VALERIA ADRIANI
MATECH – PARCO SCIENTIFICO GALILEO
Padua – Italy

Valeria Adriani is a graduate in Chemical Engineering, since 2001 she has been working for MaTech, a sector of the Galileo Scientific Park in Padua, firstly in the role of project manager and, since December 2009, as technical manager. Besides carrying out analysis and technical feasibility checks for new projects, assignments and technical coordination, she also provides consultancy on research applied to materials to companies from the various industrial sectors.

In the current highly competitive market, the strategy of portfolio diversification and the consequent acquisition of new markets must be supported by the added value that the use of new materials able to improve the performance and emotional aspect of the product can achieve. Solutions and materials normally belonging to sectors that seem far removed from the gold industry, such as mechanics, automobile and furniture, can prove extremely interesting and provide ideas for highly aesthetic solutions and technologies.

Materials and innovative solutions for the gold sector

The luxury goods sector is generically made up of a set of extremely varied products which includes jewellery, watches, glasses, interior decoration, clothing and accessories. The common denominator for all these products is a consumer target with a higher than average spending power.
In the current highly competitive market, the strategy of portfolio diversification and the consequent acquisition of new markets must be supported by the added value that the use of new materials able to improve the performance and emotional aspect of the product can achieve.
Precious metals and stones have always been associated with the luxury goods sector. In this case, it is the material itself that makes the product valuable. If the original material is poor (wood, MDF, glass, plastic, paper, etc.) the aspect can be "made precious" with surface treatments that give the item a greater aesthetic appeal.
One of these surface treatments is a spray that not only gives the sub-layers a metallic effect but also makes them waterproof and considerably heat resistant. It is available in various metallic colours providing an aluminium, tin, bronze, copper, steel, iron, zinc, etc. effect, even with various textures.
Surface finishing is not just a matter of look but also function. There are carbon coatings that combine the hardness of diamond with graphite's aptitude for sliding. In black, these depositions increase hardness and chemical resistance to surface corrosion and wear and tear, thus reducing the friction coefficient and making them biocompatible. The deposition of layers of metallic nitrides increases the nickel barrier property and therefore makes the coatings anti-allergic. Moreover, depending on the type of metal, colour variation can be obtained ranging from silver to gold and brown. The deposition of silver oxides, on the other hand, increases the antibacterial properties of the coatings. To date, these are the types of deposition that have been used in jewellery and watch-making.
By using transparent coatings, deposited with various techniques, that do not alter the colour or the aspect of the item, the product can be given other properties. For example, they are easy to clean, do not tarnish or cloud over in highly damp conditions and are fingerprint resistant.
In many cases nanotechnology solutions or processes can be implemented, as in the case of photocatalyctic coatings with titanium dioxide. These are 'self-cleaning' treatments that, due to the presence of light, are able to transform the organic substances that create the dirt into elements that are volatile or easy to remove.
By means of technological transfer, the implementation of materials from extremely different sectors that, although not traditionally considered as precious, may have suitable characteristics for creating luxury products, can now be assessed.
One example are the compounds obtained through carbon compression applied, for instance, in high technology sport products and later used in watch and jewellery making.
Another significant example is wood, a compound material with unique characteristics, which is used in all sectors of manufacturing, from the poorest (office furniture, structural construction elements and building) to the richest (sailing, jewellery, accessories). Nowadays the market offers wood by injection, also known as technological moulding wood, made from traditional, often recycled, polymeric resin, bound with wood fibres that often come from production waste. Mixed with a high percentage of fibre, which may even amount to between 60 and 70%, plastics like polyethylene (PE), polypropylene (PP), polyvinyl chloride (PVC), acrylonitrile butadiene styrene (ABS), polystyrene (PS) and, in some cases, even PLA, a natural-based biodegradable polymer, can be used. It can be extruded, like traditional plastic, or injected to obtain profiles (filled or hollow) or geometrically complex items. In this way, not only components to be set into gold items (rings, bracelets, earrings, watches) can be made, but items and accessories of daily use can also be embellished, such as combs or electronic equipment cases.
Flexible wood, whose surface is treated to obtain a soft touch effect similar to leather, is thermo-formable and can produce items with considerable deformity in all three spatial directions. These materials can be found in the building, furniture and accessory sectors.
Continuing along the technological transformation route, there are some technical materials that can give a product some very particular aesthetic effects, like fibreglass for example, which is currently used in the compound industry and which, by means of a surface metallisation process, can be made to look like copper, bronze, titanium or gold. The compound world also offers decorative braids, made of a variety of polymeric fibres, woven together to catch the eye in an explosion of colours.
The lightness and transpirability of a fabric can be combined with the shiny and bright aspect of a metal by using fibres and fabrics in steel, bronze and copper. Developed in the mechanical industry for the filtration sector or for

