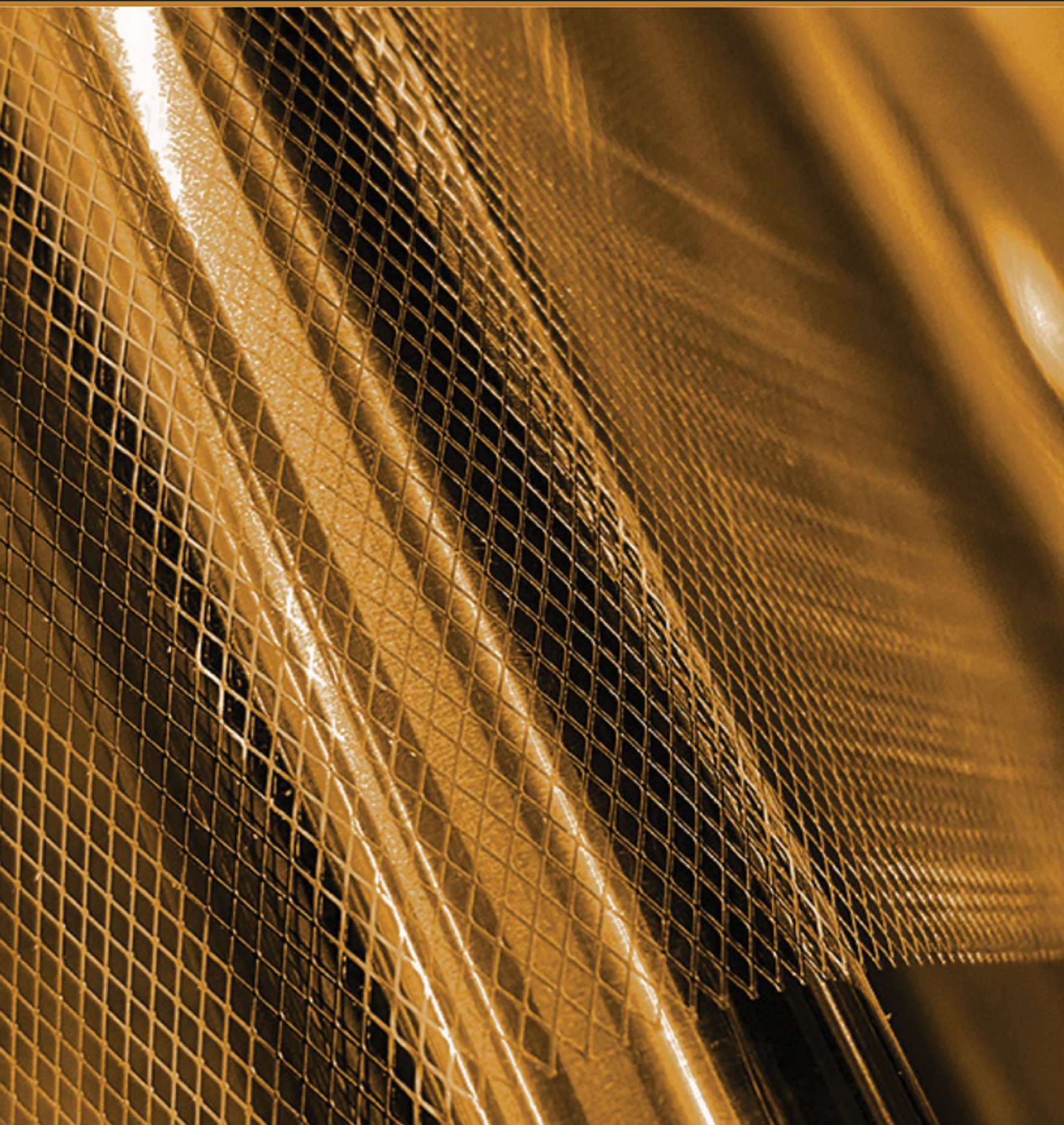
