Application Note

Industry: Textile

Application: Traverse Take-Up Winding (Spooling)

Challenges:

- Improper traverse points
- Over travel
- Tension control between feeder spool and winding spool

Situation

Spooling is the most effective way to conveniently package materials of very long length, such as thread, film, labels, cable and thermoplastics. Material is fed from a large spool at a certain rate onto another spool, with a traversing mechanism between the two spools to create the desired pattern or evenly wind onto an flanged spool or cylindrical core despite the core shape. The integrity of the spool is often based on precise patterns and proper tension control throughout the winding process.

Problem

Selection of proper traverse type for different materials is crucial, especially for profile materials that cannot twist or tolerate excessive stress. Creating a wind where the exterior of the wind is tapered even while the core is a straight, cylindrical spool is a common problem with spooling where traverse points are improperly set and over travel occurs within the winging spool.

Solution

Traversing position can be electronically geared to the rotational velocity of the winding spool. The SmartMotor uses customizable electronic gearing dwell control to achieve the desired spool shape, and closed-loop servo control ensure no over travel. Real-time monitoring of the position error with advanced PID control maintains high speed precision winding.

In addition, multiple nodes of complex winding machines are easily networked together with SmartMotor Combitronic communications.
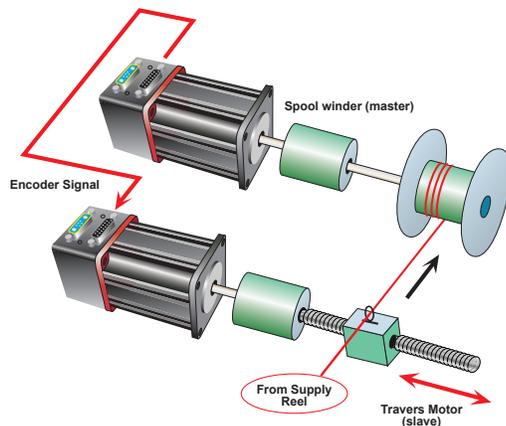
Full case study available at www.animatics.com/applications

Sample Code

The next example demonstrates the use of the **MFSDC (Mode Follow Slew Dwell Control)** command. This example shows how the MFSDC command can be applied to a spool winding program to automatically perform a profile back and forth across a spool with a user defined dwell at the end for a specific span of input distance. This will continue as long as the master encoder signal from the main spool is moving or until the motor is told to stop.

```
a=1000          'ascend and descend distance in slave counts
b=200000        'spool width in slave counts
c=4000          'one rev of spool in master counts
s=b-(a*2)       'calculate MFSLEW distance
m=1000          'gear ratio multiplier
d=1000          'gear ratio divisor
MFMUL=m         'set ratios for gearing
MFDIV=d
MFA(a,1)        'set ascend into ratio distance
MFD(a,1)        'set descend out of ratio distance
MFSLEW(s,1)     'set slew dis. btwn the accel and decel points
MFSDC(c,1)      'set dwell for "c" cnts, auto rev. after dwell
MFR             'set mode to electronic gear ratio
G               'start following the external master encoder
```

Note: Once set up, the firmware controls the winding operation in the background, allowing user programs to be running completely separate from the motion profiles. This is SmartMotor multitasking at its best.

Since gearing can be run in the second trajectory move generator, you can also make position or velocity moves on top of traversing to allow for lap and step winding as well.