working with glass, these materials are now being applied to create luxury items such as fountain pens, straps and bracelets and are even used in furnishings, both for the private sector and for contract work.
The same can be said of metallic foams. Originally created to dissipate shock and heat transmission, they are now also used in the furniture and design industry (sandwiched between glass to make meeting tables or desks, or in structural elements and light diffusion in the illumination engineering sector. etc.).
A very particular look can be obtained from stone skin, which is made of thin and flexible layers of real stone, taken from the mountains by means of a patented technology, and which can be continually applied to wood or bricks maintaining the natural vein of the rock. The market already offers some applications for stair areas, bath tubs, chairs, vases, wall-coverings, flat and curved surfaces.
Aesthetically bright and white, ceramic techniques originate from the electronic, mechanical and medical sectors but have now also been introduced into the luxury goods industry as watch dials, rings, bracelet and necklace parts. Their look, together with their dimensional perfection, could make them suitable for substituting natural pearls in the watch-making business. Steel or high tech polymer balls, used to produce precision tools and bearings in the mechanical industry, could be used for the same purpose.
Growing sensitivity towards the environment is also leading the luxury world to think about materials that reduce the impact throughout a product's entire life-cycle. In particular, the use of natural materials based on bamboo, soya, seaweed and milk can guarantee significant mechanical resistance and greater durability as well as comfort and anti-allergy benefits that come from the spontaneous release of natural substances.

1. Pictures or Images

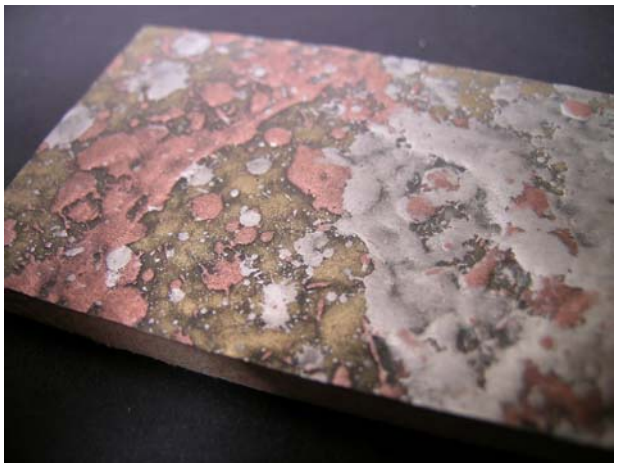

Figure 1 – Metal spray deposition

Figure 2 – Thermo-formable wood

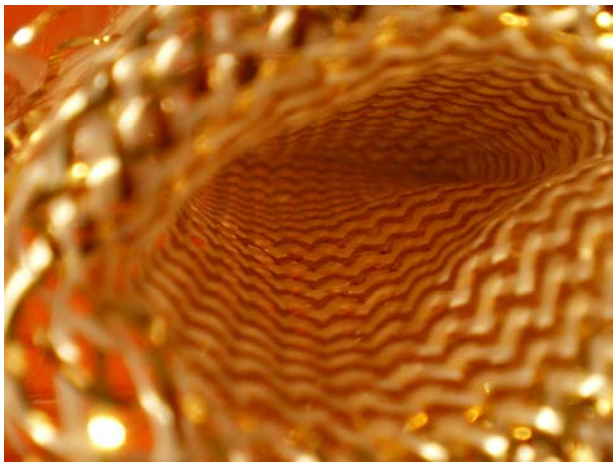

Figure 3 – Decorative braids

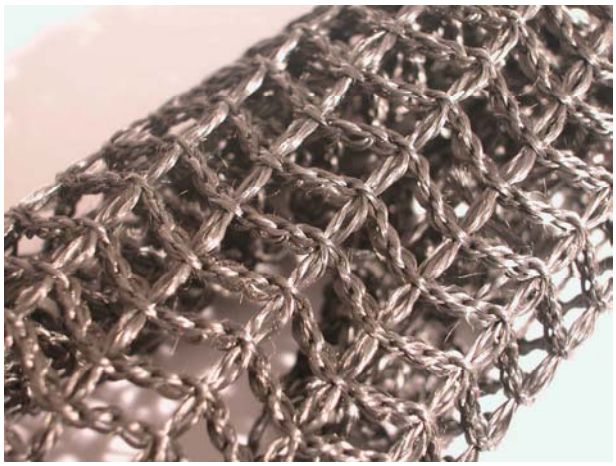

Figure 4 – Steel fibres and materials

Figure 5 – Stone finishings

Figure 6 – Ceramic injection techniques