

Conveyor Roller Failures Report

Analysis Name: Conveyor Roller Failures

Principal Analyst: Bob Latino

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**RCA, Inc.
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Event, IN 55442**

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Preserve (5P's)

Preserve Event Data

As in any investigative occupation, it is a REQUIREMENT that data (evidence) be collected from the scene and preserved in such a fashion as is appropriate for further analysis. As with the detective at a crime scene, the area is roped off and the scene preserved for the professionals who will come in and collect the necessary data.

PROACT® utilizes a data collection technique called the 5-P's. The 5-P's stand for the following five (5) data categories:

1. Parts – Physical or tangible evidence. Examples include process equipment, diagnostic equipment, fluid samples, etc.
2. Paper – Documentation. Examples include procedures, specifications, records, policies, test results, literature searches, etc.
3. Positional - Elements of time and space. Examples include times of occurrences, location of occurrences, frequency of occurrences, etc.
4. People - People sought to be interviewed regarding an event. Examples include management, administration, witnesses, engineers, hourly personnel, purchasing, etc.
5. Paradigms - People's belief systems that contribute to decision errors. "Cost reduction is #1". "It's the manufacturer's fault". "Poor design". etc.

Data Collection

Category	Data	Strategy	Team Member	Date	Completed	Hours
Paper	Maintenance Histories	Obtain maintenance histories for conveyor rollers on the packaging line. Collect data for past two years.	Bob Latino	5/6/2001	No	0
Paper	Maintenance Procedures	Obtain maintenance procedures for how to repair and lubricate conveyor roller bearings.	David Craig	5/6/2001	No	0
Paper	Purchasing Data	Obtain purchasing information which shows purchasing habits over the past two years for the conveyor rollers. Look for a change in materials and/or vendors.	Robert Tomlin	5/6/2001	No	0
Parts	Failed Bearings	Collect past, present and future failed bearings. Take to machine shop and cut open for inspection.	Robert Tomlin	5/6/2001	No	0
Parts	Lubricant	Collect lubricant samples from failed bearings and from lubricant storage facility. Take samples to lab for testing and comparison.	David Craig	5/6/2001	No	0
People	Lubricators	Interview lubricators about how often they lubricate, what type of lubricant they use and how much lubricant they apply.	Bob Latino	5/6/2001	No	0
Position	Position of Failed Rollers	Map out locations of failed bearing and see if they are isolated to one area or sporadic in location.	Bob Latino	5/6/2001	No	0
Position	Position in Time	Map out time of failures of rollers and seek any correlation.	David Craig	5/6/2001	No	0
People	Purchasing Agents	Seek changes in any purchasing practices for lubricants and rollers.	Bob Latino	5/6/2001	No	0
Paper	Operations Information	Obtain two years of operational information to see any deviations in loads on the rollers.	Robert Tomlin	5/6/2001	No	0

Order

Ordering the Analysis Team

Another prerequisite to the PROACT® RCA approach is that an appropriate team be formed for the analysis at hand. Such an effort involves the following:

1. Providing an unbiased team facilitator - Assigning a person to lead the analysis who has nothing to gain or lose by the outcome; an expert in the facilitation of the PROACT® RCA methodology.
2. Amassing a team of cross-functional members - Ensuring that the team itself is not biased with one perspective; allowing team members to be experts as well as objective observers.
3. Establishing a Team Charter (Terminal Objective) for the analysis - Gaining consensus on a one (1) paragraph statement that outlines the reason the team is together.
4. Establishing Critical Success Factors (CSFs) - Establishing CSFs that outline how the team will know when they have been successful.

Team Members
Principal Analyst: Bob Latino

Name	Facility	ReadOnly	Readwrite	Remove
Robert Tomlin	RCI	Yes	No	No
David Craig	RCI	Yes	No	No

Analyze

Analyze the Event Data

Any undesirable outcome is a result of a series of "cause-and-effect" relationships. The data collected in the 5-P's section of this report will ultimately serve as proof (evidence) as to what actually did or did not occur.

