mediate parts and anchors because the head has the same general interface for assembly with the intermediate part and anchor, as explained above.

To accomplish this customization, imaging technologies that allow CAT scan, radiographic, or visible light scan of the jaw and dentition have been combined with computer aided design ("CAD"), computer aided manufacturing ("CAM"), and rapid prototyping technologies to make Patient-Specific dental products. These technologies can be used to shape and size the implant parts as described herein to better correspond to patient specific anatomy and that will integrate better into the human body.

The patient-specific customization also applies to the anchor and/or the intermediate part. The anchor and intermediate part may be provided with particular dimensions or shapes to correspond to the dimensions of a bore at a patient's implant site. The anchor and any apical threads may be designed on a case-by-case basis also. For example, a clinician may want a modular implant with no apical threads. Further, the clinician may want the implant (the head, intermediate part, and anchor) to be made entirely of porous material or another material. Exterior surfaces on the intermediate part and anchor may also be customized as mentioned above.

With the structures described above, and whether or not stock parts or customized parts are used, the doctor is able to select a desired form for at least one of the head, the intermediate part, and the anchor for the modular implant, and make the selection specifically for a particular examined patient site to receive the modular implant. In one case, the form of each of the head, intermediate part, and the anchor are selected specifically for the particular examined patient site, and yet in another case, stacking pieces are also used on the implant and selected with the particular patient site in mind.

As another option, at least one of the head, the intermediate part, and the anchor is customized for a particular patient to receive the modular implant. In some of these cases, at least one of the parts may be a non-customized stock part.

If the clinician decides to assemble and place the implant chair-side, another feature of the modularity is to be able to place the anchor with or without the intermediate part first, place a healing screw, and cover it over for healing while a patient-specific implant head is being manufactured. When the patient-specific implant head is completed, the clinician can then revisit the surgical site, remove the healing screw, and attach the customized patient-specific implant head. In this situation, the implant is assembled in-vivo and is designed and customized specifically for a particular patient's bone and soft tissue anatomy.

Also, a modular implant can have the advantage of easier replacement or revision in certain cases if the implant fractures or otherwise fails. In this situation, instead of having to remove and replace the entire implant, the clinician may only need to remove and replace the head, where most fractures or failures would generally occur. In this way, the anchor and the intermediate part remains completely osseointegrated and stable during and after replacement of the head while the tissue heals.

While the illustrated forms are shown to be dental implants, it will be understood that such structures, with modular implants with interchangeable parts as described above and where an intermediate part is secured to the implant by a head and an anchor, may be applied to implants used on other areas of a human or animal body.

While this invention has been described as having a preferred design, the present invention can be further modified within the spirit and scope of this disclosure. This application is therefore intended to cover any variations, uses, or adaptations of the invention using its general principles. Further, this application is intended to cover such departures from the present disclosure as come within known or customary practice in the art to which this invention pertains and which fall within the limits of the appended claims.

What is claimed is:

1. A modular implant system, comprising:

a plurality of heads having a plurality of different head forms each head form configured for supporting a dental prosthesis and at least one of the different head forms having an apical end with an exterior threaded portion configured for engaging bone;

a plurality of porous intermediate sleeves having a plurality of different intermediate sleeve forms configured for engaging bone, wherein at least one of the plurality of intermediate sleeve forms is configured to be assembled on at least one of the plurality of different head forms; and

a plurality of initially separate anchors having a plurality of different anchor forms, wherein at least one of the plurality of anchor forms is configured to engage at least one of the plurality of head forms of the head so that at least one of the plurality of head forms and at least one of the plurality of anchor forms can cooperatively secure at least one of the plurality of intermediate sleeve forms of the intermediate sleeve to form a modular implant.

2. The modular implant system of claim **1**, wherein the plurality of heads include at least one externally threaded head and at least one press-fit head.

3. The modular implant system of claim **1**, wherein each of the plurality of intermediate sleeve forms is at least partially formed from one or more of:

a porous metal,
a porous metal including tantalum,
a ceramic,
a metal,
a polymer,
a resorbable material,
a non-resorbable material,
an organic bone graft,
a synthetic bone material, and
a collagen.

4. The modular implant system of claim **1**, wherein each of the plurality of head forms is at least partially formed from one or more of:

titanium,
zirconia,
an esthetic material,
a composite material,
a surface coating,
microthreads,
a polished collar, and
a biological coating.

5. The modular implant system of claim **1**, wherein the plurality of intermediate sleeve forms each have an intermediate cross-sectional shape with an outer periphery forming at least one of:

(1) a non-circular curved shape,
(2) a polygonal shape,
(3) both (1) and (2), and
(4) an irregular shape having at least one flat side and at least one curved side.

6. The modular implant system of claim **1**, wherein the plurality of at least one of the head, the intermediate sleeve, and the anchor is configured to provide an exterior surface configuration for the implant including: