

# WTS Reindeer Bridle Tension System

## Interface Mini™ and Wireless Telemetry System

### Industry: Test and Measurement

#### Summary

##### Customer Challenge

The customer needs to quantify the so-called “poll pressure.” Bits designed to give strong poll pressure using simple pulley lever principles show a much attenuated transfer of the rein tension through the bit to the poll. The attenuation is readily understood when the reindeer’s mouth is recognized as a “floating” fulcrum degrading the otherwise required fixed pivot point of an ideal lever.

##### Interface Solution

A WTS Reindeer Bridle Tension System, with two SMA Miniature S-Type Load Cells in both the line of the reins and that of the cheekpiece on one side of the horse, is used to study the dynamic response of the cheekpiece tension to rein tension in the ridden horse. Utilizing the Wireless Telemetry System (WTS), the valuable data can be displayed and recorded in real time using a PC or a handheld receiver depending on the requirements and preferences of the customer.

##### Results

The fundamental operation of the bits could in principle be discovered on the laboratory bench. But in practice of course, the equine mouth is expected to provide the fulcrum. Within the real experimental system comprising the rider’s hands, the reindeer’s mouth, and the bit, the elasticity of the equine mouth provides a “floating” fulcrum and a potential source of time-lag and decoherence between the dynamic rein and cheekpiece tensions.

#### Materials

- Two SMA Miniature S-Type Load Cells
- Two WTS-AM-1E Wireless Strain Bridge Transmitter Module
- WTS-BS-1-HA Wireless Handheld Display for Multiple Transmitters
- WTS-BS-6 Wireless Telemetry Dongle Base Station
- WTS Toolkit Software & Log100 Software included
- Customer Laptop or PC

#### How It Works

The SMA Miniature S-Type Load Cells are inserted into the line of the cheekpiece and reins on one side of the reindeer. The SMA Miniature S-Type Load Cell’s are resistive wire strip strain gages whose changes in potential difference, produced with strain, are transferred to transmitters which send the data wirelessly to a receiver connected to a USB port of a PC or a WTS-BS-1-HA Handheld Module. The WTS-AM-1E Transmitter Module are held inside modified camera cases attached to a breastplate on the reindeer. The rider is therefore not carrying any of the electrical equipment. Before the data is collected and after the cheekpiece is pretensioned, the SMA Miniature S-Type Load Cells are tared to zero. This makes it possible in some cases to see negative net values for cheekpiece tension when rein tension is applied to the cheek. The rider takes a normal contact on both reins and performs ridden exercises in the three lower gaits, and the natural resistive counter-contact from the body of the horse provides pairs of force data from the rein and cheekpiece. Because the cheekpiece is directly attached to the headpiece, we can assume that forces seen in the cheekpiece are those that are applied to the poll of the reindeer.

