

# Flex Circuits Product Technology Overview

Confidence at every step of your product life cycle

*This document provides an overview of Minco's flex circuit product technologies and capabilities. We'll work with you every step of the way to provide a solution aligned to your requirements.*

## Technology Selection

For over 40 years Minco has provided flexible circuits for advanced medical, aerospace, defense and other demanding applications. We deliver comprehensive solutions, including flex circuit design, partnering with you at every step of your product cycle.

Flex circuits can be shaped to fit where no other design can. They are a hybrid of ordinary printed circuit boards and round wire, exhibiting benefits of each. In essence, flex circuits give you unlimited freedom of packaging geometry while retaining the precision density and repeatability of printed circuits.

Minco specializes in tight tolerance, fine-line flex circuits, with different types of flex circuits offer different advantages. Some offer lower cost, others increased functionality. We'll work with you to ensure a circuit solution tightly aligned with your requirements.

## Certificates and Accreditations

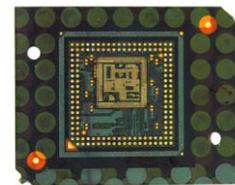
To ensure reliable production of your products using these technologies, Minco has acquired extensive certifications and accreditations.

- Nadcap accredited
- AS9100C certified
- ITAR registered
- IPC-6013 Class III Product
- IPC J-STD certified
- IPC CID Certified CAD

## Minco Offerings

Minco has a broad array of flex circuit product technologies.

HDI



Rigid-Flex



Multi-Layer



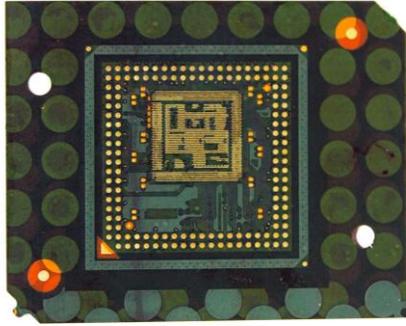
Double Sided



Flex-Coils



## High Density Interconnect (HDI)



*Increased design, layout and construction options over typical flexible circuits*

### Production Information

High Density Interconnect (HDI) flexible circuits offer increased design, layout and construction options over typical flexible circuits. Each High Density Interconnect incorporates microvias and fine features to achieve highly dense flex circuitry, smaller form factor and increased functionality. This technology offers better electrical performance, access to advanced integrated circuit (IC) package use and improved reliability through the use of microvias and thinner materials.

### Product Capability

Description	Capability
Minimum drilled via finished diameter	0.008"
Minimum laser via formed diameter	0.003"
Minimum line and spacing	0.003"/0.003"
Minimum copper thickness	9 Micron
Maximum copper thickness	< 1 oz.
Minimum pad size for thru holes vias	via dia. + 0.015"
Minimum pad size for micro vias	via dia. + 0.006"
Panel Size	18" x 24"
Laser thru hole plating aspect ratio	4:1
Blind micro via min. plating aspect ratio	1:1
Panel plating	Yes
Selective plating (pads only or button)	Yes
Number of layers	2-6
Via fill	Copper Filled

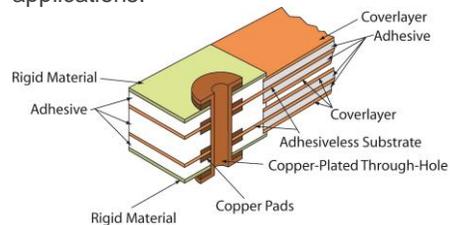
## Rigid-Flex



*Blend of rigid and flex emphasizing the best of both constructions*

### Production Information

Rigid-flex is a blend of rigid and flex emphasizing the best of both constructions, adding complimenting capabilities that neither possess alone. In its most typical configuration, the rigid-flex is as a series of rigid PCBs joined by integrated flex circuits (with emphasis on the high percentage of rigid area content). There are many excellent possibilities for circuits designed primarily as a flex circuit with the addition of integrated rigid areas. The rigid areas provide excellent hard mount points for components, connectors and chassis while flex areas offer dynamic flexing, flex to fit, and component mounting poised to take advantage of these low mass and vibration resistant zones. This blending leads to creative solutions for your most demanding applications.



