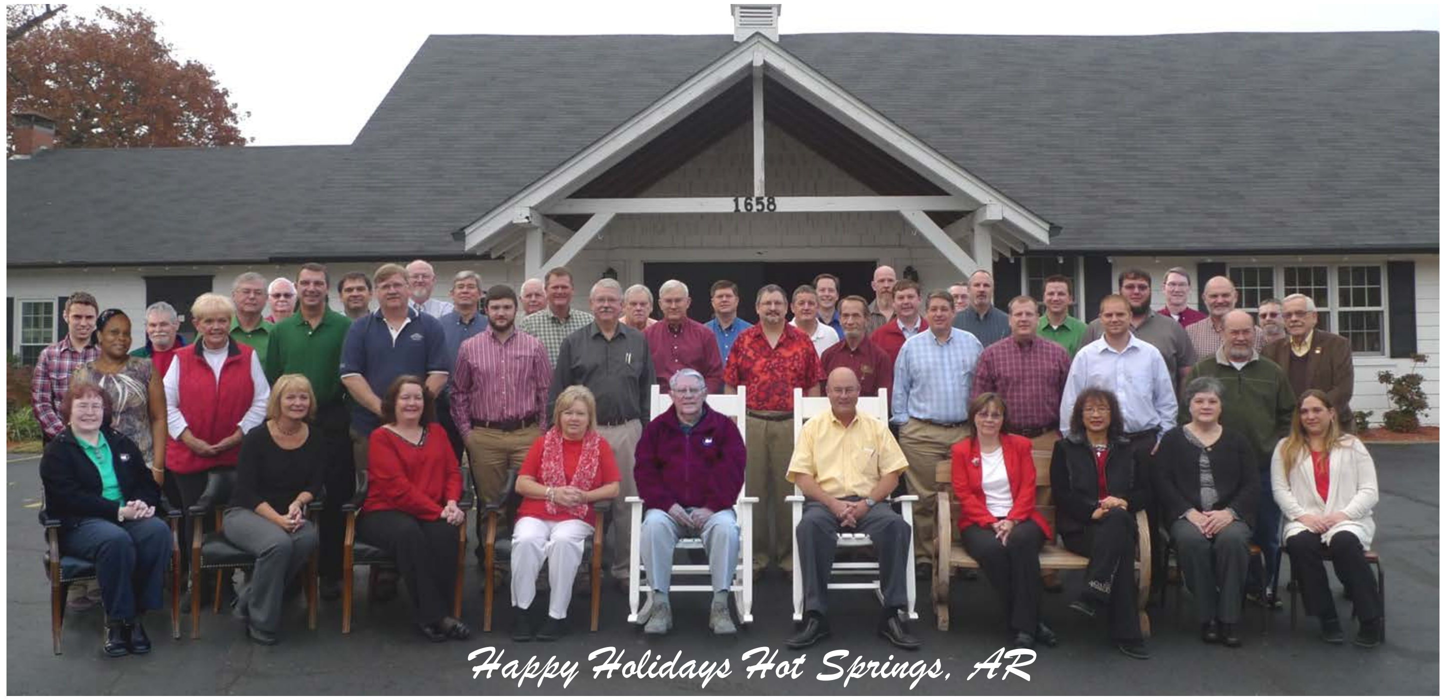