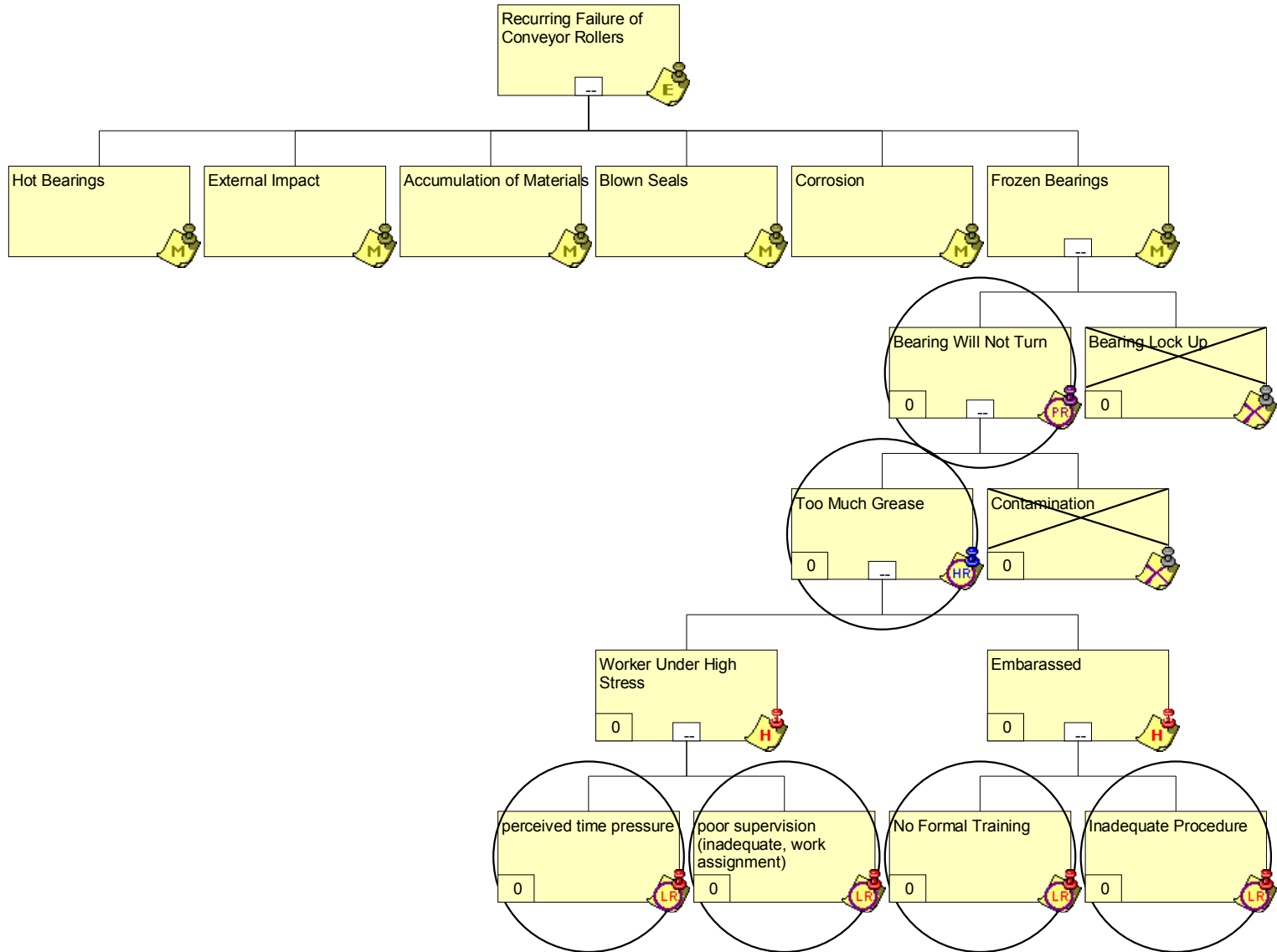
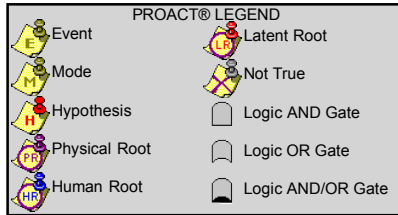
A logic tree will be used in the PROACT® RCA approach to graphically express the "cause-and-effect" relationships discussed earlier. In this approach, the top two levels of blocks represent the Event (Level 1) and the Modes (Level 2). From level to level represents a "cause-and-effect" relationship. These levels specifically represent the "undesirable outcomes" that did occur (facts only)!

