Zr. Hybrid abutment has several advantages over others.

<table>
<thead>
<tr>
<th></th>
<th>Stock Abutment</th>
<th>Zirconia Custom Abutment</th>
<th>Titanium Custom Abutment</th>
<th>Zr. Hybrid Abutment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomic</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Natural Tooth Shade</td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Strong and Durable</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Supragingival Margin</td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>(no cement problems)</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>
Since 2013, DDX laboratory have made more than several thousand zirconia-titanium hybrid (Zr. Hybrid) abutments.

Zr. Hybrid abutments have several advantages over other metal custom abutment. It is more biocompatible than any other material for custom abutment. Shade matching is much better, its strength is reinforced with Ti base and it shows better success rate than full zirconia abutment. For these reasons, dentists prescribe more Zr. hybrid abutments than ever before.
According to Dr. Gregory Kinzer at Spear Education, the Ti base is often too short.

So why the word of caution regarding hybrid implant abutments?

One contraindication for the use of a hybrid abutment would be a situation in which the Ti base is too short *relative to the height of the abutment* (Figure 3).

This would mainly be seen with implants that are placed too deep or on implants that have a lot of soft tissue thickness above the bone. With either clinical situation, the ceramic portion of the abutment portion that would provide the support for the *restoration* would be significantly weakened as it is unsupported by the metal base. This is especially evident if the ceramic portion is fabricated out of *e.max*. If a hybrid abutment were to be used in this situation, it would either need a taller chimney – increased height of the Ti base itself – or a taller collar, thereby placing the existing chimney height more coronal with respect to the margins of the ceramic portion.
4.5mm height Ti base holding and supporting the restoration that has total height of 16.5mm (almost 3:1 ratio) may fail sooner or later.
Manufacturers for Ti base like Straumann, NT trading, Glidewell, Sirona, Implant Direct, BioHorizons offer only 4 to 5mm short Ti bases.

MegaGen recognized the need for longer Ti bases and started supplying 6mm Ti bases since 2015.
In early 2016, R2 digital Laboratory set a guideline for Zr. Hybrid abutment and encouraged dentist to use more Ti custom abutment for molar areas.
R2 Digital Laboratory’s recommendation for maxillary molar restoration

Ti custom abutment

Access hole for retrievability

Full Zirconia Crown
R2 Digital Laboratory’s recommendation for any other restorations in Maxilla

Zr. Hybrid Abutment
R2 Digital Laboratory’s recommendation for mandibular molar restoration

- Full Zirconia Crown
- Ti custom abutment
- Access hole for retrievability
R2 Digital Laboratory’s recommendation for mandibular premolar restoration

Zr. Hybrid Abutment
R2 Digital Laboratory’s recommendation for mandibular anterior restoration

Too small to use Zr custom abutment

Either Ti Custom Abutment or Stock Abutment
There are dentists who only want retrievable, screw retained crowns regardless of its size and location. There are also dentists who wants only Zr. hybrid abutments for esthetic reasons. Sometimes, due to vertical height limitation, the lab is forced to choose the screw retained restoration with Ti base for posterior molars.
We realized that having only 5 and 6mm height Ti bases is not enough to provide solution for different variety of clinical cases.
We now have these Ti bases in 2017.

\(\Phi 4.0\) Ti Base

5mm  6mm  7mm  8mm
We now have these Ti bases in 2017.

Φ 4.5 Ti Base

5mm 6mm 7mm
We now have these Ti bases in 2017.

$\phi 5.0$ Ti Base

5mm

6mm
<table>
<thead>
<tr>
<th></th>
<th>(\Phi 4.0)</th>
<th>(\Phi 4.5)</th>
<th>(\Phi 5.0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5mm</td>
<td>(\vee)</td>
<td>(\vee)</td>
<td>(\vee)</td>
</tr>
<tr>
<td>6mm</td>
<td>(\vee)</td>
<td>(\vee)</td>
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</tr>
<tr>
<td>7mm</td>
<td>(\vee)</td>
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<tr>
<td>8mm</td>
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In 2017, R2 Digital Laboratory is equipped with 9 different dimensions of Ti bases for AnyRidge implant system. Only MegaGen provide this many variety of Ti bases.
Which one would you choose?
Which one would you choose?

Ø5.0 x 6mm Ti base vs Ø4.0 x 5mm Ti base
In order to further prevent Ti base dislodgment, R2 digital laboratory uses precision milling process to achieve the optimal 25 micron of cement gap.
More than 35 micron of cement gap will increase chance of future dislodgment.
With 25 micron of cement gap, friction fit is possible.
Pre-sintered zirconia is doped with silica. After sintering, silica molecule are jammed at the boundary of tetragonal zirconia crystals.
Due to lack of silica, true bonding has not been possible with zirconia. Bisco Z-Prime claimed to achieve van der Waals bond between zirconia and resin cement.

Van der Waals is an intermolecular force but is not a bond. Van der Waals forces are week and insignificant compared to covalent bonds.
Strong covalent bond becomes available due to silica molecule on zirconia. R2 digital lab uses both Z-prime and Silaine coupling agent to achieve strongest bond possible.
Panavia cement showed the most retentive strength for Zr. hybrid abutment


In short, we use the following to achieve optimal bonding to prevent Ti base dislodgment.

1. Bigger size Ti base for maximum surface contact.
2. 25 micron of cement gap for friction fit
3. Silica doping on pre-sintered zirconia
4. van der Waals bonding from Bisco Z-prime
5. Strong covalent bonding from sialine coupling agent
6. Strongest resin cement by Panavia
However, R2 Digital Lab still regards zirconia crown over Ti custom abutment as the most predictable implant restoration on molar area.