**PROBLEM**
Flat pedals are a popular choice among competitive enduro mountain bike racers as they allow riders to easily dismount from their bikes while navigating the technical terrain present in enduro racing.

There are currently no power-measuring flat pedals on the market designed for enduro mountain bike riders that offer similar performance to non-sensing flat pedals in terms of grip, weight, ergonomics, and overall form factor.

**BACKGROUND**
The Garmin Rally series represents a line of power meters tailored for cyclists seeking precision and performance enhancement. This technology uses a proprietary spindle fitted with strain gauges to measure advanced cycling metrics including power output, left/right pedal power balance, cadence, and cycling dynamics. Cyclists use these metrics to identify weaknesses and optimize their training regimen. The Rally spindle is currently only integrated into clip-in pedals.

Garmin's Rally spindle architecture provides the opportunity to explore the concept of a novel power-measuring flat pedal.

**INTERNAL DESIGN**
- **Step-Down Design**
  - Provides a 15% reduction in pedal thickness compared to Garmin's internal design
  - Ball bearings fail Garmin overloading requirements
  - Improvements for final design:
    - Bushings identified as superior to ball bearings for pedal thickness reduction
  - Custom bushing design implements novel self-lubricating IGUS H1 material
  - Maintains pedal thickness reduction of step-down while loading spindle further inward
  - Compatible with Garmin Rally power measurement technology
  - Passes both ISO and Garmin loading requirements

**GRIP**
- Custom fixture for grip quantification
- Tests different grip scenarios: Riding, jumping, uphill, downhill

**ERGONOMICS**
Modular test pedal designed with interchangeable plates of varying platform concavities and lengths to evaluate pedal profile feel

**RALLY COMPATIBLE**
Compatibility tests conducted to determine the effect of pedal body and internal design modifications on power-measuring performance

**SPECs**
- **Body Material**: 6061 Aluminum
- **Number of Pins**: 22 SHCS pins per pedal (11 per side)
- **Platform Height (Thickness)**: 16 mm
- **Platform L x W**: 107 x 104 mm
- **Weight**: 307g