From the MODE level, we do not know why they have occurred, just that they did. From this point we become hypothetical and repeatedly ask the question "How Can?".

As hypotheses are developed in this fashion, we use our 5-P's data to verify what is true and what is not true. In this fashion, facts lead our analyses not assumptions. This process is reiterated until we start to uncover the real root causes: the reasons that people make decision errors that lead to undesirable outcome.

Root causes originate from flawed systems in which people depend on to make informed decisions. We call these Latent Root Causes or Organizational Root Causes. Flawed organizational systems lead to poor decisions being made by well-intentioned individuals. We call these the Human Root Causes. Decision errors lead to Physical Root Causes, or events or conditions that are visible.

Only when we uncover the Latent Roots or Organizational System Roots are we actually conducting a "real" ROOT CAUSE analysis.



Verification Logs

Hypothesis	Description	Team Member	Verification Method	Outcome
Bearing Lock Up		Bob Latino	Direct Observation	Evidence does not support that bearing locked up internally.
Bearing Will Not Turn		Bob Latino	Direct Observation, inspect cross-section of failed bearings	Inspection reveals that failed bearings showed evidence of too much grease being applied, hence preventing the bearing from turning.
Contamination		Bob Latino	Inspection and testing of lubricant from storage location.	Evidence does not support the presence of contaminated lubricant.
Inadequate Procedure		Robert Tomlin	Review lubrication procedures for accuracy in current service.	Current procedures are inadequate for proper lubrication requirements.
No Formal Training		Robert Tomlin	Review training records for new lubricators.	No training exists for new lubricators.
Too Much Grease		Bob Latino	Inspection of failed bearings and interviews with lubricators	Physical evidence supports the presence of too much grease. Interviews also support that lubricators do not understand proper lubrication practices.

Communicate

Communicate Findings and Recommendations

As with this report, an effective means of communication is necessary to get RCA recommendations approved and implemented. This primarily involves communicating the conclusions of the RCA and the recommendations as a result of the RCA.

The elements of this section are intended to communicate the summary of the findings of the RCA for management, as well as the detailed recommendations made by the RCA team members for resolution of the causes identified.

A RCA cannot be successful without the approval and implementation of the analysis recommendations.

Event Summary

Over the past two years POLAR has experienced a 35% rise in the consumption of Roller Bearings for Conveyors. An RCA was commissioned to investigate this rise and eliminate the recurrence of Roller Bearing failures.

Summary of Findings

The RCA concluded that the root causes of the Roller Bearing failures were imbedded in improper training systems and inadequate lubrication procedures.

PROACT® Description

PROACT® is a methodology developed by Reliability Center, Inc. (RCI) to help users analyze their organization's most costly problems. The term PROACT® is an acronym for PReserving Failure Data, Ordering the Analysis, Analyzing the Data, Communicating Findings and Recommendations and T racking for Results.

