How to Fabricate Precise-Fitting Removable Partial Dentures Using Ultaire™ AKP Frameworks

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Dental Team
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Restorative Challenge
For decades, the 61-year-old patient wore low-quality upper and lower partials with poor occlusion, putting her remaining teeth at risk. Many of the remaining tooth structures were weak and brittle and her occlusal function was diminished.

Restorative Solution
The dental team selected Solvay Dental 360’s Ultaire AKP for the frameworks because its rigid strength would provide excellent support without damaging remaining dentition while giving the patient an esthetic alternative to metal. It would also allow enough intra-occlusal space to set VITA Physiodens posterior denture teeth with a 33° cuspal inclination. This solution also satisfied the patient’s requirements: she wanted to be able to chew more effectively and didn’t want metal clasps or to have to make multiple trips to the dentist for adjustments (Ulteir AKP frameworks need little to no adjustments.)

Creating The Framework
In order to ensure the impressions were the most accurate replication of the patient’s natural dentition, Dr. Grossman used custom impression trays and a high-quality PVS impression material. This ensured the CAD design captured all anatomical landmarks for a horseshoe-shaped major connector on the upper and a modified lingual bar design on the lower. The accuracy of these impressions allowed for precise fitting of the removable partial dentures.

Figures 1 and 2

Ultaire AKP clasp designs are shorter and thicker, yet they improve retention by encircling a minimum of 200° of the respective tooth. A modified lingual bar design was used on the lower for strength and comfort.

Figures 3 and 4

The horseshoe design of the upper major connector and bite blocks placed on framework for bite registration.

Figures 5 and 6

The models were articulated on a fully adjustable Artex articulator, teeth were set on the Ultaire AKP frame in wax, and the wax was carved and colorized to mimic the natural gingiva of the patient.
also allowed for functional rest seats and clasp design.

At the lab, we scanned the impression and used 3Shape software to design both the upper and lower frame in just 30 minutes. Our software is programmed with Ultaire AKP material settings; for example, it sets the undercut depth to about 0.5mm, which is ideal for clasp engagement. These deeper undercuts are a major benefit of the high-performance polymer material, and wouldn’t be possible with metal.

On the lower framework (see Figures 1 and 2 on facing page), we chose not to design a lingual plate because of the instability of anterior teeth #22 through #27. Instead, we opted for a modified lingual bar design that sits 3mm to 4mm below the gingiva of the anterior teeth with rest seats on the distal of #20 and #28. The Ultaire AKP rest seat design is the same as you would see with metal frames, yet it lends strength and stability without the weight, irritation and poor esthetics of metal. The clasp design is slightly shorter and thicker than a conventional metal clasp design. For the upper partial (see Figures 3 and 4 on facing page), we created a horseshoe design, which adds stability while allowing the patient to feel her palatal area. As with the lower partial, we avoided the lingual flush up in areas where we were concerned about recession or the integrity of the teeth, specifically teeth #7 through #10.

After milling the Dentivera™ milling disc on a vhf milling machine for about two hours, the frameworks were cut from the disc and the partials snapped right onto the models without any adjustment. This is a testament to the efficiency and accuracy of the CAD/CAM process.

**Providing Proper Tooth Morphology**

To ensure that the patient’s occlusal scheme would have full function, we used a fully adjustable articulator-mounting to mimic her natural jaw function. This guided the process of setting the fully anatomical 33° denture teeth and ultimately eliminated the need for chairside occlusal adjustments to the finished partials. (See Figures 5 and 6 on facing page.)

**Fitting and Processing**

Thanks to the software blocking out the undercuts and providing sufficient retention, the frames seated perfectly during the waxed setup try-in stage without adjustments to the clasps or rest seats (see Figures 7 and 8 below). We proceeded to the final waxing, investing, press pack and microwave processing with Keystone’s Diamond D acrylic. The finished partial frames are polished to a glass-like finish while maintaining the natural gingival anatomy and surface texture of the acrylic. These processing and finishing steps were completed in one day.

**About Ultaire™ AKP from Solvay Dental 360™**

Ultaire AKP (aryl ketone polymer) is the first product in the Dentivera™ milling disc family, offering a biocompatible, lightweight, comfortable and esthetically pleasing alternative to traditional metal RPD frames. It is easily integrated into a lab’s existing digital workflow: labs start with a digital scan or scanned impression; use 3Shape, Dental Wings or Sirona software to design the partial; and then mill the 98-mm disc. “The frame comes out of the milling machine with very few finishing steps remaining; all that’s required is to take the edges off and then it can go straight to try-in,” says Shawn Shorrock, Global Director of Solvay Dental 360.

Solvay guides new users through a comprehensive education process, including a series of e-learning modules and design practice. Upon completion of the modules, users download a file that helps guide the CAD process and includes all of the correct parameters for the material to ensure there are fewer adjustments in the final stages or after the try-in. The company is excited about patients’ responses to the material. “Long-time RPD wearers who, for one reason or another, were having issues with their old partials are literally crying when they put the Ultaire AKP partial in their mouths because the frames are so much lighter weight, fit better and there’s no metal,” says Shorrock.

For details on Ultaire AKP, call 844-659-1869, visit solvaydental360.com or search “Solvay Dental 360” on Facebook or Twitter.

A finished partial made from Ultaire™ AKP.