In my opinion (Dr. August), CEREC Guides are the most important thing to implant surgery in years. With CEREC Guides, one can scan and mill a fully guided surgical stent while the patient waits. Imagine a patient breaking a tooth and requiring an immediate implant. You can take an impression, fabricate the guide, extract the remaining root while you wait and place the implant fully guided. This is really going to change the landscape of Implantology and lower the cost barrier. A lot of GPs have CEREC technology already in their office but are reluctant to place implant unless they are guided. The costs of a surgical guide for single units can be cost prohibitive for some. CEREC guides will allow doctors to be able to fabricate the guides in house saving both time and money.
Fabricating the Radiographic Guide:

Materials:

To fabricate a CEREC milled guide, one needs one half of a Thermoplast stick (thermoplastic tray material), the proper scan body, and a stone model. The scan body is first tried on the model to select the correct size (Orange (s), Medium (white), or Large (gray)). Although the radiographic guide can be fabricated intra-orally, I find it easier to make outside the mouth.

Selecting a Reference Body:

<table>
<thead>
<tr>
<th>Size</th>
<th>Color</th>
<th>Width at most narrow</th>
<th>Max Drill Ø</th>
<th>Mes/fits position correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Orange</td>
<td>6 mm</td>
<td>≤ 1.5 mm</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>White</td>
<td>7.3 mm</td>
<td>≤ 2 mm</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>Grey</td>
<td>11 mm</td>
<td>≤ 4 mm</td>
<td></td>
</tr>
</tbody>
</table>

Select the largest Reference Body that fits the edentulous space. The larger the reference body the more room you have mesio-distally to place your implant. When planning your implant you must stay within the confines of the Reference Body. If you place too small of a Reference Body in the edentulous space, and it is off center, you will have to remake the Radiographic Guide to place the implant in the ideal position. Also, the larger the Reference Body and resulting block used the larger the implant. I found the large body difficult to place in most posterior edentulous spaces.

If one wanted to use a 5mm or larger implant, a CEREC guide could still be used, but the final drill would have to be completed with a standard drill, not a Guided Drill.

Preparing the Thermoplast:

In approximately 200 degree water, place thermoplastic material. The material is opaque when cool and clear when ready to mold. Soak the stone model in water. Remove from water with an instrument and adapt to the wet stone model. If the teeth have significant undercuts, block them out with a polyvinyl material. Do not use wax as it will melt.
Adding the Reference Body:

Place the reference body in to the still translucent Thermoplast. Make sure you seat the reference body deep into the Thermoplast so that it touches the stone in the edentulous area. Make sure you have enough thermoplast covering the lip pictured above in red. In the chart pictures before you can see that each Reference body allows only a certain amount of mesio-distal correction. Place the Reference body in the general area and direction that you want the implant as you will be planning the implant within the confines of the Reference Body on your scan. Run the guide through cold water until the material becomes opaque.

The images above show two common mistakes made while fabricating the Radiographic Guide. In the image on the lower right the Reference body is too large for the soft tissue saddle. As a result the Reference Body is too high, which may result in the inability to mill out the Drill Body. On the lower left the Reference Body is rotated distally. While the Drill Body may correct for this angulation issue, there may not be enough mass in the Reference body to handle this amount of angulation. While the Thermoplast is still clear look at how the Reference Body relates to the edentulous space. You can make corrections until the Thermoplast becomes opaque.

Remove the Radiographic Guide from the model and try in the patient’s mouth. You may need to trim away some areas along the buccal vestibule if it pinches the patient’s gingiva. The guide should fit very tight and “snap” in place. Look at the most mesial teeth to confirm it is seated. Scan the patient with the appropriate blue disposable bite fork. Due to the fact that the patient will be biting on the radiographic guide they may not be able to occlude on the fork, but use it to position the anterior teeth.

While the scan is loading, image the patient in CEREC. One only needs to image the quad in which the implant will be placed, however I like to scan the full arch to compare the contralateral tooth being replaced.
Load the CEREC data into Galileos. Go through the normal process of planning your implant position. Use the CEREC proposal as well as whichever Guide Sleeve you would use for an Opti or classic guide to aid in visualizing the perfect mesio-distal spacing on the implant. We won’t be using this guide sleeve and will change the sleeve to CEREC Guide, but I find positioning the guide sleeve helpful in getting an ideal placement. Once the Reference Body is identified, it cannot be toggled off independent of the implant so do this before the fiducials are identified.

