Surgical & Restorative Protocols

Z-SYSTEMS
ceramic implants

Celebrating 10 Years
FDA Approval

Swiss Made
Surgical & Restorative Protocols

Everything you need to know to place and restore Z-Systems Z5c all zirconia dental implants.

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What is a Z5c Dental Implant?

- It is a 5th generation all-zirconia 2-piece dental implant.
- It is a tissue-level implant that, along with the abutment, can be prepped.
- It is the strongest ceramic implant in the industry with more than 10 years of clinical success in the U.S.
- It is not a niche implant, but a workhorse that can be used in any tooth position in the mouth.
- It supports excellent long-term oral health by attracting significantly less plaque and bacteria than titanium implants.
- It supports soft tissue esthetics that are consistently superior regardless of soft tissue biotype or thickness.
Z5c Implant Diameters and Lengths

6 Implant Sizes to Choose from:

- 5x12mm
- 5x10mm
- 5x8mm
- 4x12mm
- 4x10mm
- 4x8mm

Z5c Implant Line
Unique Z5c Implant Features

1. Periphery of implant shoulder may be prepped as needed to optimize restorative emergence profile esthetics, and to establish the desired type of crown margin.
2. Implant is fully osseointegrated and ready to load within 3 months.
3. No other implant system provides better soft tissue health or esthetics. The implant is invisible under even the thinnest gingiva.
There are 4 Available Abutments

1. 4mm straight
2. 5mm straight
3. 4mm angled 15°
4. 5mm angled 15°

The abutments are not indexed in the implant. So unlike an internal hex implant, which only allows 6 abutment positions, these angled abutments may be placed in any orientation. This simplifies implant placement by allowing the operator to ignore final rotational implant orientation.
Unique Z5c Abutment Features

1. All abutments are easily prepped with a fine (red-stripped) or super-fine (yellow-stripped) diamond bur.
2. The abutments are cemented into the implant with an adhesive resin cement. The implant and abutment share a friction fit assembly that ensure a precise fit.

Apply cement to the abutment in the yellow-shaded area.
Treatment Planning

• Plan case as you would any other implant case.

• Develop a restorative plan before starting any treatment.

• Narrow cone beam 3D-CT is strongly recommended to select proper implant length and diameter; and to determine if other procedures will be needed (grafting, sinus lift, etc.)

• Some of the following may be necessary: models, mounted models, wax-ups, digital workup, surgical guides, CAD tooth design and implant positioning workup, and guided surgery stent and drill kit.

• Note: Z-Systems does not currently have a guided surgery kit and does not support fully guided implant placement, but guided protocols can still be followed using third party guides and guided surgical kits.
Treatment Planning: Special Considerations: Part 1

- The Z5c implant collar is 2.5mm tall.
- The 5mm Z5c implant has a 6mm diameter collar at the top.
- The 4mm Z5c implant has a 4.8mm diameter collar at the top.
- To prevent shear loading from restorative overhangs and cantilevers, there should never be more than 2mm of space between the top of the implant collar to the adjacent tooth!
- Adherence to this 2mm maximum space requires proper clinical measurement and proper implant selection. In other words, it requires advance treatment planning, as does all responsible implant surgery. In unusual cases, such as when there is a 14mm wide single molar space, consider using a pair of 4mm implants and restoring the spaces as a pair of premolars. Implant surgery sometimes requires creativity.
Measure the space between the adjacent teeth and remember the implant collar widths (4.8mm & 6mm). Then it’s time for some simple math to select the proper implant.

The result should be an implant with less than 2mm between the collar and each of the adjacent teeth.

It is also critical to check the vertical clearance before treatment and again after surgery. 5½mm is the typical minimum clearance height. This allows for a 4mm abutment and 1½mm for crown thickness.
Z-Systems Surgical Kit - Site Preparation

Naming protocol for drills:
- **RD230** – 2.3mm round drill
- **TD230** – 2.3mm twist drill
- **TDXXX** – X.XXmm twist drill
- **CS360** – 3.6mm countersink
- **CS400 & CS500** – 4 & 5mm countersinks
- **T360** – 3.6mm tap
- **T400 & T500** – 4 & 5mm taps
Surgical Kit – Suggested Drill Speeds

800rpm – round bur & initial twist drill

600rpm – 2\textsuperscript{nd} twist drill (TD285)

500rpm – all other twist drills & countersinks.

15rpm – all taps
Z-Systems Surgical Kit – Site Preparation

3 easy-to-follow color-coded site preparation pathways are inscribed on the kit.

