
The Top 5 Pitfalls in Designing NEMA Enclosures

Presenter: Blair Haas
President
Bud Industries, Inc.



The 5 Most Common Errors Made in Specifying NEMA Enclosures

- Choosing the wrong rating
- Choosing the incorrect material
- Choosing the wrong size enclosure
- Forgetting to value product features
- Overlooking the ability to readily modify the enclosure

Why NEMA?

- 25 years ago, NEMA products were used only in electrical applications
- Today, as electronics has invaded areas such as Factory Automation, Indoor and Outdoor Controls, and Telecommunications, NEMA has become the fastest growing portion of the electronic enclosure industry
- Sales within the electronics channel have grown by over 350%!

Common Error # 1: Choosing the Wrong Rating

- In a recent survey, over 70% of engineers were confused by the different NEMA ratings
- 40% of all enclosures that require protection are specified to the wrong level
 - Most use level that does not provide adequate protection
 - Balance is overkill, wasting dollars and time

What is NEMA?

- National Electrical Manufacturer's Association
- Ratings method to determine:
 - Protection level of the product from the environment
 - Location of product

What NEMA rating do you need?

- **NEMA 1:**
 - ❑ Unit is protected from incidental contact with the internal equipment
 - ❑ Basically – there is enough protection that you cannot put your finger inside the unit
 - ❑ This is a basic level that most enclosures can meet
 - ❑ It provides the product with safety but not environmental security

What NEMA rating do you need?

- NEMA 12:
 - ❑ Often the most misunderstood of the ratings
 - ❑ For indoor use only
 - ❑ Provides protection against falling dirt or circulating dust, fibers, and dripping and light splashing of non-corrosive liquids
 - ❑ No protection against significant environmental risks including icing, spray of water or liquids,

What NEMA rating do you need?

- **NEMA 4:**
 - ❑ Provides greater protection than NEMA 12
 - ❑ Can be used indoors or outdoors
 - ❑ Protects against falling AND sprayed liquids
 - ❑ Can withstand the formation of ice
 - ❑ Not required in many situations depending on location of product

Common Error #2

Choosing the Wrong Material

- Most US Engineers automatically choose metal enclosures – wasting money and flexibility
- NEMA enclosures are available in a wide variety of materials
- These include
 - Plastic
 - Die-Cast
 - Fiberglass
 - Steel

Why Choose Plastic?

- Advantages

- ❑ Light
- ❑ Easy to carry
- ❑ Corrosion resistant
- ❑ Low unit price
- ❑ Can be transparent
- ❑ Can be readily wall mounted



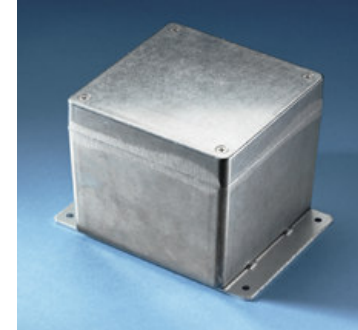
- Disadvantages

- ❑ Expensive tooling for modifications to size (up to \$40,000)

Why Choose Die-Cast

- Advantages

- Extremely rugged
- Light weight
- Natural shielding
- Low unit price
- Easy to modify
- Easy to mount
- Can be powder coated for better appearance



- Disadvantage

- Expensive tooling for unique sizes
- Not as visually attractive

Why Choose Fiberglass

- Advantages

- Light weight
- Stronger than ABS or polycarbonate
- Corrosion resistant



- Disadvantage

- Up to 2 x more expensive piece pricing than ABS or polycarbonate
- Expensive to tool
- Higher unit pricing than other plastics

Why Choose Steel?

- Advantages

- ❑ Durable
- ❑ Easy to modify dimensionally
- ❑ Good corrosion protection with proper finish
- ❑ In stainless, excellent corrosion resistance
- ❑ Easy to change finishes

- Disadvantages

- ❑ Heavy
- ❑ Expensive piece pricing



Common Error #3

Choosing the Wrong Size Enclosure

- While this may sound easy – there are options
- Very important to determine what needs to be protected – and what does not
- Often customers “over-buy”

Pick the Right Size

- For example, no need to buy large cabinet rack if only a small portion needs protection
- Can buy rack mount product that is NEMA protected – as dust may not bother other components
- Saves the cost of protecting the complete rack

Pick the Right Size

- Choosing an enclosure that is too small may require significant design time to insure proper location of internal components
- Too small enclosures limit the ability to upgrade components as technology advances

Common Error #4

Forgetting to Value Product Features

- All too often, engineers focus on picking a product of proper specs, assuming all products are the same
- Overlooking product features can penalize the production team as well as the customer

Issues to Consider

- Opening and Closing Mechanism
 - Key, knob, latches can all impact the ease of installation, service, as well as security
 - Major issue with ease of maintenance
- Wall/Equipment Mounting provisions
 - Be sure product has brackets to ease installation



Issues to Consider

- Clear Lids/Bodies
 - ❑ Avoids having to drill holes for readouts
 - ❑ Eases maintaining NEMA rating
 - ❑ Ease of viewing concerns or issues with components



Common Error #5

Overlooking the Ability to Readily Modify the Enclosure

- Few boxes can be used as is
- Typically need input and output
- May also need special finishes, screening, etc.

Issues to Consider

- Ease of modification
 - ❑ Some materials are easier to drill than others – or may require special tools and bits
 - ❑ Brackets, etc. are harder to add to plastics once production is complete
 - ❑ Special finishes need to be molded into plastic and fiberglass

Avoid the Most Common Errors in Specifying Enclosures:

1. Be sure to pick an enclosure with the right rating
2. Be sure to pick an enclosure made of the right material
3. And be sure to pick an enclosure of the right size
4. Make sure the enclosure has the features you need to speed installation and ease use
5. Prepare for modifications

While enclosures are relatively “low tech” – their high ASP means that an error is costly and has a huge impact on your budget. Choose wisely