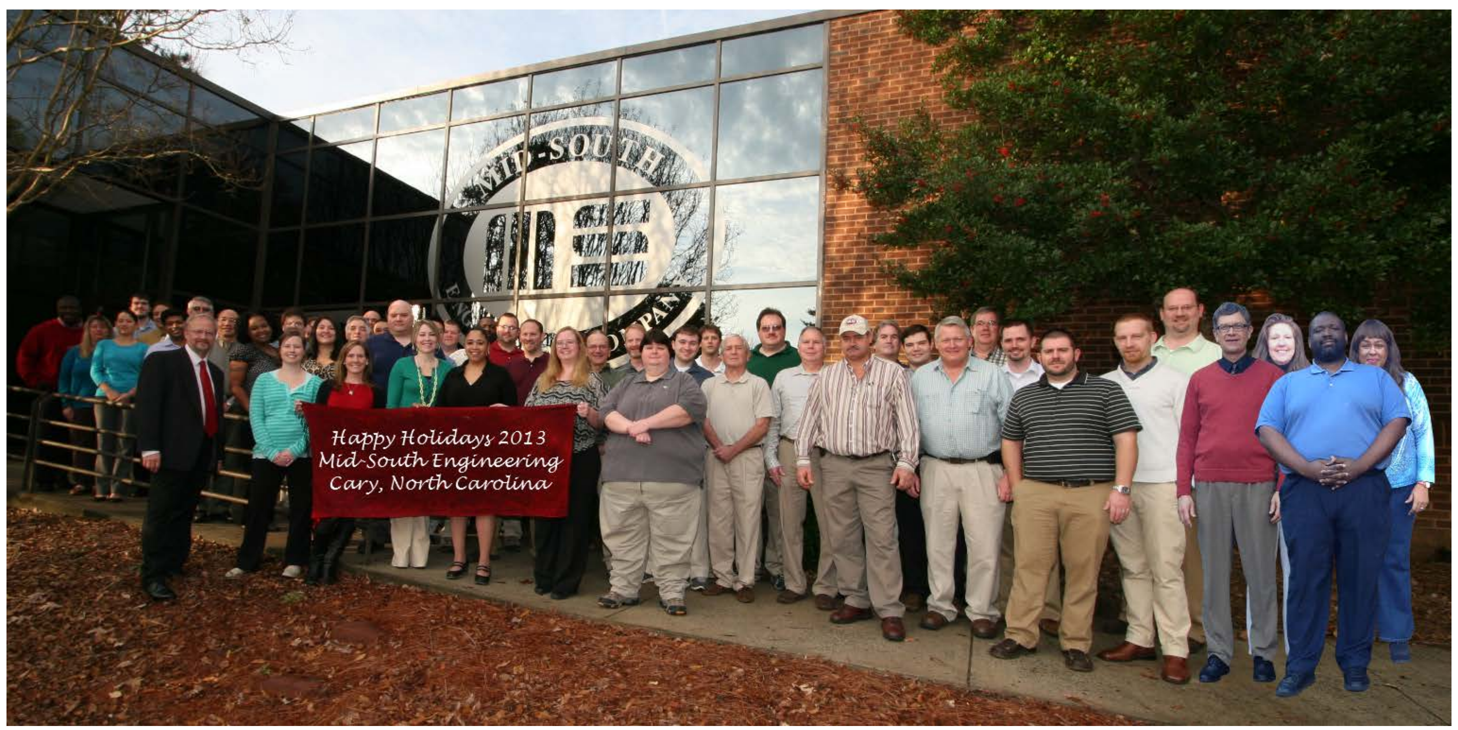