- 3.6mm – **yellow**
- 4.0mm – **red**
- 5.0mm - **green**
Instrument Sequence

Drilling for a 3.6mm Diameter Implant

3.6mm Drilling Sequence
- Round drill – pilot
- 2 twist drills
- Countersink
- Tap

Additional Note:
- The 3.6mm implant is only available as a monotype (one-piece). It is not currently available in the Z5c two-piece configuration.
Drilling for a **4mm** Diameter Implant

**Instrument Sequence**

- Round drill – pilot
- 3 twist drills
- Countersink
- Tap

**4mm Drilling Sequence**

**Additional Tip:**

- If using freehand placement, use the guide pin after the first twist drill to check placement angulation, position, and depth.
Drilling for a 4mm Diameter Implant

4mm implant uses 6 drills (max) + guide pin:

1. Round bur – the pilot drill
2. Twist drill – TD 230
3. Guide pin – check
4. Twist drill – TD 285
5. Twist drill – TD 325
6. Countersink – CS 400
7. Tap – T400

Note that the drill colors correspond to the colored pathways to ensure you have the correct drill.
Drilling for a 5mm Diameter Implant

5mm Drilling Sequence
- Round drill – pilot
- 5 twist drills
- Countersink
- Tap

Additional Tip:
- If you plan on bone grafting, consider collecting drilled bone from the flutes of the drills. This is most effective with the larger diameter drills.
Drilling for a 5mm Diameter Implant

5mm implant uses 8 drills (max) + guide pin:

1. Round bur – the pilot drill
2. Twist drill – TD 230
3. Guide pin – check
4. Twist drill – TD 285
5. Twist drill – TD 325
6. Twist drill – TD 375
7. Twist drill – TD 425
8. Countersink – CS 400
9. Tap – T400

The tap can be used or omitted depending on bone density and insertion torque.
Pilot Drill (TD230) and Guide Pin

Note the corresponding depth markings.
Pilot Drill (TD230) and Guide Pin

Know your depth markings!
Know the 3 key implant lengths!

8mm, 10mm & 12mm are the important markings to know on the drills and guide pin because those are the 3 lengths of available Z5c implants.
Site Preparation: Countersink

- The countersink often, but not always, requires use of the drill extender.
- If the top of the osteotomy is not a flat platform of bone, then this drill does not need to be used equally on all sides. You may not need to use it at all in atrophic sites.
- Over prepping with this drill will result in more crestal bone remodeling, and may result in placing the implant too deep.
Site Preparation: Tap Tips

- Using the bone taps with a contra angle handpiece requires use of the instrument pictured to the left. This adaptor attaches to the handpiece and the tap.
- It may take some “elbow grease” to maintain the tap in its proper orientation during use.
- Don’t exceed 15rpm with the tap!
Prepping Osteotomies: Tips & Tricks

Osteotomy Tips & Tricks: Part 1

• The round bur is optional. Use a different pilot drill if you have one that you prefer (a sharp-tipped bur, for example). Or just start with the first twist drill.

• The surgical handpiece should be set at 400 - 800rpm for all drills except the tap. Start at 800rpm for the 2.3mm twist drill, then incrementally decrease the speed down as low as 400rpm for subsequent twist drills.

• The tap should be run at 15rpm upon insertion, and at 15rpm in reverse when removing the tap from the osteotomy. It’s a good idea to run the drill out of the mouth for a second or two before using it to make sure the speed has been properly reduced to 15rpm. High speed use of the tap may easily strip out the osteotomy.

• Do not run the tap to the full depth of the osteotomy! Run it most of the depth, but not all the way. Tapping the full length may result in stripping the osteotomy or damaging the instrumentation.
Prepping Osteotomies: Tips & Tricks

Osteotomy Tips & Tricks: Part 2

• Use the **guide pin** especially if you are placing an implant freehand. The guide pin helps assess:
  • **Angulation** – be sure to remove bite block and check occlusion!
  • **Implant position** – no more than 2mm b/w implant collar and adjacent tooth!
  • **Pilot drill depth** – consider drilling up to 2mm deeper than implant length.

