



## LASER-BASED INLINE PROCESSING OF PRINTED GOLD LAYERS

### Task

As the number of functions integrated into electronic components increases, the electronics industry requires cost-effective processes that enable functional layers to be produced flexibly and applied selectively in high volume production. Conductive thin contact layers are now applied by electroplating, PVD, or CVD. These processes are costly, time-consuming and partly harmful to the environment since they use a great amount of chemicals. Furthermore, these processes are not location-selective and, therefore, consume large quantities of precious metals. Within this context, the industry requires innovative and inline-capable contacting processes that enable a resource-efficient and energy-efficient production by selective coating.

### Method

Fraunhofer ILT has developed a process consisting of three steps for the site-selective production of gold layers on metallic strip material. Step 1 involves the laser-based cleaning and roughening of the substrate surface in order to achieve a wetting of the gold paste applied with printing in step 2. In step 3, the solvents and additives contained in the paste are evaporated and the remaining gold particles are melted.

### Results

The laser process strategy developed in this project makes it possible to functionalize selectively printed gold pastes on Ni-Cu substrates. The functionalized gold layers are metallurgically bonded to the substrate material and have a layer thickness of 2 to 5  $\mu\text{m}$ .

### Applications

This inline-capable process can be used for the selective plating of electrical contact surfaces of various components. At the present time of development, the process operates at a surface area rate of 7.3  $\text{mm}^2/\text{s}$ .

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- 2 Contact tulips in the production process, selectively printed with gold paste.
- 3 Contact tulips: completely galvanically plated (left); contact surfaces selectively plated with gold paste and laser-functionalized (right).