



**Custom
Progressive Metal
Stamping for
Manufacturing
EMI Shielding**

All electronic devices and circuits produce electromagnetic (EM) radiation when in operation. Things like computers, cell phones, electronic medical devices, and “smart” vehicle safety systems all give off some amount of radiation to neighboring devices, and can be negatively impacted by radiation from devices near them. If not properly contained, or shielded, the radiation causes interference with the signals that devices transmit, receive, and use to function correctly.

In this eBook, we'll look at the effects of EM interference, ways to reduce or mitigate it through shielding, and benefits of progressive stamped metal electromagnetic interference (EMI) shields. Not only can these be produced in custom designs for many applications, but also the progressive stamping process allows for great and necessary precision along with high-volume production.



Effects of Electromagnetic Interference

Because electronic devices are so ubiquitous, there are countless examples of electromagnetic interference (EMI) in the devices we use in daily life, such as:



Garage Door Openers



Vehicle Infotainment Systems



Door Locks/ Security Systems in Buildings and Vehicles



Computers



Vehicle Advanced Safety Systems



USB Ports and Other Device Connection Points



Cell Phones



Aerospace Communications Systems



“Smart” Appliances and Electronics



Medical Devices



Vehicle Navigation Systems



Electronic Actuators on Doors and Equipment

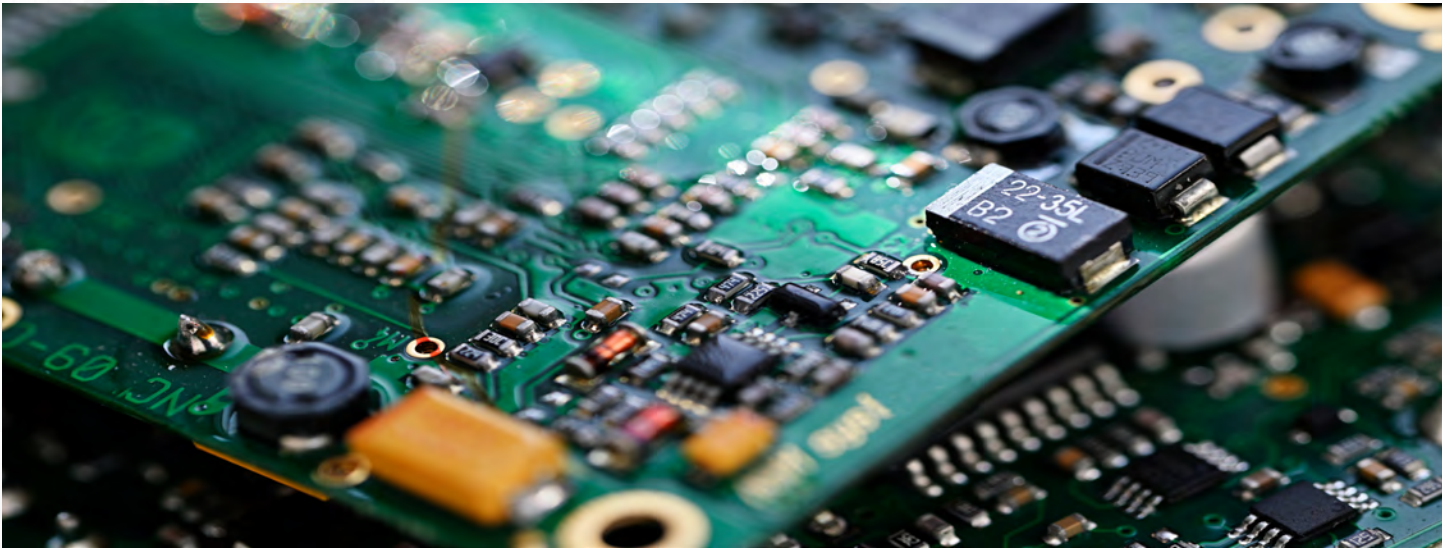
Just like static on the radio or a crowd packed on an escalator, radiation “clutters up” the frequency range in which signals travel so the data can’t get through clearly or at all. The radiation alters the ability of one circuit to trigger the next action or circuit correctly (or even at all) in a device, interfering with the transmission or reception of data. EMI can be internal (i.e., circuits within the same device interfere with each other) or external (i.e., other nearby devices like cell towers or other vehicles interfere with the workings of the device in question).

Effects of EMI range from annoying (as in the case of your car’s GPS being unable to find your exact location) to deadly (such as a cockpit radio’s signal or pacemaker failing to transmit critical data at the right time). The impact on devices’ functioning may include:

- Fully or partially blocked signals (e.g., weak or missed detection of a signal)
- Loss of data in transmission from one circuit or component to another (e.g., incomplete signal transmission triggers an incorrect action in the device)
- Equipment failure or damage (e.g., inability of a device to detect an object or signal)
- Compromised safety (e.g., vehicle safety sensors or medical device malfunctions)



How Do EMI Shields Prevent Electromagnetic Interference?



EM radiation must be controlled in two ways: containing it to prevent outward radiation, and blocking it from getting in. This is commonly accomplished through EMI shielding.

Stamped metal EMI shields are an effective choice. Because every application is unique, device and PCB manufacturers often require custom shields for their products.