Merry Christmas & A Happy New Year from All of Us!



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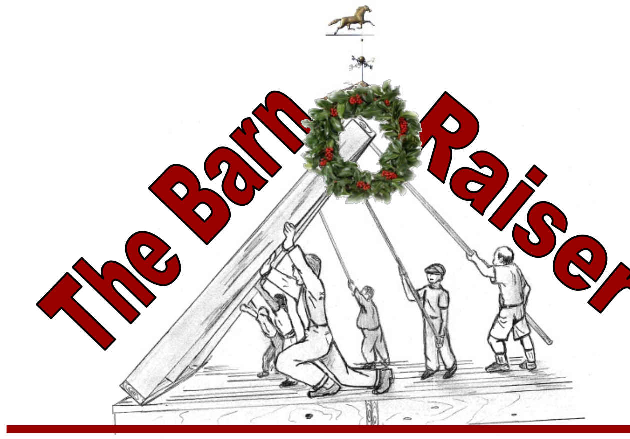


Mid-South Engineering Company

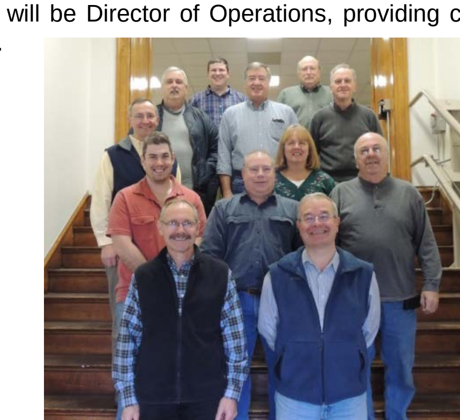
Issue 48 **Working Together** **Fourth Quarter 2013**

Mid-South Engineering Announces Maine Office

Mid-South Engineering Company is pleased to announce the acquisition of D&S Engineering, Inc. of Millinocket, Maine. The acquisition brings together two established and respected names to better serve their customers in the building products, pulp and paper, renewable energy, hydroelectric power generation, and mining/minerals/material handling industries. The existing operations of D&S Engineering will continue to operate as **D&S, a division of Mid-South Engineering Co.**

Lee Murphy, president of Mid-South Engineering, says, “Mid-South and D&S have similar traditions of technical excellence, strong client relationships, and a history of providing innovative solutions to our clients’ many needs.” Murphy continues, “Our client bases and skill sets are highly complementary and both firms share a deep commitment to partnering with our clients on projects of any size to provide quality, meaningful deliverables. I am confident that our combined resources will provide our clients with unique benefits and will provide enhanced opportunities to our employees."
Based in Hot Springs, Arkansas since 1969 and in Cary, North Carolina since 2006, Mid-South is a well-known provider of innovative and reliable engineering solutions for a broad range of industrial applications with an emphasis in the building products and renewable energy industries. More information about Mid-South Engineering is available at www.mseco.com.

D&S a division of Mid-South Engineering Co, formerly known as D&S Engineering, Inc. has been operating in Millinocket, Maine since 2003. Most of D&S’s staff members have decades of experience in forest products, manufacturing, and power generation. D&S will continue to be based in Millinocket, Maine and its experienced staff will remain intact to provide common sense engineering to its clients. Its capabilities will be enhanced by the experienced staffs at Mid-South Engineering Company. Eldon Doody will be Director of Operations, providing continuity to D&S’s clients.



Millinocket, Maine Staff

How Do They Do That? Tankless Water Heaters

Common in Japan and Europe, tankless (or demand) water heaters began appearing in the United States over 25 years ago. Unlike conventional storage tanks water heaters, tankless models heat *on demand*, without the use of a tank. The heating device is activated by the flow of water when a hot water valve is opened. Once it starts, the heater delivers a constant supply of hot water at temperatures ranging from 100°F to 140°F. Here is how the process works:

- A hot water tap is turned on
- Cold water enters the heater
- A sensor detects the water flow
- The computer automatically ignites the burner or powers the heating element
- Water circulates through the heat exchanger
- The heat exchanger heats the water to the desired temperature
- When the tap is turned off, the unit shuts down

While the supply of hot water is constant, the flow is limited by the capacity of the water heater. Typically, demand water heaters provide hot water at a rate of 3 to 8 gallons per minute.

Electric and natural gas tankless units are available. Gas-fired demand water heaters produce higher flow rates than electric ones. Sometimes even the largest gas-fired model cannot supply enough hot water for simultaneous use in larger homes or businesses. In these cases, two or more units may be necessary.

Tankless water heaters offer many advantages compared to storage units. They only heat water as it is needed, eliminating the need to use energy by constantly heating a tank full of hot water. The typical tankless unit is also compact and mounted on a wall to save space. Most are available in outdoor as well as indoor mounting configurations. Tankless units typically have a long life, lasting an average of 20 years: twice as long as tank systems. Potential drawbacks of tankless systems include a higher initial purchase price and a limited flow rate.

