

# BTS Equine Bridle Tension System Interface Mini™ and BlueTooth®

Industry: Agriculture

## 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 equine mouth is recognized as a “floating” fulcrum degrading the otherwise required fixed pivot point of an ideal lever.

### Interface Solution

A BTS Equine 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. Results are transmitted by the BTS-AM-1 Bluetooth Low Energy (BLE) Strain Bridge Transmitter Module to the BTS Toolkit Mobile App and displayed on a mobile device.

### 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 horse’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 BTS-AM-1 Module BlueTooth® Telemetry System
- BTS Toolkit Mobile App

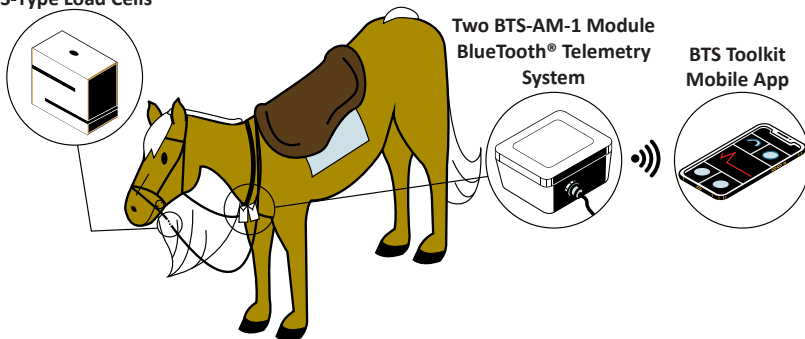
## How It Works

The SMA Miniature S-Type Load Cells are inserted into the line of the cheekpiece and reins on one side of the horse. The SMA Miniature S-Type Load Cells are resistive wire strip strain gages whose changes in potential difference, produced with strain, are transferred to transmitters which send the data by the BTS Bluetooth® Telemetry System to a receiver connected to a USB port of a PC. The BTS-AM-1 Bluetooth® Low Energy (BLE) Strain Bridge Transmitter Modules are held inside modified camera cases attached to a breastplate on the horse. 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 horse.

Two SMA Miniature S-Type Load Cells

Two BTS-AM-1 Module BlueTooth® Telemetry System

BTS Toolkit Mobile App



Horse with Reins