Greater efficiency, reduced consumption and practically no worn parts to be disposed of; this is why fibre laser means Green Technology

Easy and ecologic lasers

"Green Technology" is no longer a target, but a simple fact. From bending to cutting, the BLM Group offers a range of machines and solutions that make lower energy consumption an inevitabile "plus". If in the most traditional processes the all-electric drives draw the line between past and present machines, in the non-conventional cutting field we are witnessing a rapid achievement of what is defined as the green laser technology par excellence.
Inspired for Tube met Stefano Cattaneo, Managing Director of IPG Photonics Italy, who is the originator of this revolution, to better understand the reasons of this phenomenon and explain how a laser beam generated in fibre can really be considered "ecologic".

To start with, can a brief outline of the fibre laser be given?
Let's start with saying that it is a type of solid state laser, the only one of its kind to generate laser radiation directly inside the fibre, where it remains until focalized for welding, cutting or marking the workpiece. This is a very important concept as today the word fibre is rather over-used. One thing is to generate a laser beam inside a fibre, another is to create it in a discrete external cavity and convey it through a fibre from the source to the point of application.
Just to give an idea, last year, we presented a single 10 kW laser through a 13/14 µm fibre. Vice versa, it is unconceivable to generate a 10 kW laser power externally and to launch a beam through such a small fibre, because it would burn like a matchstick. Some people on the market mistakenly talk about the two types of most innovative solid-state lasers, i.e. "the fibre" and "the disk", as an evolution of the ND:YAG laser. This is not so as far as fibre is concerned because it is a completely different technology created for different reasons and most of all with a well-defined background.

What is the technological reason for fibre requiring a lower power to achieve the same results?
There are two considerable advantages: first and foremost is the near-infrared wave length that is better absorbed by metals compared to CO_2, which is found in the middle infrared. On the contrary plastic materials scarcely absorb the wave length, therefore, only one solution is available for cutting plastic or wood. For metals, on the other hand, "fibre" has an excellent absorption and this makes it possible for even highly reflecting materials such as copper, brass and aluminium to be processed, which would otherwise not be cut properly with the CO_2. The other advantage is the high quality of the laser beam that is generated, therefore the possibility of focusing on very small spots, which means working with very high power densities.
There are, however, advantages linked to the technology and others to the process. If we consid-

GREEN TECH

GREEN TECH is the title of a series of itinerating meetings that ADIGE has scheduled to let its customers know about the opportunities offered by its fibre laser technology.

er technology, the fibre laser is more compact, efficient and reliable and therefore has advantages in terms of lower operating and source management costs. Let us say that the fibre laser has an efficiency of around 30% compared to the 8/10% of the CO_2 laser. Then there are practically no maintenance costs as there is no need for any programmed maintenance considering that there are no components, which are particularly subject to wear like mirrors or lenses typical of CO_2 systems optical paths.
In general, thinking about a process, the use of fibre lasers makes the process faster and consumes less power. At the same time, however, it cannot be said by default that a 2 kW fibre cuts like a 4 kW CO_2 source, because on small sized tube walls "fibre" is twice as fast, on medium sized walls the two are more or less the same, whereas on large sized walls the 4kW source makes a difference. The two have different behaviours and it is difficult to estimate and quantify the economic advantage between one technology and the other without linking them to a precise application.
However, I would like to mention a basic concept of fibre sources: use of the laser is extremely easy. All in all, it is not necessary to know in detail what a laser is, but more so to know how the machine works and the process to be carried out as, in this case, the laser is simply a tool to be installed on a system which, among other things, has fairly simple configurations.

Are lasertube and fibre sources a valid combination?
Considering that we are talking about 3D applications in which a precision and absolute process control level has been reached, tube cutting combines well with the intrinsic characteristics of the fibre laser. Among other things, it is an application that often requires a high aesthetic cutting quality and it is here that fibre, with very small spots and high power density is a valid ally. Moreover, most cutting applications are linked to average-small tube diameters with thin walls with which the fibre laser performs best and which, in addition, the possibility of processing reflecting materials can also be important to open new market targets.

A note regarding fibre laser is however the presumed increased sensitivity to the beam reflection phenomenon; is this true?
Absolutely NOT. Please let me explain that this is a phenomenon inversely proportional to the power density. The greater it is the lower the density value. Therefore, assuming an equal power with a fibre laser and another solid state laser, a transport fibre of 10/20 µm is used on one side and a 200 µm fibre on the other, with considerably different density values on the workpiece and with the risk of possible reflections with the larger fibre. In any case, however, when this phenomenon, which cannot be excluded beforehand, is present the source will not get damaged in any way as the transport fibre would burn-out first, thereby avoiding that the reflected beam reaches inside the laser cavity; an this is true for any kind of laser source, including fiber laser.