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THE APPLICATIONS OF ERGONOMICS PRINCIPLES IN DESIGN-SPECIALS MATERIALS FOR DENTAL PRACTICE

Mihaela POPESCU, Veronica ARGESANU, Georgeta MOCUTA, Mihaela JULA, Aurelian MAGDA, Adrian VOICU

Université Polytechnique de Timisoara, Faculté de Mécanique, Département D'Ingénierie des Matériaux et de Fabrication (IMF) – Science de Matériaux et du Soudage (SMS), Bul. M. Viteazu, nr.1, 300222, Timisoara, Roumanie, tel. +40256403714, fax +40256403626, E.mail: mihaela.popescu@mec.upt.ro

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Abstract:

Ergonomic in dental practice imply using specials materials for manufacturing dentist utensils. In dentistry the SMA imposed themselves by their properties inclusively in the realization of the utensils for intervention/operation, realization of dental chairs. The titan and its alloys are applied in dentistry not only in dentures – implants, but also in dentistry ergo design. The multilayer diamond covered instrument is the result of an advanced technology and has a long operating life as well as an excellent braking capacity.

1. Shape Memory Alloys (SMA). The Usage of Shape Memory Alloys in Dentistry - Utensils

The alloys with shape memory have the unique property of "shape effect" (simple and double effect of the shape memory), super elasticity and biocompatibility (the usefulness of a material from this point of view can be established on the base of three selection criteria chemical, biological and mechanical), corrosion resistance, are very ductile and can be easily deformed, great capability of absorption of vibration (due to the easiness of the displacement of the internal interfaces of these alloys), the capacity to convert the heat energy in mechanical energy, and so on.

In dentistry the SMA imposed themselves by their properties inclusively in the realization of the utensils for intervention/operation, realization of dental chairs, etc., being a decisive component in their ergonomic design.

In endodontics for example, endo-manual tools made of NiTi, provided by DENTEX (www.dentex.ro) are utilized.

- Kerr Pinnacles (Fig.1)
  Manual pinnacles NiTi, kerr type (file)

Presentation: case x 6 pieces

PRODUCT	21 mm	25 mm
08	END 167	END 176
10	END 168	END 177
15	END 169	END 178
20	END 170	END 179
25	END 171	END 180
30	END 172	END 181
35	END 173	END 182
40	END 174	END 183
15-40	END 175	END 184

Fig.1.1

- Kerr Pinnacles (Fig. 1.2)
  - manual pinnacles NiTi, reamer type (drill);
  - Presentation: case x pieces.

PRODCT	21 mm	25 mm
08	END 185	END 194
10	END 186	END 195
15	END 187	END 196
20	END 188	END 197
25	END 189	END 198
30	END 190	END 199
35	END 191	END 200
40	END 192	END 201
15-40	END 193	END 202

Fig.1.2

- Hedstroem Pinnacles (Fig. 1.3)
  - Manual pinnacles NiTi, headstroem type;

- Presentation: case x 6 pieces.

PRODUCT	21 mm	25 mm
15	END 203	END 210
20	END 204	END 211
25	END 205	END 212
30	END 206	END 213
35	END 207	END 214
40	END 208	END 215
15-40	END 209	END 216

Fig. 1.3

Endodontic pieces, cavity preparation set:
EX Series
Type ISO E with extern spray

MPA –E16R	Y110-104
MPA –E64R	Y110-105

- Apex localizer connection;
- mini head;
- NiTi pinnacles (Φ 2.35 mm);
- pinnacles of counter angle, 360° rotation, 16:1 reduction;
- drill stack Ultra Push Button;

360° rotation
Counter angle
pinnacles
Reduction 16:1/64:1

360° rotation
Counter angle
pinnacles
Reduction 100:1

Fig. 1.4

NRS2-E10R	Y110-060

- Apex localizer connection**;**
- Mini head**;**
- NiTi pinnacles (Φ 2.35 mm);
- pinnacles of counter angle**,** 360° rotation**,** 100:1 reduction;
- drill stack Ultra Push Button
- 10:1 adapter piece& 10:1;
  Adapter head

TEQ-E10R	Y200-470

- Ultra Push cu button drill stack;
- Counter angle pinnacles**,** 90swingable**,** and 10:1 reduction.