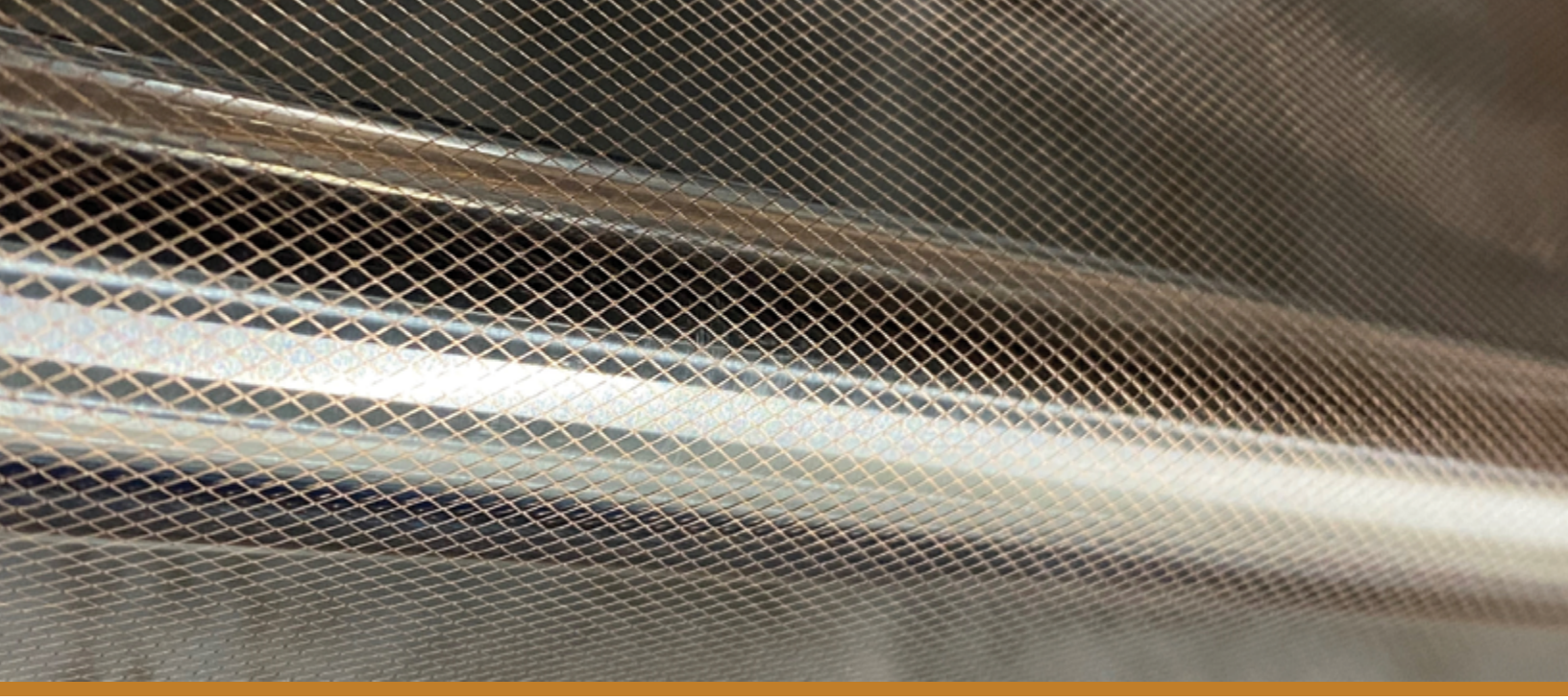
How Is Expanded Metal Foil Made?

