Wire Test Grip Fixture
This fixture can be used in any thin-gauge wire testing.
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Wire-testing issues, such as the gripping strains imposed on the wire, play a critical role in obtaining clean data. In a standard test frame fitted with flat wedge grips, the gripping action alone creates stresses on the wire specimen that cause the wire to fail at the grip location. When conventional wire grip fixtures are installed, the test span as well as the amount of wire used increase dramatically due to the large nature of the wire testing fixture. A new test frame, which is outfitted with a vacuum chamber, negated the use of any conventional commercially available wire test fixtures, as only 7 in. (17.8 cm) existed between the grip faces.

An innovative grip fixture was designed to test thin gauge wire for a variety of applications in an existing Instron test frame outfitted with a vacuum chamber. This unit was designed to adapt to a predetermined test span constrained by the vacuum chamber. The test frame was fitted with flat grips so that no gripping strain was induced into the brittle wire specimen.

In order to accomplish the task of testing small-diameter brittle wire, a very simple test fixture was designed. The first task was to create a technique to relieve the strains induced into the wire upon gripping. This was accomplished with two 1.5 in. (38 mm) wire spools. These spools were designed to relieve the gripping strains by wrapping the wire around the spools to grip the fixtures circumferentially. On each spool, a small bolt was installed to attach the wire to the spool. These bolts were placed 270° around the diameter of the spool so the wire contacted around the wheel. The concept employed ensured that the strains in the wire due to gripping would be reduced by the smooth transition around the wheel. A small groove was machined into the spools to center the wire.

In an effort to save test wire, as well as simplify the installation of the test wire to the spools, a locating rail was devised. This rail established the span of the gripping spools by pinning the spools to a thin, flat plate. When assembled, the wire is easily wrapped around and secured to the spools. The wire is pre-loaded slightly on the fixture to stay in place. This unit is then installed into the test frame. The leading edge of the rail was designed to match up to the grips installed in the test frame.

The machine was placed in the test-ready position. The loaded test rail was installed up against the sides of the flat test wedge grips, which, by design, established the test wire centered in the test frame. Pre-existing marks on the test spools allow the operator to center the fixture, top to bottom, prior to gripping. The test spools were machined to a width of 0.025 in. (0.64 mm), matching that of a standard, flat test specimen. When the flat wedge grips were closed, the wedges gripped the spools and established the test span. After the grips seat, the test rail can be removed, and the wire is ready to test. If for some reason the specimen needs to be removed from the test frame, the installation rail can be reinstalled on the pinned spools and