Model	Code	Description
MPA-E16R	Y110-104	16:1**,** steel
MPA-E64R	Y110-105	64:1**,** steel
NRS2-E10R	Y110-060	100:1**,** steel
TEQ-E10R	Y200-470	10:1**,** steel**,** push button

Fig.1.5

NiTi TEE is a very economical system of pinnacles made of nickel-titan and having an increased taper to enable mechanical canal treatments, easier, more rapidly and more safely. Flexible and efficient these pinnacles are used especially in the CROWN DOWN technique treatment.

The intro kit NiTi TEE contiains7 instruments made of nickel titan – pinnacles of K and S types and a manual instrument of type K. The unique shape of the S cutting edge with 2 cutting blades placed at 90 degrees and idle apex permits rapid and efficient treatments.

The NiTi TEE pinnacles are used in manual endodontic pieces at speeds between 150-300 rpm.

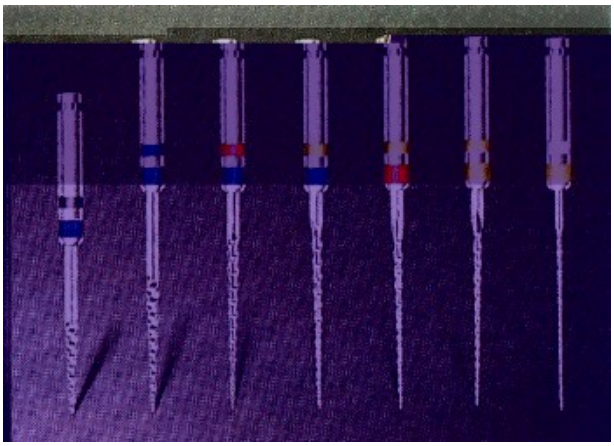

Fig. 1.6

ENDO-MATE DT

Torque Control & Auto Reverse

Endo-Mate DT is especially conceived to permit the usage of all types of NiTi pinnacles.9 programs can be allocated for the exact specifications of the producers. The command unit is compact and easy to enable total portability between the work stations. A dual power supply permits the ENDO-MATE DT to connect to the plug or the operating with accumulators. The micro motor commanded by a micro processor is light, compact and works extremely precisely. The great LCD screen indicates clearly, in every moment, the work conditions.

Characteristics:

- For all types of Ni-Ti pinnacles;
- Torque control from 01 to 65 N.cm- with respect to the ratio of the selected head

- auto-reverse function;
- compact unity;
- good visibility thanks to the great screen;
- plane and intuitive in usage keys;
- Works with accumulators or plugged in;
- Time of working with accumulators 2 hours;
- The hand piece light and comfortable;

Ratio	Head Revolution [min^{-1}]
20:1	**100-650**
4:1	**500-3.200**
1:1	**2000-13.000**

Fig. 1.7

For all types of pinnacles there exist 9 programs (speed, torque etc.) They can be stored by a simple pressing of a button. To navigate between the different programs it is sufficient to press the Program key.

2. The usage of titan in dentistry - instruments

The titan and its alloys are applied in dentistry not only in dentures – implants, but also in dentistry ergo design.

- Ergonomic comfortable handle. NSK dedicated its activity to the design of hand pieces that adapt comfortably to human hand even for long lasting treatments. This is valid for all types of hands. The titan is the optimal material to confer comfort, tactile sensitivity and optimal adherence even for gloved hands.

Fig.2.1

- **NSK autoclaving:** all NSK pieces are characterized by superior durability and high performances even after frequent autoclaving. All the pieces are autoclaved at 135°C.

There exists the Ti-max series for high speed titan hand pieces.

There exists the Ti-max series for low speed titan hand pieces

The Ti-Max scalars are made of titan with air.

There exists the Ti-MaxTi series for low speed titan hand pieces

Fig.2.2

Flexiquik NSK couplings are made –This is a luxury coupling having a bulb included in the coupling and the exterior case of massive titan.

