Bearing Failure Investigation

Conclusion and Results

By conducting interviews and performing a design and application review, Kelly concluded that the bearing failures were caused because of the following factors:

- The actual operating conditions were outside the designed operating envelope of the fans
- Thrust bearings rated at 8,800 pounds faced actual thrust of 36,000 pounds
- Excessive thrust pressure, caused by suction conditions, resulted in premature failure of the bearings

Kelly considered two corrective actions: replace the fans or modify the existing fans.

- Replace all six fans
- Modify the foundation and ductwork as necessary
- Modify existing fans
  - Moving thrust bearing to outboard end
  - Strengthen bearing support structure to accept higher thrust loads
  - Replace bearing with one rated above 36,000 pounds

Find the Cost/Benefit Analysis on the next page - which action would you choose?

Bearing Failure Cost/Benefit Analysis

Fan Replacement		Fan Modification	
Costs		**Costs**	
6 new fans and motors	$200,000	New bearings at $750 each	$4,500
Modification of foundation & ductwork	$100,000	Bearing support modification	
		• In-house labor $2,000 per fan	$12,000
3 months downtime for replacement and modifications		• Material costs $1,000 per fan	$6,000
• Burdened fixed costs	$2,549,160	Downtime 138 hours	
• Maintenance labor costs	$200,000	• Burdened fixed costs	$160,632
Lost production capacity	$525,000,000	Lost production capacity	$34,500,000
Total costs	$527,849,160	Total costs	$34,683,132
Benefits		**Benefits**	
Eliminates incremental maintenance costs	$12,136 / yr	Eliminates incremental maintenance costs	$12,136 / yr
Increase in capacity and revenue 96,000 tons per year @ $500/ton	$48,000,00 / yr	Increase in capacity and revenue 96,000 tons per year @ $500/ton	$48,000,000 / yr
Total benefits	$48,012,136 / yr	Total benefits	$48,012,136 / yr
Payback Period:	11 years	**Payback Period:**	< 1 year