

## Invisible Braces

The young woman in the lower photo is wearing new type dental braces that are virtually invisible at normal contact distances; only in closeup, as in the upper photo, are the translucent braces detectable.

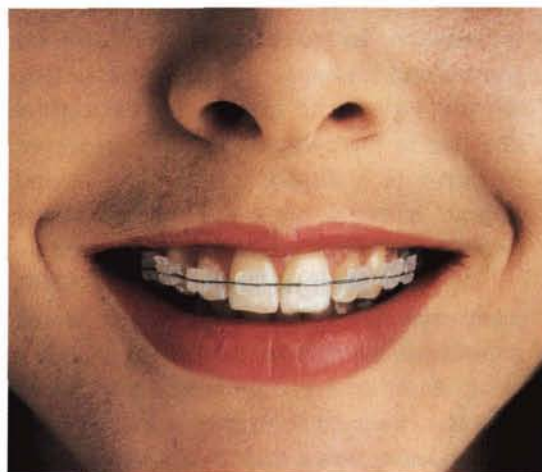
They are Transcend<sup>®</sup> ceramic braces, jointly developed by Ceradyne, Inc., Costa Mesa, California and Unitek<sup>®</sup> Corporation/3M, Monrovia, California, with an assist from the NASA Industrial Application Center, University of Southern California (NIAC/USC), Los Angeles California. NIAC/USC is one of 10 NASA-sponsored dissemination centers that provide information search and retrieval services to industry clients and offer assistance in applying the information. Ceradyne is a regular user of NIAC/USC services.

Marketed by Unitek/3M, Transcend Brackets<sup>®</sup> represent a high technology orthodontic innovation in which individual translucent brackets, especially designed for each tooth, work in concert with a thin metal connecting wire to gradually reposition teeth, mouth and jaws into proper alignment. Intended to meet a need for an orthodontic appliance that was aesthetically appealing yet as clinically effective as plastic or metal braces, Transcend brackets are made of a very hard, shatter-resistant alumina with high strength and maximum translucency. The translucency allows light to pass through the ceramic material to the tooth, thereby causing the bracket to appear tooth-colored. The brackets do not stain, discolor, deform or bend.

The material is known as translucent polycrystalline alumina, or TPA. It came to orthodontics by an indirect route. Ceradyne, a leader in advanced ceramics for defense, aerospace, electronics and industrial uses, was looking for a special material to be used in infrared radomes employed by the military services in tracking heat-seeking missiles. TPA emerged as a

leading candidate. At Ceradyne's request, NIAC/USC conducted an extensive literature and patent search to provide a technology base for Ceradyne production of TPA.

In 1986, Unitek contacted Ceradyne in quest of a transparent material of sufficient tensile strength to be used in orthodontic treatment. Ceradyne suggested TPA as the answer and the two companies embarked on a program of development and clinical trials. Transcend Brackets were introduced in 1987 and in the same year production soared to 300,000 pieces a month, marking what its developers say was the most successful orthodontic product introduction in history.



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