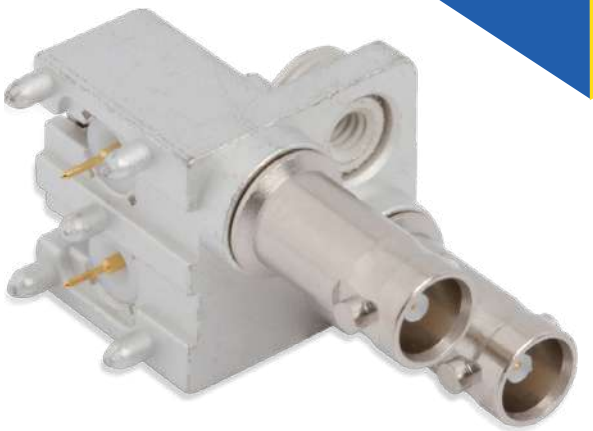


CUSTOM RF SOLUTIONS

A collaboration from concept through production



Amphenol® RF

WWW.AMPHENOLRF.COM

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Amphenol RF is the world's largest manufacturer of RF connectors, coaxial adapters and pre-configured cable assemblies. Our broad portfolio of interconnect feature IP-rated waterproof, tamper resistant, ruggedized and ultraminiature solutions to meet the increasing needs for innovative options within next generation applications. We understand that there are times when standard off-the-shelf products don't quite meet all of your specific design requirements and are prepared to support your project by developing custom solutions.

Our team will work with you from concept through mass production, and beyond, to create a unique interconnect to specifically meet your needs.

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Capabilities



Ruggedized Waterproof IP-Rated Sealed Solutions

Waterproof interfaces designed to protect against temporary submergence for use in harsh environments such as smart agriculture and industrial applications.



Hybrid Cable Assemblies with Signal, Power and Coax Lines

Different types of signal, power and coax lines are integrated into a single package. Ideal for various applications including military, medical and wireless LAN.



Camera Module Interconnect

Unique robust solutions designed for harsh environments using injection molding techniques such as overmolding, and high speed stamping and forming ideal for IoT and autonomous vehicle applications.



Multi-Port Gang Mate Connectors

Specially designed, tightly pitched interconnects commonly used in board-to-board applications and wire-to-board applications. Reduces PCB assembly time and often increases robustness.



Board-to-Board Solutions

Engineered to maximize radial and axial float, typically using a three-piece connector system, ideal for broadband and wireless applications.



Custom Interface Development

Enhanced connector systems engineered to improve upon existing designs when existing products don't meet the requirements of your project, designed to meet specific customer needs in any industry or application

Custom Cable Assemblies

Unique configurations designed using virtually any coaxial cable and combination of RF and non-RF connectors including FAKRA and HSD automotive interconnect.

Modification of Existing Products

Dimensional or feature adjustments can be made to standard off-the-shelf connectors to meet the specific mechanical or electrical requirements of your application.

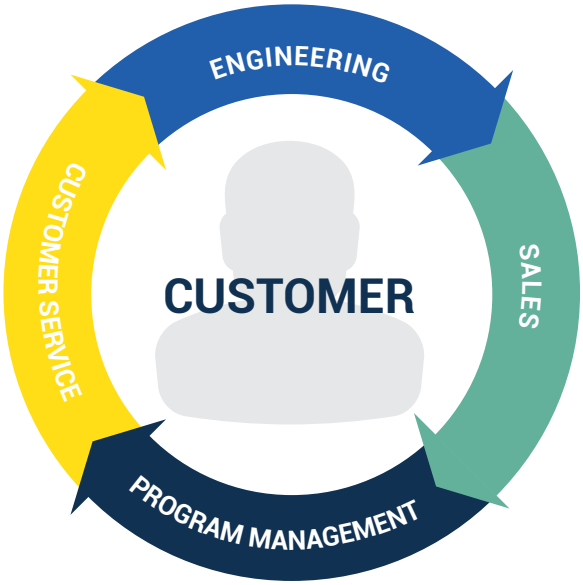
DID YOU KNOW?

Each custom solution design is modeled using the latest 3D modeling software prior to a physical prototype being built. This streamlines the design process and reduces time and cost.

Conceptual Design

Our dedicated customer-centric team, made up of sales, program management, engineering and customer service, will start by working with you to define the requirements for your new design. The information gathered in this phase is a critical step in the process and will help to determine the timeline and budget for the project. Understanding the end application is key to finding the right solution and creating a realistic timeline for the project.

During the conceptual design phase, you will become familiar with the various technical support services that Amphenol RF offers. You can expect these to be available to you over the life of the project.



- More than 40 engineers in North America, Europe and Asia
- Research and Development in USA, China and India
- Full range of design, simulation and testing
- Global manufacturing

Mechanical Design

Our global team of experienced engineers collaborate to develop a custom solution using state of the art 3D modeling and design software based on the information gathered by our cross-functional support team in the conceptual design phase.

There are several steps that take place at this time that are crucial to the design of your custom RF interconnect, adapter or cable assembly.