This article previously appeared in the Entergy Solutions Plus newsletter, and is used with permission.

Is That a Breaker?

By: Bill Brown, Electrical Engineer

(Update of an article that appeared in the Third Quarter, 2007, Issue of The Barn Raiser)

Remember the "Good Old Days"? Homes often had only one receptacle in each room, and you had to be careful not to plug in too many appliances or a fuse would blow. That was when every house had a fuse box and there was always a box of spare fuses nearby—some of the time. It was not too uncommon to run out of spare fuses, and a penny was placed behind a blown fuse to get the lights back on. That was a risky practice because the fuse was present to prevent a sustained overload of the wiring. A penny behind a fuse bypassed the protection of the fuse and left the main fuse (if there was one) as the only protection from a short circuit or overload. This practice often resulted in fires started by allowing wiring to become grossly overheated.

Today, most homes have breaker panels, so the opportunity to use a penny to bypass circuit protection is nearly extinct. But today there is a similar situation in industrial power distribution systems that is just as risky as the penny behind the fuse—and it is far too common. A fairly normal practice in the past has been to cannibalize an unused motor starter for use as a feeder for some non-motor load. Generally, an electrician would connect equipment directly to the load side of the circuit breaker, bypassing the starter contactor and overload block. The problem is that the device that looks like a molded-case circuit breaker inside a starter bucket is very likely NOT a circuit breaker. It is more likely to be a high-interrupting motor circuit protector or HMCP (or MCP).

The difference between a breaker and an HMCP is significant and must not be overlooked. Their misuse as a circuit breaker is the modern equivalent of the penny behind the fuse. Here is why.

A true circuit breaker has two internal mechanisms to cause the breaker to open or "trip". First, it has an instantaneous overcurrent mechanism that senses the extremely high currents that are likely to occur during a direct short. Second, a circuit breaker contains an additional mechanism that senses ***non***-short-circuit overloads. In many cases, a breaker is referred to as a thermal-magnetic breaker. The instantaneous short-circuit trip is a magnetic device; the non-short-circuit trip is a thermal device. (Note that dual-element, time-delay fuses contain these same two functions.)

This second (non-short-circuit) mechanism has an inverse-time characteristic that allows the breaker to hold for a time if the overload is slight (i.e., just above nominal trip setting), but trip more quickly if the over-current is higher. This allows the breaker to hold during an initial inrush of current, but causes it to trip if the over-current condition is sustained.

Circuit breakers are rated for their long-term operating current. For example, a 50-ampere breaker can carry a sustained 50-ampere current indefinitely (within tolerance). Exceeding this rating, at 60-amperes for the example, activates the inverse-time mechanism and causes the breaker to trip. The time necessary for the trip to occur depends on the breaker's characteristics. Note that some breakers, particularly large ones, have interchangeable or adjustable trip features that allow the breaker's settings to be tailored to the load. The trip rating of the breaker and the current ratings of downstream circuit components must be matched for safe and reliable operation.

This inverse-time overload function is necessary to protect conductors and other circuit components because it will eventually trip on any circuit current above its rating or setting. An HMCP, however, completely omits this overload mechanism. The current rating shown on an HMCP is actually the continuous safe current rating for the device. It can operate at this rating indefinitely. But unlike a true circuit breaker, if the circuit current exceeds this rating, nothing happens unless the current is high enough to trigger the short-circuit trip mechanism. The current at which a trip occurs is often adjustable and may range from three- to ten-times the continuous current rating.

Therein lays the problem: An HMCP and a real circuit breaker will both trip on a short circuit when the current reaches three- to ten-times the continuous rating. However, at a lower current, such as twice the rated current, an HMCP does absolutely nothing—at least not immediately. Eventually some downstream component will fail during an overload and draw enough current to trip the HMCP's short-circuit mechanism. By the time this occurs, wiring and other circuit components, including the HMCP itself, will be damaged and will require repairs before the circuit can be returned to service. Such an event could easily result in a fire and will almost certainly lead to extended downtime.