Turbine mills:

Turbines NSK out of titan

Model	Code	Description
A500L	P665	mini head11.3 mm¸ 430.000 rpm
A600L	P666	normal head 14.4 mm¸ 430.000 rpm
A700	P667	force head ¸ 14.6 mm¸ 50.000 rpm
A500	P668	mini head¸ without optical fiber
A600	P669	normal head¸ without optical fiber
A700	P670	force head¸ without optical fiber

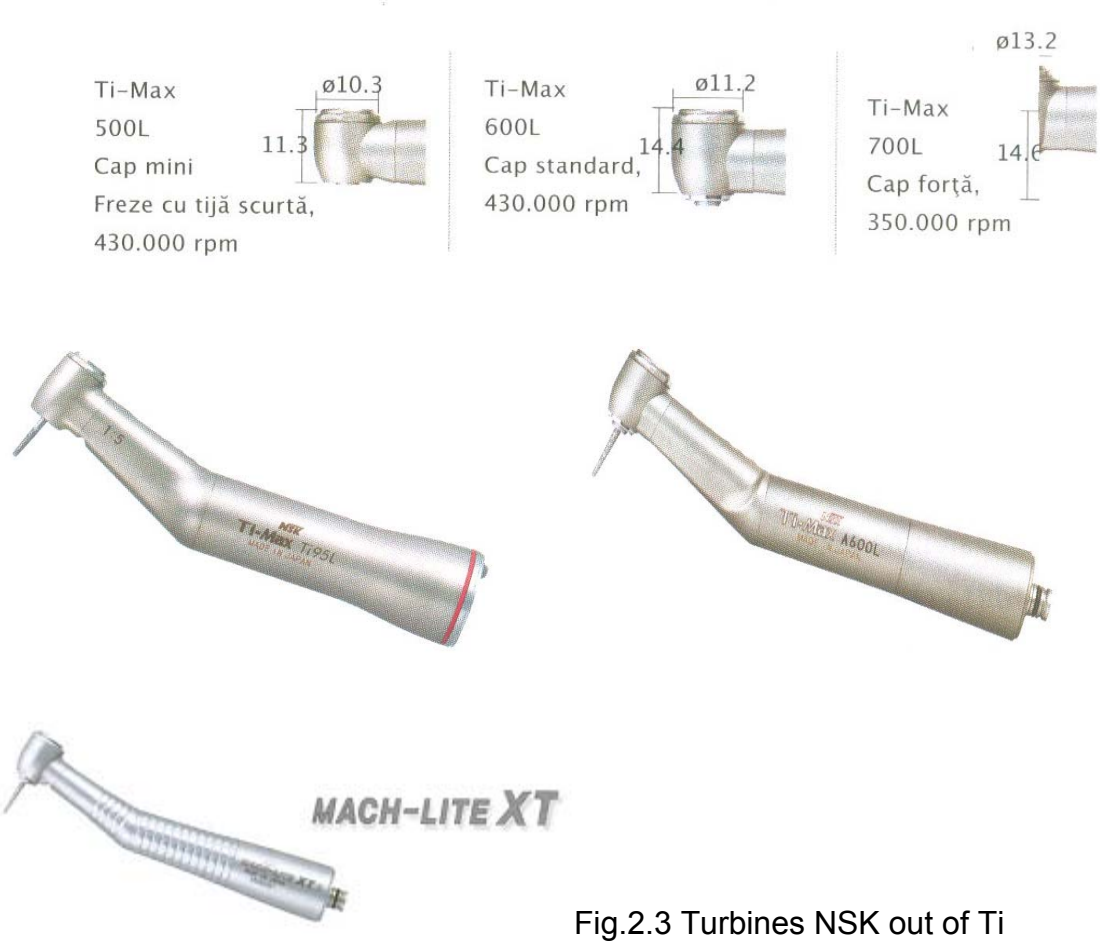

Fig.2.3 Turbines NSK out of Ti

3. Special multilayer materials Diamond instruments (DIATECH firm) realized in multiple layers for dental consulting rooms

Multiple diamond layers in dental instruments are considered to be one of latest applications.

The multilayer diamond covered instrument is the result of an advanced technology and has a long operating life as well as an excellent braking capacity.