### Product Capability

Description	Capability
Minimum drilled via finished diameter	0.008"
Minimum laser via formed diameter (in flex portion)	0.003"
Minimum line and spacing	0.003"/0.003"
Minimum copper thickness	9 Micron
Maximum copper thickness	≤2 oz.
Minimum pad size for thru holes vias	via dia. + 0.015"
Panel Size	18" x 24"
Thru hole plating aspect ratio	10:1
Panel plating	Yes
Selective plating (pads only or button)	Yes
Number of layers	2-14
Via fill	Copper Filled

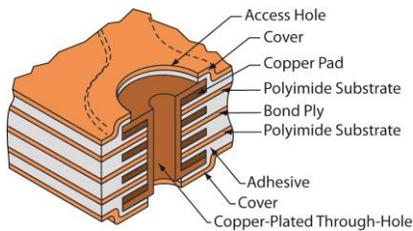
## Multi-Layer



For situations where the circuit is exposed to excessive vibration or shock combined with frequent bending or folding

### Production Information

Multilayer flex circuits offer exceptional performance and reliability in situations where the circuit is exposed to excessive vibration or shock combined with frequent bending or folding. Multilayer technology allows high circuit density connections to be achieved in applications where one or two layers of conductors could not meet the required circuit packaging requirements. Additionally, multilayer flex circuits provide increased functionality with a smaller footprint.



Cover may be replaced by photo-imagable overlay (PIC)

### Product Capability

Description	Capability
Minimum drilled via finished diameter	0.008"
Minimum laser via formed diameter	0.003"
Minimum line and spacing	0.003"/0.003"
Minimum copper thickness	9 Micron
Maximum copper thickness	≤ 7 oz.
Minimum pad size for thru holes vias	via dia. + 0.015"
Minimum pad size for micro vias	via dia. + 0.006"
Panel Size	18" x 24"
Thru hole plating aspect ratio	10:1
Blind micro via min. plating aspect ratio	1:1
Panel Plating	Yes
Selective Plating (pads only or button)	Yes
Number of layers	8 or less
Via fill	Copper Filled

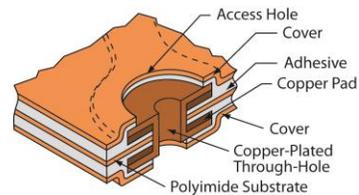
## Double Sided



Double sided for greater flexibility in design and functionality

### Production Information

Double-sided flex circuits provide the ability to access circuit traces from both the top and bottom sides of the circuit, which offers greater flexibility in design and functionality. When properly designed and utilized, double-sided flex circuits offer the same level of dynamic, repetitive flexing as a single-sided flex, but with a greater range of application uses due to its ability to carry more complex circuit layouts.

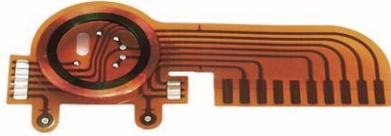


Cover may be replaced by photo-imagable overlay (PIC)

### Product Capability

Description	Capability
Minimum drilled via finished diameter	0.008"
Minimum laser via formed diameter	0.003"
Minimum line and spacing	0.003"/0.003"
Minimum copper thickness	9 Micron
Maximum copper thickness	≤ 7 oz.
Minimum pad size for thru holes vias	via dia. + 0.015"
Minimum pad size for micro vias	via dia. + 0.006"
Panel Size	18" x 24"
Panel Plating	Yes
Selective Plating (pads only or button)	Yes
Via fill	Copper Filled

## Flex-Coils

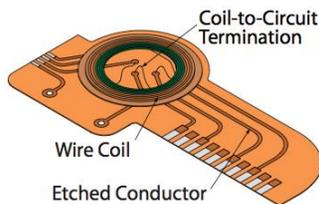


*Combines antenna coils and flexible or rigid-flex circuits in one rugged package*

### Production Information

Flex-coils combine antenna coils and flexible or rigid-flex circuits in one rugged package. Coils with wire as small as AWG 50 allow high sensitivity in a flat laminated package, or choose an etched coil for total thickness of less than 0.010 inch (0.25 mm). Polyimide insulation provides high dielectric strength, flexibility and protection for the antenna. When integrated with a flex or rigid-flex circuit the package improves reliability, reduces parts count, simplifies assembly and reduces rejects.

Flex-Coils can be designed in round, rectangular, oval or other shapes to meet your packaging requirements. They can be supplied flat or preformed to precise dimensions. They are ideal for implantable medical devices, high precision position sensing and non-destructive test machinery.



### Product Capability

Description	Capability
Maximum outside diameter	4.5"
Minimum inside diameter	0.125"
Wire Gauge	30-50
Inductance Tolerance	5%
Resistance Tolerance	10%

**For more information on Minco's product technologies and capabilities, please contact your local Minco representative or visit [Minco.com](http://Minco.com).**