For example, holes in a shield (also called apertures) are often no larger than $1/20$ of the wavelength and may be as small as $1/50$ the size. Most designers include requirements for size, placement, and quantity of apertures in their part prints. In addition to blocking waves, the holes also allow for airflow and regulation of thermal buildup in the devices. Additional part features may include seams and slots to hold frames and covers together.

Your device and PCB designers know which circuits emit harmful amounts of radiation and which are most vulnerable. Therefore, they are able to create precise shield designs to accomplish needed protection while also physically fitting into the overall product dimensions. A progressive stamper, like CEP Technologies Corporation, can take your EMI shield design and mass produce it based on your part prints and specifications in a range of materials for a variety of applications and industries.

Metallic shields reflect or absorb waves to minimize or reduce interference. Material choice is based on the electrical or magnetic dominance of the waves in question and how different metals reflect or absorb them. The degree to which they do this is called their shielding effectiveness, or SE. Required strength and shield size are also considerations in selecting materials.

The need for EMI shielding is so vast it touches almost every industry. Major consumers of EMI shield components include the automotive, appliance and home electronics, computer, telecommunications (including cell phones), medical device, and aerospace industries, along with countless military applications.

Stamping Process for EMI Shielding

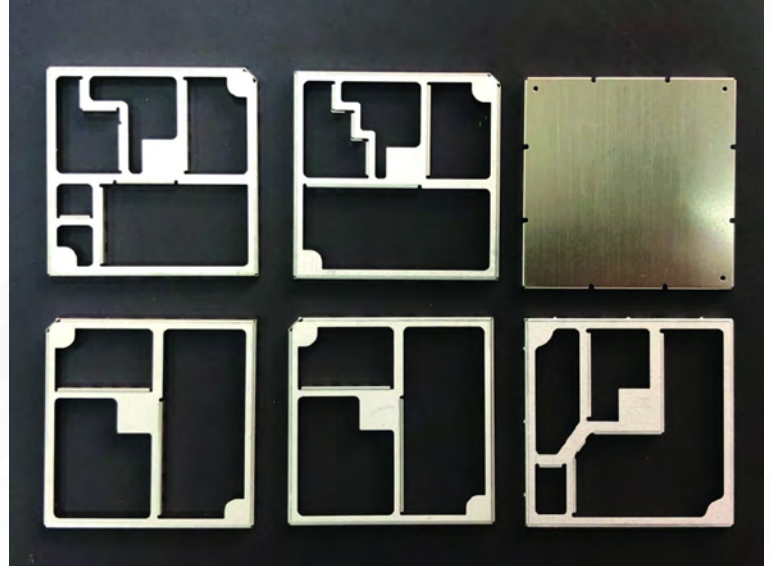
Partnership is the key to a successful stamping project. As the customer, you are the expert on the design and shielding effectiveness (SE) of the part. This includes material selection, specifications and tolerances, and overall part geometry and design. It is always a good practice to share the details of design intent and critical features with your stamper. This ensures that the finished stamped shield components meet your requirements.

In addition to a sound part design, components must be manufacturable. This means that the specifications and tolerances of the design must be achievable through the progressive stamping process. Requirements such as flatness, profile tolerance, corner angles, and clean edges contribute to the quality and performance of the finished shield.

A precision stamper like CEP Technologies can help by suggesting ways to optimize your design and material selection for efficient and cost-effective manufacturing. CEP also manufactures tooling and dies in-house, so production can get underway quickly.

Metal shields are commonly made of copper, brass, nickel, silver, steel, or tin. Coatings of tin or nickel may also be used to protect the base metals. The choice of materials involves balancing characteristics of the metals (e.g., conductivity, solderability, permeability, thickness, and weight) to create the best protective shield within time and budget constraints.

For designers, a best practice is to plan for shielding early in design stages. This reduces any rushing to add it once the PCB or device is finalized and in testing. As with most manufactured components, shields take up space in the assembly, and cost time and money to produce and test, so planning ahead may result in savings later. Likewise, talking with a progressive stamper about your shield design and requirements early means you'll know if there are potential challenges with material availability or details of the stamping process.



Why Work With CEP Technologies?

CEP Technologies has decades of experience stamping miniature to small parts from a variety of materials in thicknesses from 0.002" to 0.080". All tooling is created and maintained in-house for the lifetime of your stamping project. We also offer our customers rapid prototyping, electroplating, laser cutting, photo-chemical etching, cleaning, and tape and reel packaging of finished parts.

At CEP, we're not just another stamping vendor. We strive to be your partner with expertise in the ins and outs of progressive die stamping, material selection, and efficient production.

Contact us today to discuss your next EMI shielding project or **request a free quote!**

About CEP Technologies

CEP Technologies is a leading supplier of miniature to small precision metal stampings for numerous industries and applications. We provide high-volume custom metal stampings and rapid prototyping services for customers around the world. With decades of experience in progressive die metal stamping methods, our team manufactures EMI shields and custom stampings that deliver the highest quality and efficient production.

We serve companies in the automotive OEM and aftermarket sectors, telecommunications, power and circuit protection, medical devices, electronics and EMI/RFI shielding, electrical and lighting, manufacturing, and more. **Contact us** today to get your project started.

Contact Us

Resource Library

Request a Quote



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