Battery Applications | EMI Shielding | Lightning Strike Protection | Filtration





Expanded metal foil is a lightweight coil of metal that has been slit and stretched to create a uniform mesh pattern of openings.

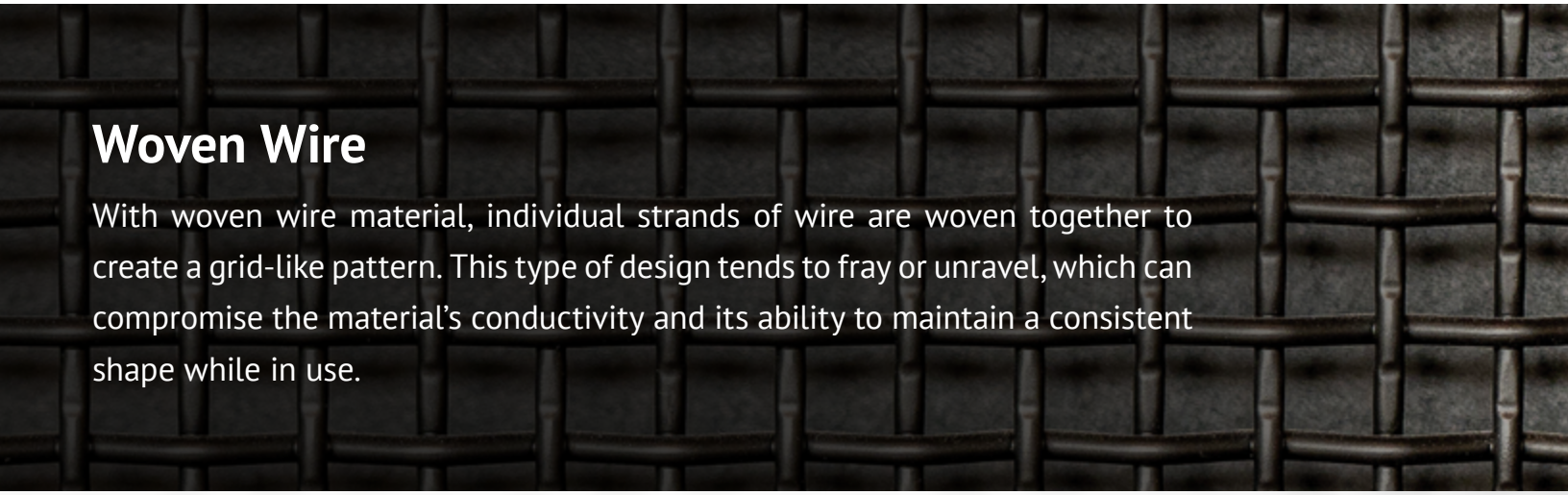
Combining the benefits offered by solid sheet metal and wire mesh, this material provides a high level of strength and support, gives precise conductivity/resistivity, and allows air, water, and light to pass through.

Expanded metal mesh also retains its structural integrity during the fabrication process and mitigates the risk of unraveling common with woven or welded wire mesh.

These advantages make expanded metal foil a superior material choice for everything from lightning strike protection to durable industrial and automotive filters to high-precision EMI shielding.

Expanded vs. Perforated vs. Woven Wire

Two of the most common material alternatives to expanded metal foil are:



Woven Wire

With woven wire material, individual strands of wire are woven together to create a grid-like pattern. This type of design tends to fray or unravel, which can compromise the material's conductivity and its ability to maintain a consistent shape while in use.

Perforated Metal

Perforated metal is produced by feeding a metal sheet through a machine that punches regularly spaced holes into the material. This process creates a considerable amount of scrap material, which increases the overall cost of the final product. The amount of waste generated depends on the size of the holes being created.

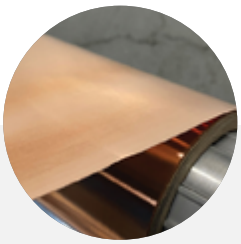
While woven wire consists of multiple strands of material, expanded metal foil is produced as one homogenous roll of material with regular and precise openings. This facilitates more highly consistent conductivity/resistivity and allows the material to better support applications in which accurately sized openings are critical to product or system performance.

Expanded metal materials also overcome the yield limitations associated with perforated materials since no scrap gets generated during the manufacturing process. Eliminating or minimizing waste is especially important when working with expensive exotic or specialty metals.

What Happens in the Expanded Metal Foil Manufacturing Process?

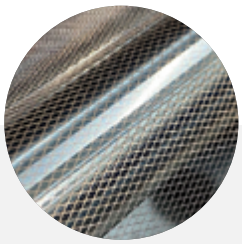
With the customer's requirements in mind, the expanded metal fabricator selects precision dies that will optimize the geometry of the openings. The expanding equipment is then programmed according to the specified feed rate, tool geometry, and tool travel.

