Recommendation

Increase concentrate storage by installing a 90-ton tank to reduce associated overtime labor costs by 100%.

Annual Savings Summary

Source	Quantity	Units	Cost Savings
Administrative Costs	-	-	$45,000

Implementation Cost Summary

Description	Cost	Payback (yrs)
Before Incentives	$66,392	1.5
No Incentives Found	-	-

Facility Background

The facility mills polymers to create a 7% SBS concentrate that is added to make the final product. The current concentrate tank capacity limits production. According to facility personnel, the staff are required to work overtime to keep production going when there is not enough tank capacity to allow the facility to mill more polymer. Facility personnel estimated that a total of 25 hours of overtime is worked per week for 24 weeks per year to maintain sufficient milled polymer for concentrates production. Overtime is one and a half times the regular pay rate.

Facility personnel estimated that a 90-ton storage tank (~25,000 gallons) would eliminate the concentrates as a bottleneck.

Opportunity Background

Bottlenecks occur when a part of a process is disrupting the flow of materials. Theory of Constraints addresses identification and mitigation of production bottlenecks [1]. There are multiple causes of bottlenecks, including unequal processing times between production stage and high variability in processing times in production stage. Bottlenecks can be addressed in many ways. In some cases additional capacity at one production stage is beneficial.

Additional storage would benefit the facility by both reducing a constraint in the system and eliminating the need to have staff work overtime.

Proposal

Install a 90-ton storage tank to eliminate the need for additional overtime labor hours. This will save approximately $45,000 annually after an implementation cost of $66,392, resulting in a 1.5 year payback period.

Calculation Methodology

The savings calculation is based on information provided by facility personnel. Facility operation weeks, overtime necessary per week, and cost per hour of overtime were multiplied to obtain an estimated cost savings associated with eliminating the need for overtime operation.

Notes

Overtime labor costs are the only savings taken into account. There may be additional energy savings based on reduced facility operating hours.

Installed cost of a 90-ton tank may vary due to the transportation cost to ship a tank to the facility. The facility is in an area that may be more costly to ship items to.

References

[1]   "Theory of Constraints",
        http://www.leanproduction.com/theory-of-constraints.html. Web. 31 Oct. 2016.

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Original Template October 2016, style 2015

General Data

Site Data

Overtime Cost	(C_O)	$75	/hr	**(Rf. 1)**
Overtime Necessary	(t)	25	hrs/wk	**(N. 1, Rf. 1)**
Weeks Worked	(Q_W)	24	wks/yr	**(N. 2)**

Overtime Analysis

Current Conditions

Overtime Issued	(O_C)	600	hr/yr	**(Eq. 1)**
Overtime Cost	(C_C)	$45,000	/yr	**(Eq. 2)**

Proposed Conditions

Overtime Issued	(O_P)	0	hr/yr	**(Rf. 1)**
Overtime Cost	(C_P)	$0	/yr	**(Rf. 1)**

Savings

Overtime Reduction	(O_S)	600	hr/yr	**(Eq. 3)**
Overtime Cost Savings	(C_S)	$45,000	/yr	**(Eq. 4)**

Implementation Cost

Tank Costs

90 Ton Tank	(C_{TT})	$37,900	**(Rf. 2)**

Labor and Transport Costs

Labor Cost	(C_L)	$231	/hr	**(Rf. 3)**
Labor Time	(t_L)	80	hr	**(N. 3, Rf. 2)**
Transport Costs	(C_T)	$10,000		**(N. 4)**

Economic Results

Annual Cost Savings	(S)	$45,000	/yr	**(Rf. 4)**
Implementation Cost	(C_I)	$66,392	/yr	**(Eq. 5)**
Simple Payback	(t_{PB})	1.5	yrs	**(Eq. 6)**

Notes

N. 1) The hours billed include all employees related to the task.

N. 2) The facility operates half of the year (from May to October).

N. 3) The labor time is an analyst's estimate based on receiving the tank, preparing the area to install the tank, and tank installation.

N. 4) Analysts added additional costs for transportation due to the location of the facility. The facility is remotely located and may need a special trip to ship the tank there.

Equations

Eq. 1) Current Overtime Issued (O_C)

$$t \times Q_W$$

Eq. 2) Current Overtime Cost (C_C)

$$C_O \times O_C$$

Eq. 3) Overtime Reduction (O_S)

$$O_C - O_P$$

Eq. 4) Overtime Cost Savings (C_S)

$$C_C - C_P$$

Eq. 5) Implementation Cost (C_I)

$$C_{TT} + (C_L \times t_L) + C_T$$

Eq. 6) Simple Payback (t_{PB})

$$\frac{C_I}{S}$$

References

Rf. 1) Information provided by facility personnel during the assessment.

Rf. 2) Cost for a 25,000 gallon tank and the labor hours found in the RSMeans 2016 Building Construction Data book on page 526.

Rf. 3) Cost for labor is based on hiring a crew of one steamfitter foreman, two steamfitters, and one steamfitter apprentice for installing the tank. (Crew Q-7) It was found in RS Means 2016 Building Construction Cost Data on page 748.

Rf. 4) The annual cost savings is the savings from elimination of required overtime to keep up with product demand.

Incentive Data

Annual Energy Savings	(E_s)	*0*	MMBtu	**(Rf. 1)**
Annual Cost Savings	(S)	*$45,000*	/yr	**(Rf. 1)**
Implementation Cost	(C_I)	*$66,392*		**(Rf. 1)**
Simple Payback	(t_{PB})	*1.5*	years	**(Rf. 1)**

Incentive Analysis Summary

No Incentives Found

The state and city the facility is located does not provide any published incentives at the time this recommendation was authored. Analyst recommend confirming with utility representatives before beginning implementation; custom incentives can sometimes be arranged.

References

Rf. 1) Developed in this recommendation on the previous pages.