

Fusion Implants

Advanced Veterinary Devices



PEDICLE SCREW FIXATION SYSTEM

SURGICAL PROTOCOL

Implant Design

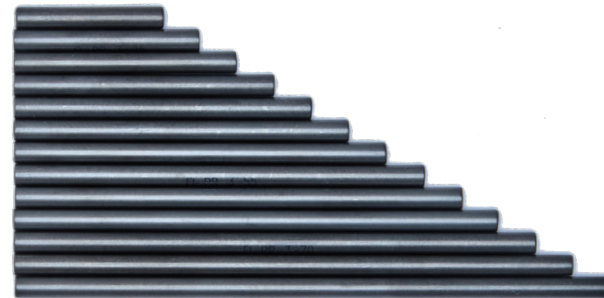
- **Pedicle Screw Anatomy:**

- **Tip:** fluted, self-tapping.
- **Shaft:** standard locking screw thread, large core diameter for strength and resistance to cyclic loading.
- **Neck.**
- **Head:** rounded, seated in a U-shaped “tulip” cup.
- **Integrated washer:** allows **polyaxial motion** with 6° of freedom.
- Angle of deflection of the tulip-head (30°)



- **Locking Mechanism:**

- A **rod** is introduced into the tulip.
- Compressed by a **set screw (cap)** against the washer and head, producing a rigid construct
- Pedicle Screw Protocol



Pedicle Screw System Components

- **Screw sizes:**
 - Standard AO dimensions: **2.0 mm, 2.7 mm, 3.5 mm**.
 - Long 3.5 mm screws available (useful for transpedicular screws in C6 vertebra).
- **Rods:** pre-cut in a range of lengths.
- **Cross bars:** available for construct reinforcement Pedicle Screw Protocol

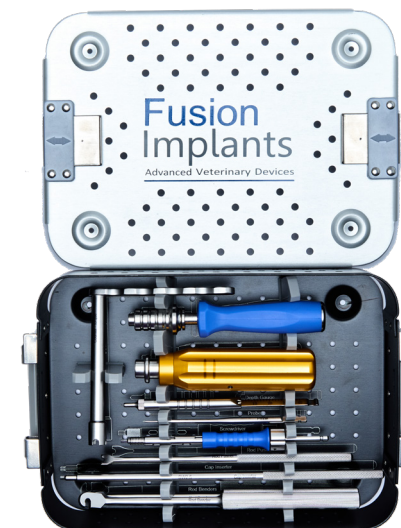


Required Instrumentation

- Drill bits: Ø1.5 mm, Ø2.1 mm, Ø2.9 mm.
- Depth gauge probe (40 mm).
- Pedicle screw driver inserts.
- Screwdriver handle (medium).
- Torque-limiting screwdriver handle (3.0 Nm).
- Counter-torque instrument.
- Rod pusher, rod benders x2.
- Cap inserter.
- Pedicle instrument box Pedicle Screw Protocol

Indications

- Dorsal fixation of the thoracolumbar spine for vertebral fracture/luxation, malformation or tumour
- Dorsal fixation of the lumbosacral spine for degenerative lumbosacral stenosis
- Ventral (trans-pedicular) or dorsal (lateral mass) fixation of the cervical spine for disc or osseous-associated spondylomyelopathy



Screw Length Selection

- **Principle:** use the largest screw the vertebral pedicle can accommodate safely, to maximize fixation strength Pedicle Screw Protocol
- **General rule:** add **+4 mm** to measured bone tunnel length.
 - 2 mm → transcortical purchase.
 - 2 mm → screw left proud of cis-cortex, to allow tulip head polyaxial function.
- **Exception: S1 screws** → add **+6 mm** (due to increased distance from rod to screw insertion point compared with L7 or S2).

Use of 3D Printed Guides

- **Patient-specific guides** available from Fusion Implants.
- **Provide:**
 - In-silico surgical plan and screw map.
 - Sterilisable bone model.
 - Duplicate drill guides for planning and rehearsal.
- **Benefits:**
 - Safer bicortical placement.
 - Controlled position, angulation, and depth.
 - Particularly valuable for high-risk regions (e.g. atlantoaxial instability, malformed vertebrae).



Screw Insertion Technique

- Use a specific **pedicle screwdriver head**.
- Engage the sleeve securely with tulip thread before loading the screw.
- Align screw axis with pedicle trajectory — avoid angulation errors.
- Advance screw carefully: tactile feedback expected when crossing transcortex.
- Leave neck of screw **2 mm proud** (except S1, see above) to maintain polyaxial motion

Rod Application and Locking

1. **Rod selection:** choose appropriate length.
2. **Rod manipulation:** use rod pusher to align tulips.
3. **Test fit:** ensure rod seats well in tulip base, no kinking under compression.
4. **Set screw application:**
 - Use cap inserter; clip loosely into cap to prevent loss in wound.
 - Insert with torque-limiting handle until audible “click” confirms correct torque.
 - Use counter-torque for controlled tightening

Cross Bar Application

- Cross bar nodes press-fit onto rods.
- The cross bar can be cut to length.
- Tighten caps on nodes to hand-tight.
- **Benefits:**
 - Prevents muscle adhesions over laminectomy defect.
 - Links construct → improved resistance to screw pullout

Key Safety Points

- Always add +4 mm (or +6 mm at S1) to tunnel measurement to prevent insufficient screw purchase.
- Use 3D printed guides where anatomy is distorted or high-risk.
- Confirm all rods and caps are seated securely before final torque.
- Consider cross bar placement in cases with laminectomy or poor bone quality.