During the fabrication process, the material is simultaneously slit and stretched to create precise, uniform openings. If desired, rollers then compress the expanded material to the desired thickness. Depending on the material's intended application, additional secondary processing may be used to enhance specific performance attributes.



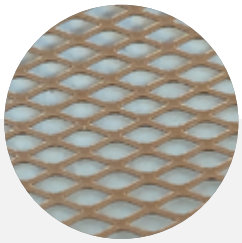
Step 1

The raw material sheet is inserted into the expanded metal machinery.



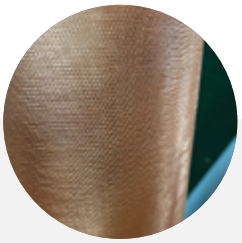
Step 2a

The material is slit and stretched based on customer shape and thickness specifications.



Step 2b

The expanded metal mesh manufacturing process works with a wide range of metals and polymers based on the end use. The material shown in this example is copper.



Step 3

After exiting the machine, the material is re-wound into a roll for easier delivery and application.

Select the Right Material, Shape, and Size for Your Application

The expanded metal mesh manufacturing process works with a wide range of metals and polymers, each of which has distinct properties that make it suitable for certain applications and environments.

Some of the materials used to create expanded metal mesh products include, but are not limited to:

Copper

Aluminum

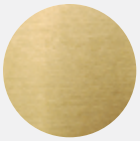
Nickel

Monel (nickel alloy)

