

Advanced Technology ID# FT-14-004 Enhanced Infrastructure Technology Evaluation

Final Project Report

Developed by
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Organization



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1 Executive Summary

The goal of this project was to evaluate the effectiveness of an improved vault blower. Vault blowers are used to keep distribution vaults, containing transformers, at an acceptable ambient temperature. The approach involved examining issues with current ventilation systems, developing a new equipment specification addressing these limitations, and field demonstrating a prototype built to these new specifications. Both the performance and cost of the new blower are favorable. So, a recommendation has been made to SCE's Distribution Apparatus Engineering group to adopt this new vault blower specification.

This project was funded by EPIC I.

2 Project Summary

The following subsections address the key project elements.

2.1 Project Objective

Southern California Edison's (SCE) Distribution Apparatus Engineering group asked the Advanced Technology organization to investigate and develop recommendations for an enhanced, ruggedized, cost effective vault ventilation system (strengthened, longer service life blowers & related components).

2.2 Problem Statement

Data shows that SCE vault blowers last approximately 2 years then fail due to corrosion, bearing, and balancing issues. Insufficient ventilation allows vaults to overheat, shortening vault life. Average vault replacement cost is approximately \$250K.

2.3 Scope

The intent of this project was to develop a specification that improved blower life, acquire and field test a prototype based on this specification, and provide recommendations to the Distribution Apparatus Engineering group and other Independently Owned Utilities.

2.4 Schedule

This project started in 2014 was complete in 2016.

2.5 Milestones and Deliverables

- Investigate current state issues 4th Qtr. 2014
- Develop hardened blower specification 2nd Qtr. 2015
- Procure prototype vault blower 4th Qtr. 2015
- Initiate pilot December 2015
- Evaluate/inspect vault blower June 2016
- Provide Recommendations to SCE Distribution Apparatus Engineering 2nd Qtr. 2016

3 Test Set-Up/Procedure

The prototype vault blower was visually inspected to ensure it met new specifications. Noise level readings were taken in a lab environment. The prototype was installed in a vault in the field for evaluation. Noise level readings were taken in the field and at the end of the field

test. The blower was visually inspected at the end of the test period (six months) for corrosion. It remains in operation.

4 Project Results

The following subsections specifically address the technical results, lessons learned, and technology/knowledge transfer plan for the project.

4.1 Technical Results, Findings, and Recommendations

Existing blowers use motors that are not enclosed and allow moisture into the motor, use un-sealed ABEC-1 bearings, and have impellers that are balanced to grade G 6.3. Key features of the hardened blower specification are: severe duty totally enclosed fan cooled motor (IEEE 841 or equivalent), double sealed ABEC-5 grade bearings, impeller balanced to a higher quality grade G 2.5, and stainless steel louver rivets.

After six months in service, the blower showed no signs of corrosion, the noise level reading stayed consistent at 85 dB (install vs. 6 months later) which is indicative that bearings & balancing are as installed. Based on these results, SCE is confident that use of a hardened blower will significantly reduce the meant time between failure (2 years).

Based on our engineering judgement, test results and evaluation, we expect that the new hardened vault blower could last up to 10 years. We recommend standardizing the new blower going forward. We also recommend that Engineering continues to monitor and track the performance of the new blower to find out its true lifespan.

4.2 Technical Lessons Learned

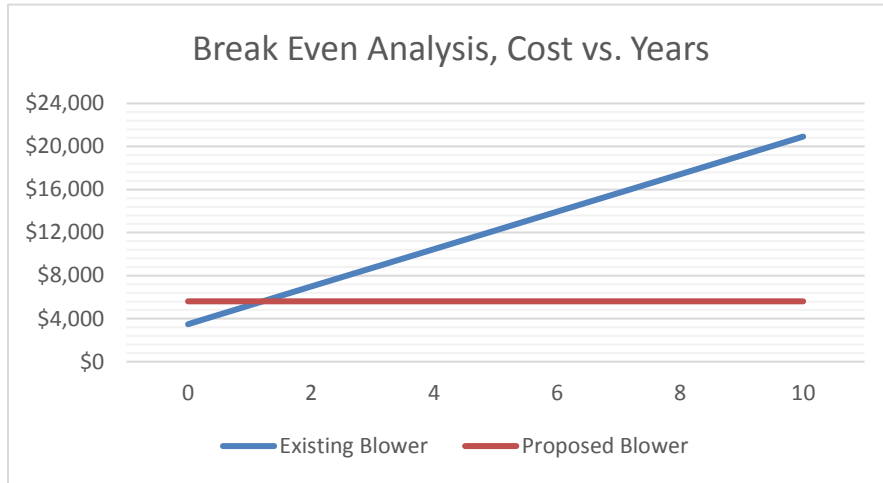
NA

4.3 Benefit Analysis

Utilizing hardened blowers in SCE distribution vaults will lower O&M and Capital costs and contribute to minimizing premature asset degradation (see analysis below). Existing blowers cost approximately \$2,487 and last approximately two years. The hardened blower procured for this demonstration cost \$4,613. The labor to install a blower is the same for either blower; about \$1,000.

The table below shows the cost of the new and old blower over a ten year period, and an expected savings (benefit) of \$7,822 (without inflation). Furthermore, the cost of the new blower is recovered in year 3.

Year	\$ Old Blower	\$ New Blower	Benefit
1	\$ 2,487	\$ 4,613	\$ (2,126)
2	\$ 2,487	\$ 4,613	\$ (2,126)
3	\$ 4,974	\$ 4,613	\$ 361
4	\$ 4,974	\$ 4,613	\$ 361
5	\$ 7,461	\$ 4,613	\$ 2,848
6	\$ 7,461	\$ 4,613	\$ 2,848
7	\$ 9,948	\$ 4,613	\$ 5,335
8	\$ 9,948	\$ 4,613	\$ 5,335
9	\$ 12,435	\$ 4,613	\$ 7,822
10	\$ 12,435	\$ 4,613	\$ 7,822



4.4 Technology/Knowledge Transfer Plan

Recommendations were made to upgrade the existing vault blower specification to the new hardened vault blower specification. The hardened vault blower is not an SCE proprietary piece of equipment and can be procured by other utilities from the vault blower manufacturer, or procured via competitive procurement. SCE expects the cost to go down with large procurements.

5 Metrics

The new hardened vault blower should last significantly longer than the unit currently used by SCE and result in significant savings.