Material Selection – *Analysis of your system is necessary to determine if the design requires one or more of the following considerations.*

- Ruggedized designs (body and coupling nut material selections – stainless steel and brass)
- Non-magnetic (BeCu)
- PIM performance (non-ferromagnetic materials)
- Extreme temperature environment (dielectric material selection)
- Adverse environmental conditions (plating selection)

Performance Requirements – *Review of system expectations to determine necessary design characteristics.*

- Factored into both material selection and manufacturing process selection
- Work collaboratively with RF/electrical engineering to ensure design meets required electrical performance and mechanical robustness

Manufacturing Process Selection – *Analysis of volume and design requirements to determine appropriate manufacturing process.*

- High volume designs may warrant tooled manufacturing techniques (molding, die casting, stamping)
- High performance designs may limit processes in key components to tightly control dimensions and/or physical parameters



RF Simulation

Once the mechanical design phase is underway, RF simulation software allows our engineers to test your custom solution to ensure that the attributes meet all the necessary coaxial connector requirements of the project. We are committed to engineering a custom product that checks all of your boxes and are able to reduce the cost of producing physical samples at this stage by utilizing the ever expanding arsenal of software at our disposal.

Typical simulated coaxial connector requirements:

Return Loss

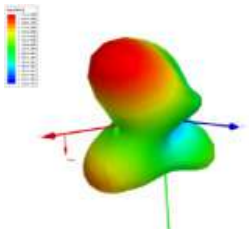
- Typically most important requirement for connectors
- Accurate models of connectors result in very close correlation to measured performance of manufactured design

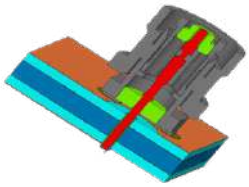
Insertion Loss

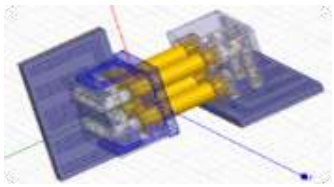
- When more accurate insertion loss simulation plots are required, layered boundaries can be used to account for losses through plating

PCB Launch Optimization

- Encrypted ANSYS 3D component files are available for many of our standard products
- Additional RF engineering support is available as needed









Isolation

- Critical for gang mate or tightly pitched interconnects, especially for PCB connectors

RF Leakage

- Required for systems with other components that are sensitive to stray signals

Power Handling

- Thermal withstanding of connector for high power applications

DID YOU KNOW?

ANSYS 3D component files for many of our standard part numbers can be readily downloaded directly from our website.

Pre-Production

Once you're satisfied with the mechanical design of the interconnect, we'll move into the pre-production phase. Prior to mass production, we build physical samples to confirm that the mechanical and electrical performance specs predicted in the RF simulation can be met. Samples are typically built in low volumes for engineering and customer evaluation.



When it comes to manufacturing samples, we have several options available. Although the majority of parts are machined, if individual components are tooled, samples can be made utilizing soft tools, 3D printing or machined versions of a tooled design.



Samples are manufactured at a dedicated short run facility (SRF), or model shop. These locations concentrate on building prototypes of new designs which allows for quick turnaround. Typically these samples are produced in the same facility where mass production will also take place and is conveniently located in all our manufacturing facilities: Danbury, CT USA, Nogalas, MX and Shenzen, CN.

Tooling Development

As your custom RF interconnect is coming close to mass production, it's important to understand the types of tooling available as our team will be recommending the solution that makes the most sense based on your project specifications.





Progressive Stamping Dies

Used to cut components out of sheet metal and formed into contacts or other components. Good for high volume manufacturing, allows for use of selectively plated stock.

Die Cast Molds

Used in place of machined components, utilizes zinc alloys for high volume production

MIM (Metal Injection Molds)

Technique using stainless steel in mold, for odd or intricate component geometries

Plastic Injection Molds

Used for plastic components, such as insulators or housings. Insert molding allows encapsulation of metal components.

Soft Tooling

Tools that can be built and used for small batches, often used during the prototype phase

Hard Tooling

Tools that are built to be used for long-term, high-volume manufacturing

Mass Production







The final step in the process is making your design concept come to fruition in volumes that can support your design schedule. Amphenol RF has a global manufacturing footprint with production facilities in the United States, Mexico and China.

In addition to cellular manufacturing and inline process control involved in high-volume production, the production processes available include:

- Hand Assembly
- Semi and Fully Automated Assembly
- High-Speed CNC Machining
- Stamp and Forming
- Injection Molding



Continuous Improvement Process

Amphenol RF is committed to providing you with the highest quality products on the market today. Through our continuous improvement process, we follow a checklist of stringent guidelines to ensure that you receive your order in perfect condition and that they are individually tested to meet all of your specified requirements.



DID YOU KNOW?

Customer feedback is critical to our improvement process. Visit our website to provide input at your convenience.

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CONTACT US TODAY TO DEVELOP YOUR NEXT CUSTOM SOLUTION!