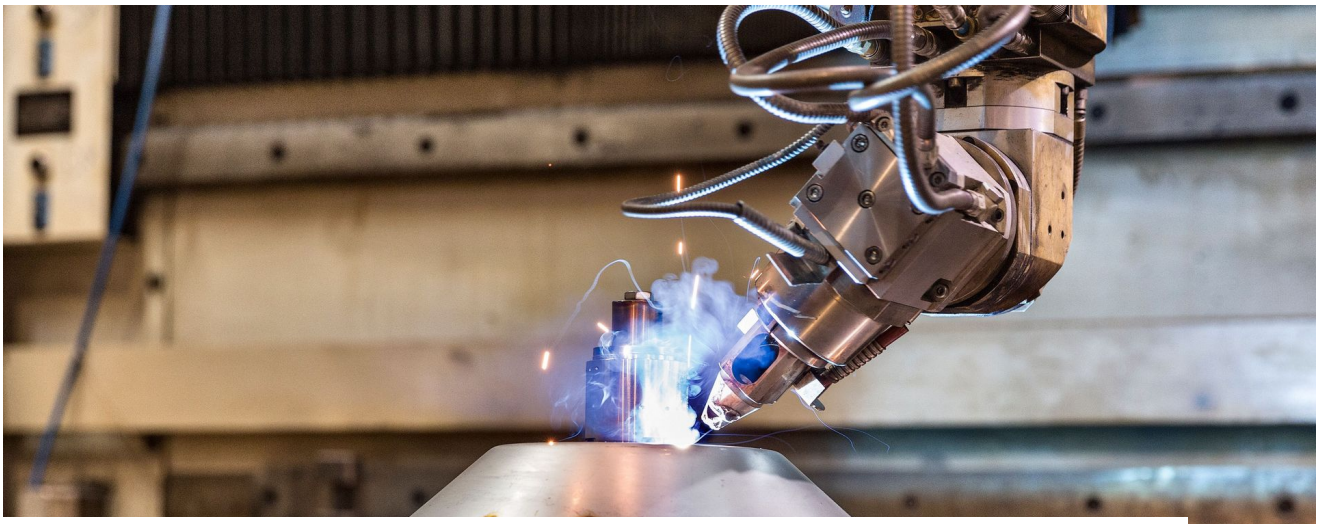


& Roberto Tartaglione

ATHANASSIOS KALIUDIS

Future right next to history: LMD in southern Italy

ELFIM, a supplier from southern Italy, manufactures entire components using laser metal deposition (LMD). As a result, the company saves a heap of waste and is more flexible in the geometric forms it can create.

The southern Italian town of Gravina in Puglia exudes history from every corner. The ancient Greeks were here, followed by the Romans and later the Normans. Emperor Frederic II of the Hohenstaufen dynasty also came and left behind a castle.

If you leave the picture-perfect historic town center on provincial road 159, after about ten minutes' drive along a bleak and desolate limestone plateau you will reach the factory gates of ELFIM s.r.l.. Behind the gray concrete facade of the building, history suddenly seems very distant – because here the future is being made.
In the production facility, Michele D'Alonzo (one of the company's two founders) heads towards a Lasercell 1005 and talks about his company. "We specialize in various applications of laser technology such as 2D and 3D cutting or welding, and we produce all kinds of components that our customers go on to use in the aerospace, automotive and petrochemical industries."

Once he's reached the laser system, he introduces his current project. "Here, we're in the process of manufacturing an impeller." However, there is not much to see. Laser optics move to and fro – and only on closer inspection can we tell that gradually, layer by layer, an object is emerging. "LMD," says D'Alonzo in a word.

Data to forms

The abbreviation "LMD" stands for "laser metal deposition", also known as laser cladding; it is the name given to a process in which metal powder and laser light are used to manufacture workpieces. In this process, a laser generates a melt pool on a base structure and simultaneously causes powder delivered via nozzles to be fused into beads.

