

# Molybdenum at work in the dentist's office

Dental instruments need to be hard for the dentist to work efficiently and precisely, and tough enough not to break during procedures. At the same time they have to be hygienic, corrosion resistant and easily sterilized. The molybdenum-containing hardenable surgical stainless steel Type 440A fits these requirements and new, even harder and tougher grades are on the horizon.

Dentists recommend a semiannual check-up and a visit to the hygienist. Regular flossing and brushing can help slow the accumulation of plaque and tartar, but only dental hygienists can effectively reach small crevices between the teeth and clean near the gum line. To accomplish this and many other tasks, they often use tools made of a hardenable molybdenum-containing stainless steel.

## Tools of the trade

Several types of tools are used to clean and care for the teeth, including probes, mirrors, scalers, ball burnishers, and condensers. Mirrors help examine patients' mouths. Scalers remove plaque and tartar by scraping. They come in many angles and tip shapes so the hygienist can comfortably reach all of the tooth's facets. Ball burnishers provide the final polishing of fillings, smoothing scratches left by other tools. Probes are used to find cavities and condensers to place and compact restorative material into a prepared cavity.

Dental tools are available in a variety of materials, including stainless steel, carbon steel, titanium and plastics. Important factors in tool selection include material strength and toughness, weight, balance, ability to hold a sharp edge, and resistance to corrosion.

Strength and toughness prevent tool breakage which might easily lead to puncture wounds. Stainless steel tool tips exhibit excellent toughness. Scalers,

curettes and probes need a sharp edge to reduce the pressure exerted by the dentist, helping to avert damage to the patient's teeth or the tool itself. Dull dental tools are more difficult to work with. They reduce control, and with that, the quality and precision of the work. They also require more time for a procedure, increasing fatigue of the practitioner, not to mention that of the patient. Periodic sharpening is therefore an essential part of tool maintenance. The high hardness of surgical stainless steel maximizes tip

life between sharpening and reduces the total maintenance time.

As in all medical practices, hygiene is key for safe and successful procedures. Dental tools are sterilized after each use, usually with high-temperature steam under pressure in an autoclave, with dry heat or with chemical vapor. Stainless steel does not corrode in any of these procedures. Its non-reactive surface is easily cleanable and disinfected. ➤



Regular visits to the dental hygienist help to keep teeth healthy and prevent plaque from accumulating.  
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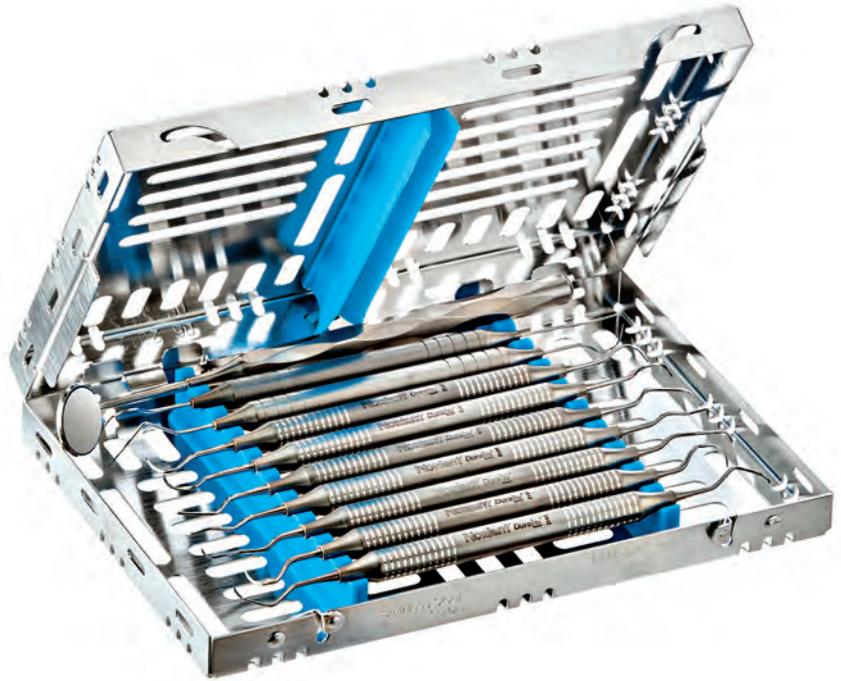
## The stainless choice

Stainless steel's superior properties ensure that it is widely used in dentists' offices all over the world.

The grade of stainless steel employed depends on the intended use of the tool. One widely used grade for curettes and scalers, instruments used to remove hardened plaque from the tooth surface, is AISI Type 440A. This high-carbon, hardenable stainless steel contains 0.75% molybdenum. A manufacturer in California uses Type 440A to make high-quality dental and surgical instruments. According to their metallurgist, it delivers the best hardness, toughness and wear performance of any stainless steel. Another top US tool producer echoed this assessment and stated that Type 440A stainless steel enables them to manufacture durable, reliable, high-quality instrumentation that allows dentists and hygienists to achieve peak performance and maximize patient care. The alloy's molybdenum addition contributes to the toughness and corrosion resistance.

A maker of dental instruments in Germany makes probes from 3%-molybdenum super duplex stainless steel for its high strength, flexibility, and excellent wear resistance. The latter ensures a long-lasting sharp tip.

But new grades are entering the market. The stainless steel producer Sandvik already offers a range of molybdenum-containing grades for medical and dental



"The combination of corrosion resistance, edge retention and tensile strength make Type 440A the perfect material for our product." © Nordent Manufacturing

instruments. Currently the company is working with high-quality toolmakers to test its newest grade for dental applications, a precipitation hardenable (PH) grade with 4% molybdenum. It can be formed at low hardness and then heat-treated to the final hardness in just one step, offering a considerable advantage over hardenable martensitic grades, which require three or more heat-treating steps. But the key advantage is that the grade is much tougher than the martensitic stainless steels, which can be fragile, especially if dropped.

Dentists can choose among many materials for their instruments. Stainless steels provide just the right properties for every kind of tool. As dentistry advances, the tools and materials must advance with them and there are new developments with even higher molybdenum contents on the horizon. It could be said that Mo-containing dental tools are one of the reasons behind many great smiles! (Alexis Werner)