Right click on the implant or click on the SLEEVE icon in the implant menu. Click the button that says “CHANGE”

On the pulldown marked SLEEVE SYSTEMS, scroll down to Sirona-CEREC. Select that option and hit OK. You will now have an additional tab on the top of the screen in the CHANGE IMPLANT dialog box marked REFERENCE BODY. Select this option.

On the following screens you will mark your fiducials. Play with the lever underneath the image until the fiducials look
Double click on the 3 most clear fiducials. Once you do that the computer will then search for the remaining fiducials. Make sure that the large fiducial containing portion of the Reference Body faces lingual and not buccal in the XG-3D as there may be a tendency to cut this portion off in its smaller 8 by 8 FOV.

Hit OK to confirm that the fiducials were found. You now have the reference body on the 2D and 3D images. Turn on FINAL DRILL PATH and PILOT DRILL PATH by right clicking the implant in the 2D views. This gives you a better visual of how your drill path and Drill Body will interact with the implant. The Drill Path must fit in the Reference Body to be able to be milled out.

Right click the implant again and select SLEEVE. Here we will enter the D2 value. The D2 value, also known as the Drill Stop Length is the distance from the apex of the implant to the top of the guide.
If you measure the length of your Guided Drill from the cutting tip of the drill to the drill stop, the D2 value will be that length minus 1mm which is the thickness of the stop.

The D2 Value is illustrated further below. D2 is the length of from the apex of the implant to the top of the guide. This value is defined as the length of the drill from the cutting tip to the stop minus the thickness of the Guide Handle, which is 1mm. For a Nobel 8mm implant this value is 17mm (18mm drill minus 1mm handle). For a 10mm Nobel Implant this Value is 19mm. For an 11.5 this is 20.5, etc.

D1 adjusts with the D2 value. At times the tissue may be so high that the Guide Sleeve penetrates it. Or you may want to do a bone supported guide (not for CEREC Guides), the D1 will go the opposite way. I try not to mess with the D1 as the drill length will always be the same and thus, you may over or under prepare your osteotomy in depth if you are not watching.
After you are satisfied with your arrangement, in the Side Menu, select SURGERY and click the icon of the guide. At the bottom of the menu you can see the large R icon for Export plan for third party processing. Click the R.

The following dialog box appears. If you had not given the D2 value. The sleeve position will show in red and you will have to enter that. Select the proper drive to export to and click EXPORT. The file will be saved as a .dxd file which will be imported into CEREC.
After hitting IMPORT in the top menu, select the FILE TYPE option for DXD file. Choose the correct file and open it. The Drill Body will appear in the mill preview. Place the appropriate block into your milling unit and hit mill.

In about 12 minutes on the MCXL the Drill Body will be milled. Break it out of the block and remove the sprue. Err on the side of over adjusting rather than under adjusting the sprue area. Mark which side of the Drill Insert represents the lingual of the Surgical Guide.

Remove the Reference Body from the Thermoplast. Using a scalpel, remove any Thermoplast material which may prohibit the seating of the Drill Body. From the bottom of the guide cut away an area for the drill to go through the guide.
Inserting the Drill Body:

The Reference Bodies make a small rectangular notch on the lingual of the Thermoplast and a round indentation on the buccal side. Again, pay special attention to the Drill Body as to which side is Buccal and which is Lingual.

Snap the Drill Body into the Thermoplast. You should hear a click. Inspect the top and bottom of the Surgical Guide. Make sure that the Drill Body was inserted with the correct Bucco-lingual orientation.

View the guide from beneath to make sure that the base of the Drill Body is flush with the Thermoplast. You can also insert the proper sized Guided Drill into the guide and see how it fits. Pay attention to the trajectory of the drill. If the Drill Body is placed in backwards the drill trajectory will be off.
There are specific Guide Handles to each block and Guided Implant kit. Play around with the Guide Handles to see which ones fit the drills in the kit. The Nobel set of drill handles comes with many types to fit all the different Nobel kits, so try them out with the ones you have.