

Purpose of this Bulletin

Ingersoll-Rand was one of the very first power tool companies to adopt Yield Control for fastener tightening and we have made a study of Yield since its introduction to the shop floor in the 1970's. It is important for Ingersoll-Rand Customers and Salespeople to understand why Ingersoll-Rand remains the industry leader in Yield Control.

Self Adapting Algorithm

I-R uses the original SPS patented yield algorithm, which takes the first derivative of the torque angle curve. Others use the second derivative. The second derivative is more delayed and has to be tuned to the joint. This means that the installer has to run several joints in order to set the threshold parameters. Regardless, the delayed detection results in greater and more scattered permanent extension resulting in fewer reuse opportunities for the fastener.

Flexibility

In some cases the user has a permanent extension target to meet as specified on the manufacturing drawing. This can be accomplished using a combination of the early onset yield detection and angle into yield parameter to target a specific permanent extension for QC validation of the method. This is an important user aid where 'dial an extension' precision is important.

Overlapping Chords and Highest Sample Rate in the Industry

The chord length is the angle interval over which we measure the change in torque. This is usually in the range of 8 to 30 degrees, we check this torque increase every sample (fraction of a degree), again to detect the earliest onset of yield. The chord length is user selectable. Torque samples are made at an industry leading 10kHz.

Smoothed Curves

One defect of using a derivative signal for control is that it amplifies noise in the primary signal. Our high sample rate allows us to use a superior smoothing algorithm on the measured torque signal before the gradient is calculated to eliminate this noise and ensure reliable yield detection.

Experience

The successful exploitation of yield control requires careful joint design, planning and experience. Our application engineers have been yielding fasteners for close to three decades and are considered authorities in the industry. If Yield Control is the desired approach for an application Ingersoll-Rand has the equipment and the experience to provide the optimum solution. We provide application testing, joint analysis, installation, training, and validation services to support every need.

See AS 071504 IC Yield Tightening with Ingersoll-Rand DC Electric Tightening Systems