

# Plastic Connectors Are Beneficial for Industry, Part 2

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*This is part two of a two-part piece. [Part one can be found here](#) [1].*

### Connection Options

Connectors are designed to accommodate tubing of varying hardness (durometer), from soft and flexible like PVC, silicone and C-flex®, to semi-rigid types like polypropylene, polyethylene, polyurethane and ethylene vinyl acetate (EVA).

To facilitate these varying styles of tubing and their respective application needs, different connector types are used, including barbed connectors, check valves, luer connectors, quick connects, threaded luers and tube-to-tube connectors. Of these, the most commonly used tubing connectors are tube to tube connectors, luers and quick connects. These basic connector styles can cover a wide range of liquid and air applications in laboratory and industrial environments.

**Tube to Tube Connectors** - a popular choice for applications that do not require the disconnection of equipment or parts at any point during production or use. Tubing connectors are available in many different configurations, sizes and material options to adapt different tube sizes or styles, reroute the flow direction without kinking, and act as a manifold.

**Luer Connectors** - delivery systems can employ conical or taper seal connectors, called luers, to link various system components. The male and female components of luer connectors join together to create secure, yet detachable, leak-proof connections with no o-ring or gasket required.

Luer connectors come in a variety of configurations adapting to tube connections, threaded connections (UNF, NPT and metric) and other luer or quick connect

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terminations. Some of those incorporate a tapered UNF thread, similar to a pipe thread,

which can also seal on the thread due to interference on the pitch diameter, facilitating directional alignment with tees and elbows.

**Quick Connects** – quick connects (quick disconnects) allow flexible tubing and/or equipment to be quickly and safely connected and disconnected. They may be preferred over general connectors for fluid control because they can incorporate built-in shut-off valves that prevent spillage, allow multiple disconnections and faster servicing.

One of the newest and most versatile plastic quick connect solutions available for laboratory and industrial applications, the MQC Series manufactured by Value Plastics, a Nordson Company, provides an intuitive push-to-connect design. With its large, ergonomic buttons providing an audible click on connection and grips for easy handling with gloves, combined with a wide selection of color-coding options, the MQC is unique for ease of handling and the prevention of misconnections.

Many of the latest quick connect designs focus on the user interface, and are equipped with intuitively simplistic thumb latch and side latch mechanisms to make for easy handling in laboratory and industrial fluid management applications. Quick connects mitigate the prospect of accidental misconnections and create quicker and safer device connections.



### Barbs

Plastic barb-style connectors provide designers with a capability to accommodate the widest possible range of tubing properties and application conditions, including a multitude of configurations such as tees, Ys, elbows and manifolds. A number of barb designs are available – each with unique characteristics to tailor connection performance to specific needs – for handling assembly forces, tensile resistance and blow-off resistance without the need for clamps.

Barbs derive their holding capability by expanding tubing above its nominal inside diameter (ID), creating some amount of interference for a secure seal and good

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mechanical retention. The tube expansion can vary dramatically, from lower profile, easier connections to much more aggressive interferences, depending on the pressure and tensile pull requirements.

The selection of the barb style is very important to the connector's tube holding capability. The cylindrical surface behind the barb should allow the tubing to relax against the connector. In choosing a barb style, it should be ensured that the barb is designed with a sharp peak, allowing it to "bite" into the tubing for optimal retention.

Many plastic connectors and almost all metal connectors utilize a multi-barb, making for an inferior tube connection and seal. Multi-barbs cannot create a sharp bite on the tube, inhibiting retention, and do not allow the tube a chance to relax behind the barb, also resulting in poor tensile pull strength.

Multi-barbs are also relegated to a manufacturing process that leaves a parting line on the sealing surface, creating a potential leak path. This is an inherent design flaw, yet all multi-barb connector designs, including metal connectors, display this liability. In fact, many inferiorly crafted single-barb plastic connectors are also afflicted with a parting line, reducing the efficacy of the connector. An optimally designed and properly injection molded connector will incorporate a singular barb with no parting line, a sharp bite and a clean sealing surface.

### Design Optimization

Many factors can reduce the tubing's ability to perform under pressure including temperature, chemical degradation, mechanical stress, fluid pulsation, selection of connector type and barb design.

The latest generation of plastic connector technology affords designers and manufacturers a wide latitude of flexibility to design and set-up applications that custom fit to their specific needs. Some connector manufacturers, like Value Plastics, provide comprehensive design centers to help instrumentation and equipment manufacturers achieve the highest level of performance from their connectors. With good consultation up front on the designer's application requirements and prospective off the shelf or custom solutions, the pitfalls can be avoided and optimal designs can be executed.

### Benefits

Compared to metal, plastic connectors provide a considerable reduction in weight, and much improved flexibility with regard to the equipment they serve. Uniquely equipped to do so, plastic quick connects allow rapid and easy servicing and maintenance of assembly line equipment, filling and packaging systems which limits system downtime and speeds throughput. Color-coding on plastic connectors also makes for quick tube identification and reconnection.

The cost difference between metal and plastic connectors is a major motivating factor pushing instrumentation, equipment and system designers to further

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embrace plastic connectors in laboratory and industrial applications.

With project requirements and timelines becoming increasingly demanding, the need for precision fluid management solutions applicable to industrial processing and instrumentation design is critical to achieve a high efficiency ROI. Plastic connectors, particularly when custom designed for the application, are more frequently becoming the preferred solution in industrial and laboratory settings, due to their overall proven efficacy.

*For more information, please email [georgep@valueplastics.com](mailto:georgep@valueplastics.com) [2] or visit [www.valueplastics.com](http://www.valueplastics.com) [3].*

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