Fig. 3.1 illustrates the finding of the optimum solution. The significance of the digits is as following:

1. The presentation of the diamond covered instrument at scale the 1:1;
2. The afferent prices, I-III group;
3. The reference number;
4. the head diamond; 1/10 mm
5. the length of the head in mm; MLX= the code for granulation;
6. the colours code for different granulations;
7. the order ticket
8. the ISO code
9. the order number
10. unitary package

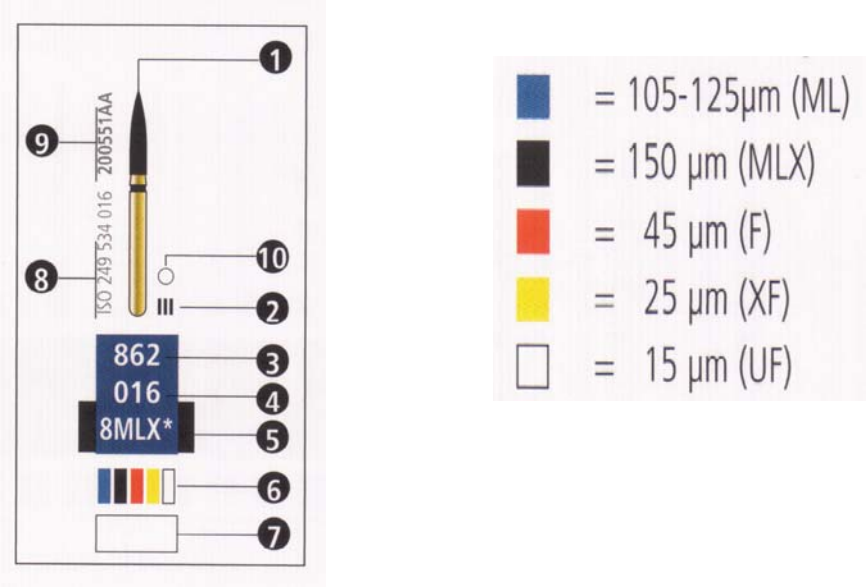

Fig .3.1

The multilayer diamond covered instruments DIATECH are based on diamonds realized accordingly to the most recent technologies. Their diamond thickness is greater and distributed on more levels. By the manufacture technology, the new granulations with diamond constantly maintain an excellent quality of the cutting. Fig. 3.1 illustrates by comparison that the diamonds work more rapidly and last more.

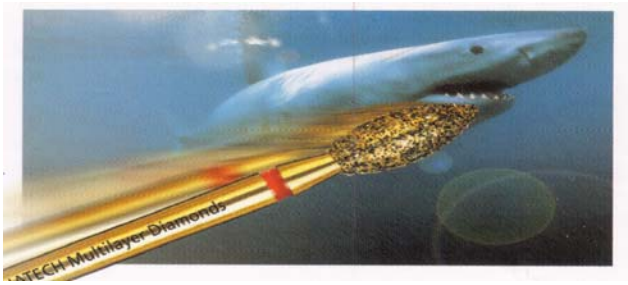

Fig.3.2

Fig.3.2 explains the distribution of the diamond particles and the manner of their attachment on the steel support.

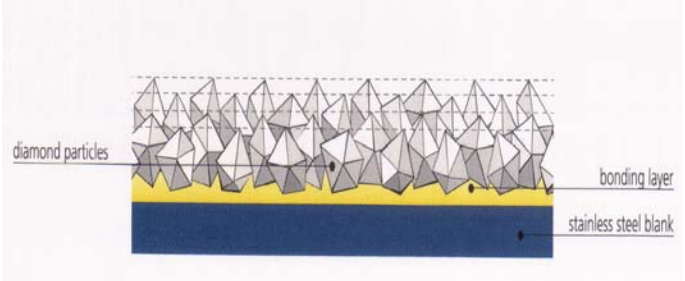

Fig .3.3

Fig.3.3 indicates performances of the life cycle (minimum, cutting efficiency-initial cutting efficiency)

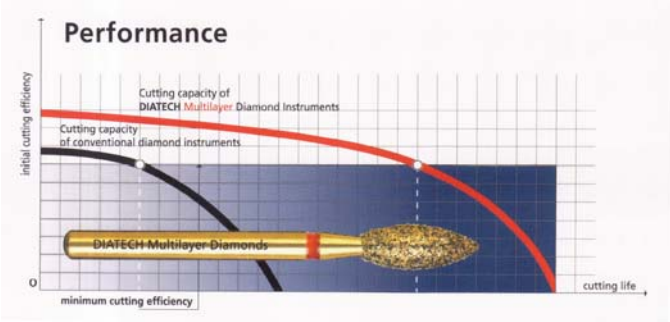

Fig .3.4

4. Conclusions

There are presented case study of specials materials utilized with implications in dental practice.

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