Stainless steel

Plastic

Teflon



Brass

Phosphor bronze

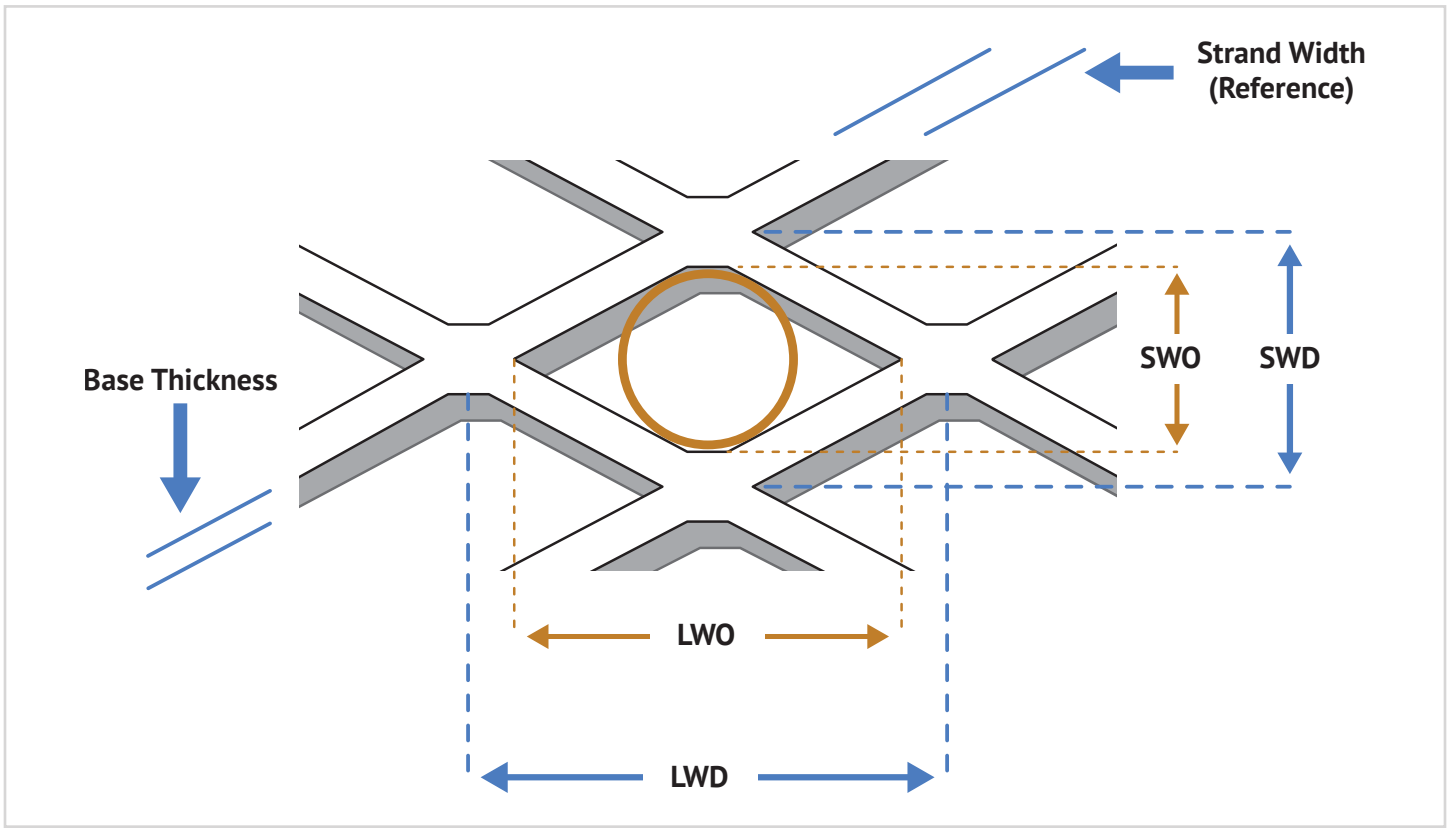
Titanium

Silver

Geometry, Specifications, and Measurements

For optimal product performance, several measurements and functional criteria must be specified prior to the manufacturing process. Relevant information includes open space dimensions, such as:

LWD	Long way of the diamond (LWD) The distance from the center of one joint to the center of the adjacent joint across the longest opening of the diamond
SWD	Short way of the diamond (SWD) The distance from the center of one joint to the center of the adjacent joint across the shortest opening of the diamond
SW	Strand width (SW) The amount of material slit from the parent material to create the opening



Additional measurements and specifications may include:

- Total surface area
- Raw material thickness
- Coverage area (2 x SWD x strand)
- Width of sheet
- Open area (100 - coverage area)
- Conductivity or resistivity
- Openings per inch, which will dictate the opening geometry (from diamond to square)
- Manufactured material thickness (height of leveled/flattened material)

At CThru Metals, our proprietary metal expansion technology allows us to provide our customers with creative solutions and product customizations that would otherwise be impossible to achieve.

For example, we are currently the only expanded metal provider in the world that can manufacture varying strand widths within a single roll of product.

Our expanding equipment allows us to modify strand widths in specified areas as the material undergoes processing. This capability gives us unparalleled flexibility when it comes to designing processes for specialized products and systems.

For example, strand width variations make it possible to create varying resistivities, conductivities, and strengths for products such as batteries, fuel cells, filtration systems, EMI/RFI shielding applications, and lightning strike protection.

It also allows the material to provide different levels of filtration within tanks or other fluid-processing systems.

Other unique capabilities at CThru Metals include:

40”+ roll widths

We can accommodate roll width requests of 40” or larger, which is unparalleled when it comes to expanded metal foils.

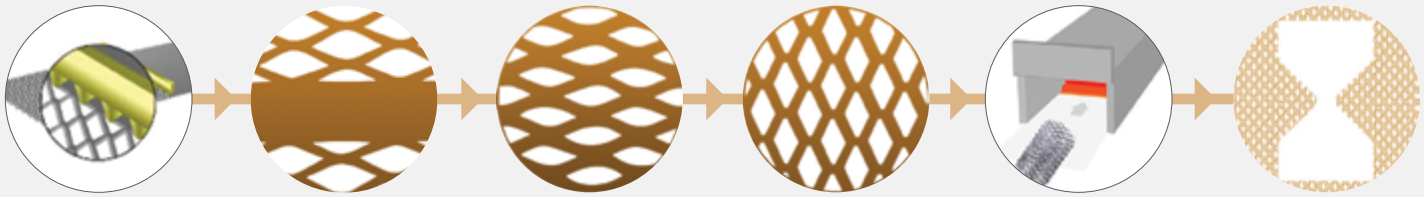
Intermittent mesh / solid sections

Our custom-built expanding equipment allows us to integrate intermittent solid strips throughout the material in the horizontal direction, with seamless transitions between expanded and solid sections.