• **Consider using a shorter implant.** Longer isn’t better in the short- or long-term! Using a shorter implant allows you to over-instrument the depth of the osteotomy by up to 2mm, which allows latitude in depth of placement without having to re-prep the site. *Implants aren’t always placed on flat osseous platforms – this impacts ideal placement depth!*

• Shorter implants also decrease serious complications: nerve injury, sinus penetration, osseous fenestration, encroachment on adjacent teeth, etc.
Prepping Osteotomies: Tips & Tricks

Osteotomy Tips & Tricks: Part 3

• Using the **countersink** takes some practice, especially when using it on a bony platform that is not flat. If the surface is not flat, all surfaces should not be prepped an equal amount. Sometimes little to no countersinking is required (atrophic areas where the ridge significantly dips down). The goal is to create space for the apical portion of the implant collar. Over-aggressive use of the tap, however, will encourage implant placement that is too deep; and remodeling of crestal bone that may mimic bone loss for other reasons.

• The Z5c is a **tissue-level implant**. This means that the height of the soft tissue is the most critical factor in determining proper implant placement depth. The goal is to have the top of the implant even with the gingival crest. Thread exposure is not a determinant of implant placement depth.

• The **tap** is not always required. The decision to use the tap depends on bone density and implant placement torque. While bone density may be subjective, torque is not!
Surgical Sequence: Round Bur
Surgical Sequence: Twist Drills
Surgical Sequence: Countersink
Surgical Sequence: Tap (15rpm)
Surgical Sequence: Implant Placement
Implant Placement: Packaging

Front of implant box

Back of implant box

Pee pack inside box (not sterile)

4 separate labels are included.

*Save labels for patient chart and implant log. Your referral doctor may also appreciate one!
Implant Placement: Packaging

Each implant box contains an implant in nested peel packs, as well as a separately packaged healing cap.
Implant Placement: Packaging

Inside the outer peel pack is second implant container which houses the sterile implant. Peel off the top and swivel the plastic retaining arm to access the implant.
Implant Placement: Implant Pickup

Attach the placement instrument into the implant. The placement instrument must be fully seated into the implant!

Fully seated – no gap.

Placement instrument has 4 teeth that engage four grooves on top of implant.
Implant Placement: Implant Pickup

Using the included driver, the placement instrument has a green insert that can be advanced inside the placement instrument to spring the top of the instrument so that it grabs and internally holds on to the implant.
Implant Placement: Implant Pickup

The top is sprung (spreads apart) to engage the inside of the implant as the driver advances the insert. The insert should NOT be advanced all the way, but just until you start to feel resistance with the driver. This makes it easier to remove the placement instrument from the patient’s mouth, after placing the implant, without having to use the driver to do this. You will need to loosen the insert before placing another implant.

Visually confirm that the placement instrument is fully seated into the implant before using the driver to secure the implant.

It’s a good idea to remove the insert from the placement instrument prior to ultrasonic and autoclave treatment so the insert is not lost.
Implant Placement: Set Torque Wrench to 35Ncm
Implant Placement: Setting The Torque

- Z5c implants are not designed to be placed under high torque.

- Before each use, make sure the torque is set no higher than 35Ncm.

- To set the torque, twist the proximal and distal segments of the torque wrench in opposite directions. Do this until the 35Ncm reading is in the middle of the window in the middle of the handle. (See previous slide.)

- If the torque exceeds 35Ncm during placement and the torque wrench is properly set, the implant will not be over-torqued. The instrument will stop advancing the implant.

- If the torque wrench defaults to prevent over-torqueing, you must back the implant out of the osteotomy and correct the osteotomy before proceeding further. This may require increasing the length of the osteotomy, tapping, or increasing the countersink.

- Backing the implant out of an osteotomy may require adjusting the torque wrench to temporarily increase the torque. By twisting the handle to shorten the handle, you can increase the torque. After removal, be sure to reset the torque back to 35Ncm.

*Important*
Implant Placement: Attaching The Torque Wrench

The head of the torque wrench is labeled “IN” on one side and “OUT” on the other side. To place an implant, mount the implant and placement instrument as shown below. The “IN” side should be facing away from the implant. Reverse the torque wrench direction (flip it over) to back the implant out of the osteotomy.

Always use a finger to place some downwards pressure on the torque wrench to keep the placement instrument fully seated in the implant.
Implant Placement: Placement Depth

Proper Placement Depth

- The guide for proper placement depth is the crestal gingiva. The top of the implant should be even with it.
- Note that we have used Fermit here instead of a healing cap. Fermit provides an excellent seal with the implant without adding additional height that could result in unwanted occlusal loading.
There may be times when placing the implant slightly subgingival is preferable. This typically occurs in the smile line, when a little extra height is desired to establish a more ideal emergence profile. Sites with thicker than normal gingiva may also be better managed with slight subgingival placement.

