}	7.5 HP Reliance Prem Eff
Horsepower (HP)	8	HP	
Number of Units	1	N_{Units}	
Cost of Energy ($ / kW Hr)	$0.008	C_{Energy}	8cents / KWHR
Annual Hours of Operation (Hrs)	4,160	H_{Annual}	5 Days 16 Hours
EFFICIENCY SUB-TOTAL	**$1,994.07**		

*Energy Savings = $(0.746*HP*N_{Units}*C_{Energy}*H_{Annual})*(100/\varepsilon_{Comp}-100/\varepsilon_{DODGE})$

TOTAL YEARLY TCO SAVINGS	**$41,994.07**