Executive Summary Recommendations

Root Cause	Type	Recommendation	Team Member	Estimated Completion Date	Completed
No Formal Training	Latent	Develop formal training for lubricators and implement site wide.	Robert Tomlin	5/6/2001	No
Inadequate Procedure	Latent	Rewrite current lubrication procedure to apply to the current operation.	Bob Latino	5/6/2001	No

Detailed Recommendations

Root Cause	Type	Recommendation	Completed
No Formal Training	Latent	Develop formal lubrication training within a four week period. Prepare a selection process that will identify those that will benefit the most from such training. Break the training down into knowledge (classroom) and skill (application) development and provide testing to measure effectiveness of the effort.	No
Inadequate Procedure	Latent	<p>Develop a team of lubricators to help develop the lubrication procedures. Such a procedure should include an annual review component. The implementation of the procedure should be within one month.</p> <p>Proper training in the correct procedure should be provided to insure proper application.</p>	No

Acknowledgements

Company	Title	Name	Expertise
Chevron	Technical Rep	John Rister	
NDT Supply	Forensic Eng	Luis Sojo	

Analysis-At-A-Glance

Analysis-At-A-Glance

For the benefit of those that must oversee Root Cause Analysis (RCA) activities from the business perspective, this Analysis-At-A-Glance section provides such information.

In the PROACT® Root Cause Analysis process, there are three points where tasks are assigned to team members, they in:

1. data collection.
2. hypothesis verifications and
3. the development and implementation of recommendations.

At each of these points the analyst is afforded the opportunity to input the number of man-hours it took them to complete the task and to add any other associated costs to complete the task.

Analysis-At-A-Glance is the section where all of this information is brought together in a meaningful fashion. This is the location of where the estimated Return-On-Investment's (ROI-Year 1) reside for both the individual recommendations and the analysis as a whole. The detailed cost breakdowns are also available upon request in this section.

PROACT® RCA Analysis-At-A-Glance Overview

ANALYSIS AND TEAM DATA

Analysis Name:	Conveyor Roller Failures
Principal Analyst:	Bob Latino
Team Members:	David Craig, Robert Tomlin
Team Charter:	To identify the root causes of the Recurring Conveyor Roller Failures. This includes identifying deficiencies in or lack of management systems. Appropriate recommendations for root causes will be communicated to management for rapid resolution.
Critical Success Factors:	<ul style="list-style-type: none">- A cross-functional section of plant personnel/experts will participate in the analysis- A disciplined RCFA approach will be utilized- A measurement process will be used to track the progress of approved recommendations- All analysis hypotheses will be verified or disproven- Management agrees to fairly evaluate the analysis team's findings and recommendations- No one will be disciplined for honest mistakes
Start Date:	5/6/2001
Estimated Completion Date:	6/5/2001
Estimated Cost of Event:	\$250,000.00

STATUS OF PRESERVE

Number of Data Collection Tasks Assigned:	10
Number of Data Collection Tasks Complete:	0
% of Data Collection Tasks Completed:	No Data

STATUS OF ANALYZE

Number of Hypotheses:	10
Number of Verifications Assigned:	6
Number of Verifications Completed:	6
% of Verifications Completed:	100.00 %

STATUS OF COMMUNICATE

Number of Root Causes Identified:	6
Number of Recommendations Proposed:	2
Number of Recommendations Approved:	0
% of Recommendations Approved:	No Data

NUMBER OF RECOMMENDATIONS

Approved:	0	No Data
In-Process:	0	No Data
Completed:	0	No Data

ESTIMATED RETURN-ON-INVESTMENT (YEAR 1)

Estimated Cost of Event/Benefit Derived if Eliminated:	\$250,000.00
Cost of Root Cause Analysis and Recommendations:	\$0.00
Estimated Return on Investment (%):	No Data

Executive Summary: Root Cause Action Plan

Root Cause	Proposed Solution/Action Plan	Metric to Track	Team Member	Estimated Completion Date	Approved	In-Process	Complete
No Formal Training	Develop formal training for lubricators and implement site wide.		Robert Tomlin	5/6/2001			
Inadequate Procedure	Rewrite current lubrication procedure to apply to the current operation.		Bob Latino	5/6/2001			