Always keep in mind the need for impression-taking and thorough cement removal when considering deeper implant placement.
Implant Placement: Healing Cap Pickup and Placement

The healing cap is most easily carried into the mouth and snapped onto the implant using a perio probe. Slide the probe through the channel on the occlusal surface of the cap until the cap does not swing freely. Then transfer it to the mouth and snap to place with minimal finger pressure.
Implant Placement:
Should I Use a Healing Cap or Fermit?

- The healing cap is used if it is needed to hold back soft tissue to keep it from lying over top of the implant. This helps establish final soft tissue esthetics at the time of the initial surgery.
- If soft tissue management is not required, the Fermit allows a little extra vertical clearance.
Prosthetic Procedures – 6 Simple Steps!

1. **Prep implant** around the periphery if it is exposed.
2. **Select an abutment**, and prep if needed, as dictated by occlusion.
3. **Cement abutment** into implant with an adhesive resin cement.
4. **Make an impression** of the implant and abutment, either a traditional or digital impression, exactly as you would do for a natural tooth.
5. **Fabricate crown** for cementation.
6. **Cement crown** to implant and abutment with an adhesive resin cement.
Prepping the implant, if needed, is most easily accomplished using **fine (red-striped)** or **super-fine (yellow-striped)** egg shaped zirconia diamond burs with plenty of irrigation.
Step 2: Select abutment & prep if needed

It is far easier to try in the abutment and check the occlusal clearance, then remove the abutment and prep it outside the mouth.
Step 3: Cement abutment with adhesive resin cement

1. Apply cement around the upper half of the stem of the abutment.
2. Pack gauze rolls and such to keep the top of the implant dry.
3. Place abutment into implant and clean off excess with a microbrush.
4. Light cure.
Steps 4 – 6: Exactly like procedures for natural teeth!

4. **Make an impression.**
   - Pack cord or use hemostatic agents if desired.
   - Use a laser or electrocautery if desired.
   - Use your Cerec unit or other digital impression unit if you like.

5. **Fabricate cementable crown.**

6. **Cement crown** to implant and abutment with an adhesive resin cement - such as Panavia or RelyX.
Prosthetic Goals for Restorative Success

- Get an accurate impression of not just the abutment, but also of the implant platform. Without clear recording of the implant platform and margins, the crown will not make contact with the implant, and it will thus only be supported by the abutment!

- All implant crowns (and the entire masticatory system) benefit from reduced cuspal height in the posterior. Tall cusps create interferences, and interferences cause fracture or TMJ problems. Remember, over time natural tooth cusps will wear, but ceramic will not? What will your crown look like in 20 years?

- All implants and implant restorations benefit from minimization of the bucco-lingual width of an implant crown. This helps direct occlusal forces down the long axis of the implant in a compressive fashion – which implants, abutments, and restorations tolerate very well. Overhangs, cantilevers, and ridge-lap features are loaded in a shear fashion, not in compression. Nothing in the mouth tolerates shear loads well: not ceramics, screws, tooth structure, or ductile metals like titanium.
The ideal occlusion for an implant crown is to have it slightly out of occlusion. Obviously this may be different if the patient has several implants in one or in opposing quadrants. Implants are not teeth and they don’t have the compliance that teeth do. *High occlusion may be the #1 cause of implant or implant restorative failure!*

While an implant won’t move, opposing teeth may. Use the patients routine recall visits to check the occlusion of any implant restorations (not a bad idea for root canal teeth, either).

All implant crowns should have interproximal contacts within 5mm of the interdental bony crest. The eliminates large embrasure spaces and supports long-term maintenance of the interdental papillae and bone height.

Good impressions often require good soft tissue retraction. With zirconia implants and abutments, retraction cord, electrocautery, and laser ablation are all good options.
Prosthetic Goals for Restorative Success

• One of the most common causes of overhangs, cantilevers, and ridge-lap features is poor implant placement. Poor implant placement is often caused by poor treatment planning or improper implant selection. There should never be more than 2mm between the implant collar and the adjacent tooth – never. This creates exactly the type of crown overhang that is loaded in shear and results in failure.

• Enlist your lab’s help for consistent success. Specify in your implant crown lab prescriptions:
  • Minimize bucco-lingual crown width and cuspal height.
  • Light occlusion (so you can adjust it out of occlusion) or no occlusion.
  • Make sure they recognize all the margins and the implant platform, and that they make the crown to seat firmly onto those margins (this is obviously still true whether or not the implant margins are prepped).
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