These transitions are key for achieving a durable product with equivalent levels of strength on both sides of the solid sections.

Solid sections of material are often incorporated into products such as solar panels to create tabs for supporting connection points or for adding defined edges. We offer our customers limitless design possibilities for solid strip integration.

How It's Made



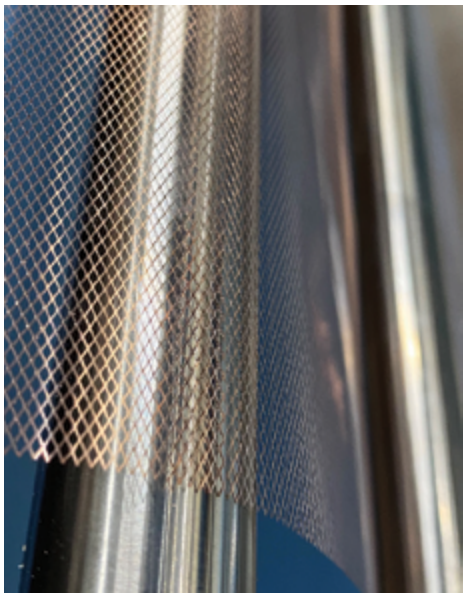
Raw Material Fed into Tooling | **Slitting & Solid Sections** | **Stretching** | **Flattening** | **Annealing** | **Blanking / Forming**

In-house custom blanking

In addition to material fabrication, we can also stamp expanded metal mesh into various configurations to fit the needs of specific applications.

For example, materials can be blanked into complex geometries to accommodate intricate battery designs.

By combining multiple processing steps in one continuous sequence, we provide faster turnaround times and reduced shipping costs for our customers.



