



Thor Engineering, LLC Significantly Reduces Arc Flash Hazard Levels at Motor Control Centers in Georgia-Pacific OSB Manufacturing Plant

Customer
Georgia-Pacific, LLC

Industry
Wood Products,
Home Building Products,
OSB Manufacturing Plant

Utility Service
115 kV
20 MVA Connected Load
11 Unit Substations
30 Motor Control Centers



Project Description

In 2005, Thor Engineering, LLC was retained to conduct a power distribution systems analysis at a large OSB manufacturing plant in Skippers, VA. The services provided included:

- Short Circuit Analysis
- Coordination Study
- Arc Flash Analysis

As a part of our standard services, we always look for ways to improve electrical system reliability and improve safety. Our reports provide recommendations where applicable.

System Background

12.47 kV is distributed underground throughout the plant to 11 unit substations. Each unit substation consists of a 2 MVA oil-filled pad-mount transformer close-coupled to a 480 volt switchgear with draw-out power circuit breakers. Each 480 volt draw-out power circuit breaker is an 800 Amp frame with solid-state trip unit. Due to the high amount of available fault current at the secondary of the transformer, the manufacturer equipped each of the draw-out power circuit breakers with 1600 Amp, Class L fuses. The solid state trip units have Long Time and Short Time trip functions (no instantaneous trip function). Each 480 volt draw-out power circuit breaker feeds an 800 Amp Motor Control Center.

Initial Findings

Due to the lack of instantaneous trip function on each circuit breaker, and in conjunction with the high available fault current, Arc Flash Hazard levels at each of the 30 Motor Control Centers (MCCs) was very high (HRC #3). This would mean that electrical workers would be required to wear Category 3 Arc Flash Switching Suits when performing energized work in the MCCs.

Plant management realized that it would be difficult for maintenance personnel to perform daily tasks in this type of Personal Protective Equipment (PPE) and furthermore it would be difficult to manage compliance. A solution to lower the Arc Flash Hazards at each MCC was needed.

The Solution

Since each of the 480 volt draw-out power circuit breakers was already equipped with Class L current-limiting fuses, the solution was to reduce the size of these fuses from 1600 Amp to 1200 Amp. The lower fuse size still coordinated with the 800 A frame circuit breaker and it provided improved current-limiting capability. By modeling the entire system using commercial engineering software we could see that the 1200 amp fuse would sense an arc fault in the MCC and clear within a ¼ cycle (0.004 secs.). This greatly reduced the Incident Energy released during the Arc Flash event. Now the MCCs are rated HRC #0 which is the lowest Arc Flash Hazard level as defined in NFPA 70E. PPE requirements were reduced

to simply having to wear long sleeve cotton clothing and cotton/natural fiber pants (standard street clothing).

Recognizing the major safety improvement, plant management quickly authorized the funds to purchase the new fuses. During the next scheduled plant outage the fuses were replaced and the Arc Flash Hazard Warning Labels were installed.

Simple, Yet Effective

This case study shows that it is possible to lower Arc Flash Hazards in a typical industrial plant by employing simple, yet highly effective solutions. The cost of replacing fuses is negligible compared to the benefit of improved worker safety.

Arc Flash Hazards were reduced from an HRC #3 to an HRC #0.

The maintenance worker no longer has to wear cumbersome PPE to perform routine tasks.

To learn more about Arc Flash Solutions or other Engineering Services, contact:

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