ELFIM is using a nickel alloy powder for the impeller.



In combination with a powder feeder, the Lasercell 1005 from TRUMPF is also highly suitable for laser metal deposition. Picture: Antonio & Roberto Tartaglione

"Strictly speaking, LMD is actually nothing new. It's a process that has been used for many years now for repairs and coatings. However, we decided to use the process for manufacturing complete components – as is the case with this impeller here."

D'Alonzo leaves the machine to carry on its work in peace and leads us to the offices. On their computer screens, the employees there are creating complex shapes that the laser system will later transform from virtual existence into reality.

> **If we had used the conventional process, we would have had to mill the blade from a large block of metal – and 70 percent of the material would have then simply been thrown away.**
>
> Michele d'Alonzo | General Manager at ELFIM S.r.l.

A new process to revive classic cars

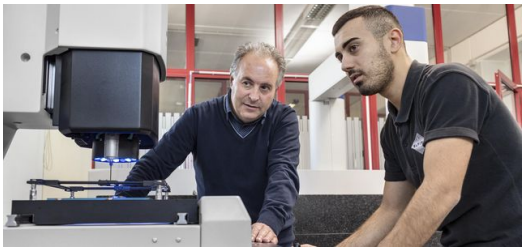
With this process, it's almost always a question of manufacturing individual items. To date, ELFIM's largest order was for a batch of twelve. "We use the LMD process to manufacture components that either could not be produced in any other way – or that would be much too expensive to produce using any other process because of the small batch sizes involved. That may be, for example, because a lot of money would first have to be spent on making a mold or other tools," explains D'Alonzo.



The company ELFIM s.r.l. is situated on a bleak and desolate limestone plateau near Gravina in Puglia.



Multi-talented: ELFIM does not just use the Lasercell 1005 to weld and cut 2D and 3D components. The system is also suitable for laser metal deposition.



Replacement parts for classic cars are rare. Using the LMD process, they can be reconstructed in a cost-effective way. In such cases experts at ELFIM



An employee prepares the Lasercell 1005.

perform a 3D scan of an existing replacement part.



ELFIM uses the Lasercell 1005 for various applications of laser technology such as 2D and 3D cutting or welding and also for laser metal deposition. Picture: Antonio & Roberto Tartaglione

And that's where the past and the present come together again in southern Italy: one of the first and still most important uses of the LMD process is to manufacture replacement parts for classic cars. Of course, there are no computer models for these. In such cases experts at ELFIM perform a 3D scan of an existing replacement part, make some modifications here and there, and so obtain a three-dimensional CAD model. This procedure is known as reverse engineering. For other commissions – such as the impeller – they receive a complete set of data ready for production.

Zero waste

D'Alonzo leads us back into the production facility. There, the first impeller blade is now finished. "If we had used the conventional process, we would have had to mill the blade from a large block of metal – and 70 percent of the material would have then simply been thrown away."

D'Alonzo runs his hand over the impeller blade and points out another advantage: "We just wouldn't have been able to create this geometric shape with a milling machine. However, the special curvature enables the impeller to handle 50 percent more volume." Since the powder is fed through nozzles coaxial to the laser beam, it is possible in principle to expand forms in any direction.

In the future, D'Alonzo wishes to make the material-saving process even more economical. "At present, we specify before we go into production how much powder will be fed through the nozzle. However, it would be more efficient if the amount was matched during the process to what was actually needed."

In order to meet such challenges, ELFIM is collaborating with a number of universities and businesses. That's because, in D'Alonzo's view, the LMD process still has a great future ahead. "We're still miles from having exhausted all the possibilities. Strictly speaking, w're still right at the beginning."

Elfim s.r.l.

ELFIM s.r.l. employs a total of 42 people in the southern Italian town of Gravina in Puglia. Founded in 1992, the company began by producing security doors and safes. In 1998, it specialized in metal processing using laser technology – so becoming the first company of this kind in southern Italy. Then, in 2007, it started to use LMD.



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