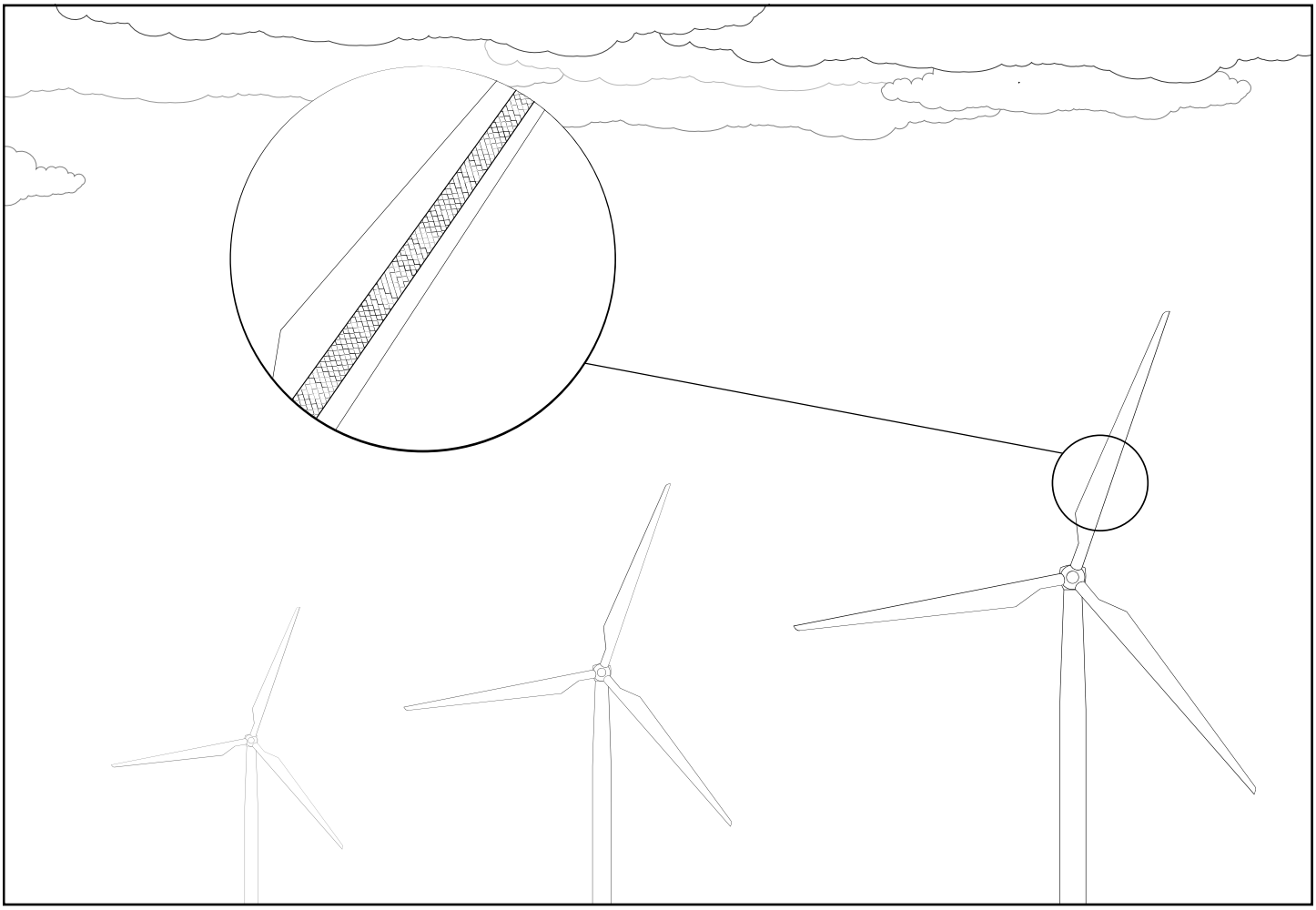
Common Applications

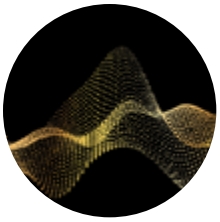
Expanded metal foil is a tough, conductive, resilient, and versatile material, making it an ideal solution for practically any industry requiring high-strength mesh materials to support products or systems. Some of the most common applications include:

Lightning Strike Protection

In airplanes and wind turbines, expanded metal mesh is embedded into composite surfaces and structures to dissipate electrical energy after a lightning strike.

It provides a conductive path that protects the composite from burns, delamination, and other types of lightning-induced damage without adding excess weight to the structure.





EMI Shielding

Expanded metal is often used in electronics applications to shield against electromagnetic interference (EMI).

The material's homogenous, electrically continuous surface is effective for providing consistent EMI shielding in everything from gaskets to computers.

Renewable Energy

Several emerging technologies in the renewable energy sector utilize expanded metal for its electrical properties and shielding capabilities.

In battery and fuel cell applications, for example, expanded metals can be used for everything from membrane and catalyst support to flow distribution.

Filtration

In industrial and automotive applications, durable and malleable expanded metal materials can be used as either filter media or filter media support structures.

For example, automobiles utilize expanded metal as the primary support structure in airbag inflators, oil filtration and hydraulic systems.

Expanded Metal Solutions From CThru Metals

Formed from a single, continuous metal sheet, expanded metal material outperforms woven wire and perforated metals in terms of conductivity, strength, stability, and waste generation. These unique properties and advantages have made expanded metal mesh foil a preferred material solution for numerous established and emerging technologies. To optimize the performance of the material, it is important to carefully customize everything from the type of metal to the dimensions of the openings.

CThru Metals is an industry-leading producer of advanced and innovative expanded metal mesh foil solutions for mission-critical applications in aerospace, electronics, automotive, filtration, renewable energy, and more. Our custom expanding equipment is engineered to operate at twice the speed of standard expanding machines, saving you time and money on your project. We also offer in-house stamping capabilities that allow us to stamp expanded metal products into virtually any requested geometry while maintaining tolerances as tight as 0.001 inches.

To learn more about our custom expanded metal solutions and capabilities, please request a quote.

REQUEST A QUOTE

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