

Cable Design

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Designing a cable starts with a customer requirement that can range from a detailed, multi-page specification to a single line description. In any case, a drawing is used to determine spatial orientation of the various components.

An outcome of a customer cable requirement is the cable shown below. It consists of two computer cables, three single pair 14 AWG instrument cables with a 35 mil jacket, seventeen 8 AWG conductors and a bare ground conductor. The cable is to be suspended vertically in a mine shaft thus the need for a ribbed inner jacket. The steel interlocked armour bites into the ribs to “lock in” the cable core and prevent longitudinal movement due to gravity.

The design starts with laying out the cable components using drawing software such as AutoCAD.

The cable core construction is determined with consideration given to the cable application. This could involve the amount of flexibility, any components sensitive to stress, ground wire placement, symmetry of design and diameter restrictions.

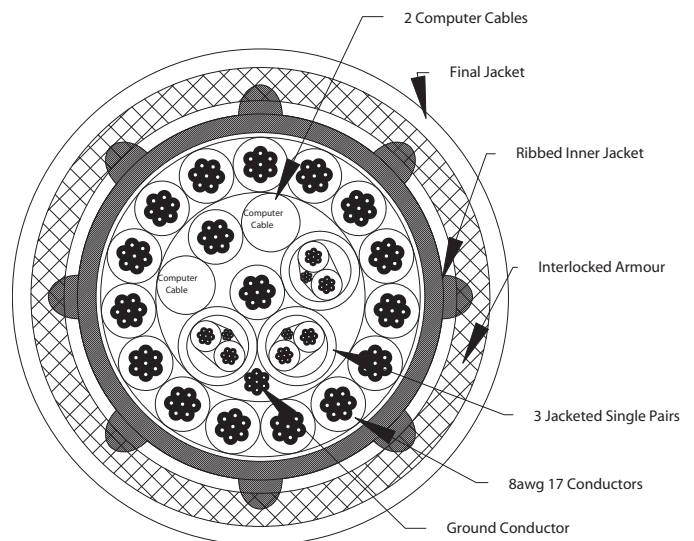
The optimum design would normally be the smallest circular diameter possible in order to keep cable cost and weight to a minimum

The complexity of the design increases with greater number of components of varying sizes.

In the previous cable, the inner layer consists of two computer cables, three jacketed single pairs and two single conductors, all supporting the outer layer. The inner layer is designed first through trial and error until a diameter is obtained to support the outer layer seen on page 1. Fillers are used in the inner interstices to ensure that the inner components stay in place and provide a circular core for the outer layer of components.

If this cable was being used in a flexing application the components that are sensitive to the stresses of bending would be brought to the inner layer but not to the center. The center tends to be a high stress area. Cables used in flexing applications are usually comprised of layers with reverse lay to prevent the cable core from loosening and to allow the layers to move freely. This core construction is more concentric and, in some composite constructions, challenging to design.

Optimum ground wire placement is closest to the center of the core. Careful consideration must be given to the fact that the ground wire is often bare and if placed in compression with insulated conductors can cause damage



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to the insulation of adjacent conductors.

The customer often gives restrictions to the overall size of the cable. Size constraints can be challenging to the designer.

Designing a cable core can take more than several attempts especially when limitations are in place. Custom cables with complex designs, whether it is size restrictions, custom specification or special requirements, are in demand in the cable industry.

ShawFlex is a custom cable manufacturer of composite cable designs including components such as coax, fibre optic, computer cables, strength members, multiple gauge size components and numerous other specialty constructions. The specialty constructions may utilize special tapes, water blocking gels, and special insulating and jacketing compounds. At ShawFlex designing a cable is all about the special requirements of our customers.