So, while an HMCP looks like a suitable protective device, it is really more like the proverbial penny behind the fuse since the HMCP provides no overload protection. This is not only unsafe, it is also a violation of the National Electrical Code (see NEC 240.4)

NFPA 70E compliance has compelled most mills to survey electrical equipment in order to determine the arc flash hazard level and to identify other issues. The survey of equipment can be a very convenient resource for finding HMCP mis-application if the brand and all part numbers of "breakers" were recorded. Also note that a third breaker-like device, the molded-case switch, may also be found, particularly in imported equipment. (Molded-case switches may look like a breaker but are just switches <u>without any tripping mechanism</u> at all.)

To summarize, there are several steps that need to be taken to address the misuse of HMCP's. First, all installed devices that look like circuit breakers should be examined to insure that the devices are providing the proper level of protection for the circuit. HMCP's should only be used in conjunction with a contactor and thermal overload block (i.e., in a motor starter). Second, spare circuit breakers and HMCP's need to be segregated and <u>clearly</u> identified by function. This will help prevent the wrong device from being installed by mistake. Third, all electrical personnel need to be trained with regard to the difference between breakers and HMCP's. And, finally, every HMCP that is found being used as a feeder breaker needs to be replaced with a real breaker (thermal-magnetic) as soon as possible.

<u>CODE MATTERS</u>

Codes ***do*** matter in the building and industrial plant world…..A lot.

By: Karen Griffin, Staff Architect, MSECO Hot Springs

This new section, "Code Matters" will be used time to time to address important Code questions that have been asked by clients during the design process, and work on answering them in a general sense. Every situation is unique in a project and the multitude of codes to follow and design choices should be evaluated by engineers and architects to help clients make safe and economic decisions when renovating, upgrading, or building a new plant. So here we go, first question:

Question:

I want to incorporate tornado shelters in my existing plant. What are my options?

Referenced Codes: The International Building Code (IBC), ICC-500 (international Code Council), FEMA-320, FEMA P-361, SDI 100

Options:

1. <u>In-Ground Safe Room</u>:

Could be a precast concrete manhole or concrete box located on property. Added details can make this option compliant. These type units may be fully buried or earth bermed as well. Fiberglass molded units are another option with stairs and carpeting and seats. Each one of these types of units may hold 5 people or thereabouts, depending on box size. And yes, there are ventilation holes. A 4-5 person unit may run between $1000 and $ 3500 each.

2. **<u>Site Built Interior Room in New Building</u>:** Make a conference room or toilet room double as shelter rooms. Specific detailing by an engineer for this concrete or masonry room can make this option FEMA compliant. This can be an economic solution if the room does not get very large. A conference room could be designed quite nice so that it would not look like a "bunker". A 16′x24′ conference room with table and chairs will accommodate about 60 people and cost around $30,000 in a new building or addition. A site build tornado room which could double as another use may be very expensive for an existing facility because the foundation work will drive the cost up.

3. **<u>Above Ground Prefab Room in Existing Building</u>:**

Purchase a premanufactured room with minimal site assembly. These may be made of steel or Kevlar and could be incorporated into surrounding walls to look more "friendly". An 8′x10′size would hold 15-20 people and cost about $10,000. Remember…this room must stay empty until needed, and not used as storage which may be very tempting!

Did you know?

- In most areas of the country, safe room structures must withstand winds of 250 mph and windborne debris impact of a 15 lb. flying missile traveling at 100 mph.
- Doors must swing into the shelter room so fallen debris outside does not block the doors.
- Doors must be rated for the ANSI and FEMA standards and labeled, as well as the door frame. May have heavy weight or extra hinges, steel stiffened core.
- Signage must be clearly posted and should direct employees through the building or from building to building.
- Estimate 5 square feet per person (for short duration tornado).
- The distance to travel to the room is at the discretion of the plant manager and designer.