

History of flexible circuits

Flexible Circuit technology has a surprisingly long history. Patents issued at the turn of the 20th century show clear evidence that early researchers were envisioning ways of making flat conductors sandwiched between layers of insulating material to layout electrical circuits to serve in early telephony switching applications.

One of the earliest descriptions of what could be called a flex circuit was unearthed by Dr Ken Gilleo[3] and disclosed in an English patent by Albert Hansen in 1903 where Hansen described a construction consisting of flat metal conductors on paraffin coated paper.

Thomas Edison's lab books from the same period also indicate that he was thinking to coat patterns cellulose gum applied to linen paper with graphite powder to create what would have clearly been flexible circuits, though there is no evidence that it was reduced to practice.

In the 1947 publication "Printed Circuit Techniques" by Cleo Brunetti and Roger W. Curtis (National Bureau of Standards Circular 468 first issued 15 November 1947) the a brief discussion of creating circuits on what would have been flexible insulating materials (e.g. paper) indicated that the idea was in place and in the 1950s Sanders Associates' inventors (Nashua, NH) Victor Dahlgren and company founder Royden Sanders made significant strides developing and patenting processes for printing and etching flat conductors on flexible base materials to replace wire harnesses.

An advertisement from the 1950 placed by Photocircuits Corporation in New York demonstrated their active interest in flexible circuits also.

Today, flexible circuits which are also variously known around the world variously as flexible printed wiring, flex print, flexi circuits, are used many products. Large credit is due to the efforts of Japanese electronics packaging engineers who have found a countless new ways to employ flexible circuit technology.

For the last decade, flexible circuits have remained one of the fastest growing of all interconnection product market segments. A more recent variation on flexible circuit technology is one called "flexible electronics" which commonly involves the integration of both active and passive functions in the processing.