

ActInPak



COST Action FP1405

Active and intelligent fibre-based packaging – innovation and market introduction

OVERVIEW OF PRINTED ELECTRONICS AT DRUPA 2016



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INŠTITUT ZA
CELULOZO IN PAPIR



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Horizon 2020

PRINTED ELECTRONICS AT DRUPA 2016

1828 exhibitors

Around 20 exhibitors for printed
electronics/materials

1,1 % of all exhibitors

*Which indicates that Drupa is still yet
far from being a very important trade
show for the printed electronics
companies.*

The companies present at DRUPA



ActInPak

Seminar by OE-A



Speakers...

-  Martin Glatz, Karl Knauer.
- Wolfgang Mildner, MSWtech.
- Dr. Jeremy Burroughes, CDT.
- Dr. Ralf Zichner, Fraunhofer ENAS.
- Dr. Michael Korell, Evonik Creavis.
- Thomas Kolbusch, Coatema.
- Dr. Edward Holland, FUJIFILM Dimatix.
- Dr. Kurt Schroder, NovaCentrix.
- Andrea Glawe, Kroenert.
- Milan Saalmink, Holst Centre. Etc...



PRINTED ELECTRONICS AT DRUPA 2016

NOVACENTRIX

- Photonic curing processing equipment PulseForge 1200/1300 photonic curing tools.
- They dry, sinter, and anneal electrically-conductive inks at very high temperatures on substrates like polymers and paper, without damaging the substrates.
- They also showed a multi-lamp processing unit with over 1 meter of process width.
- ***New conductive inks (Metalon JS-A102 silver-based ink)*** deposition on a wide range of polymers with piezo-electric inkjet heads in a roll-to-roll processing, it is ideally processed using our own PulseForge photonic curing tools. Some conditions are achieving sheet resistance as low as 10 milliohms/square.

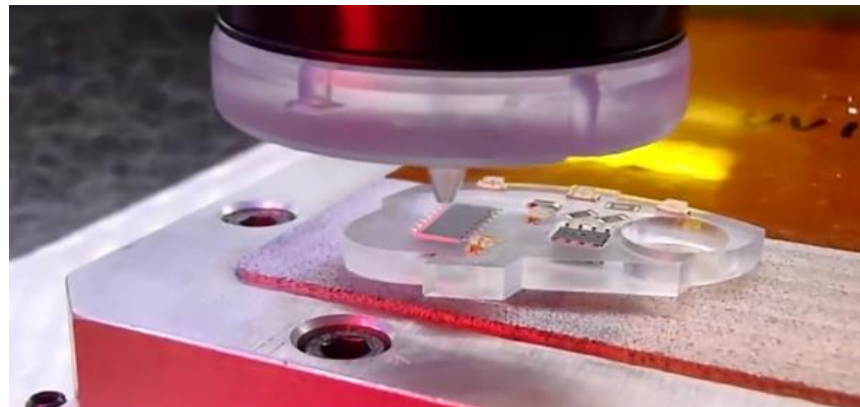


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NOVACENTRIX



	PulseForge 1200		Thermal ²		Units
	JS-A101	JS-A102	JS-A101	JS-A102	
Sheet resistance	20-25	20-25	150-200	150-200	milli-ohm/square
Volume resistivity ¹	3.9E-06	3.9E-06	4.7E-05	4.7E-05	ohm-cm
Pencil hardness	>4H	>4H	>4H	>4H	--



PRINTED ELECTRONICS AT DRUPA

2016

CERADROP

- 🌀 CeraPrinter X-Serie – materials deposition inkjet printer (printed electronics, 3D-printing)
- 🌀 Examples of electronic applications

HF Antenna	Biology
RFID	Ceramic thick films
OPV	LTCC
OLED	Multilayer Ceramic Capacitor
Interconnection	Magnetic components
Printed memories	Temperature sensors
Photodetectors	Piezoelectric actuators
Lens	Sol gel selective deposition
Semiconductor	Photocatalytic elements
	Fuel cells
	Solar cells front contacts



PRINTED ELECTRONICS AT DRUPA 2016

ADPHOS

- ☉ aLITE®-Technology, **advanced Light Initiated Thermal Emission**
- ☉ aLITE is based on an area-focussed, high intensity energy source, to allow instantaneous thermal processing.
- ☉ Water based or solvent based coatings can be instantly dried or even cured, which is a mandatory requirement to overcome the present application barriers to coating applications in “direct to shape printing”.
- ☉ Today these applications are typically performed by integration of label-printed solutions into the industrial production process.
- ☉ aLITE also allows the performing of inline drying and sintering of functional coatings applied by inkjet or Aerosol , as necessary, for cost competitive 3D-production of 3- D components.
- ☉ For 3-D additive manufacturing processes, higher speed, more focussed local melting of plastic and even metal powders can be achieved with aLITE offering significant advantage if applied to laser or infrared based 3-D processing.

PRINTED ELECTRONICS AT DRUPA 2016

PolyIC PolyTC® replacement of indium tin oxide (ITO) films

Touch Screens

Applications

- ☐ Mobile phones and smart phones
- ☐ Tablet PCs
- ☐ Netbooks and Laptops
- ☐ GPS
- ☐ Information- and control displays
- ☐ Screens for any kind of devices

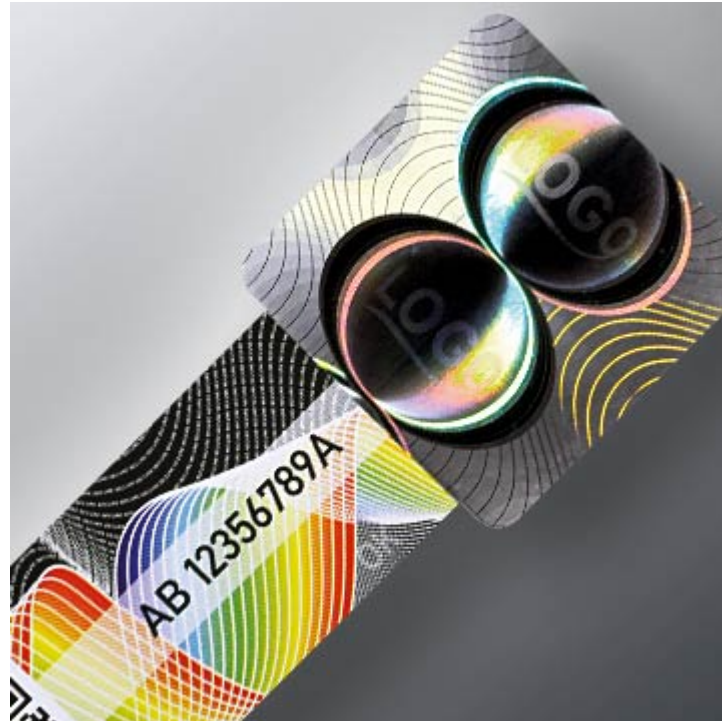
Advantages

- high optical transparency due to transparent substrate
- individually customizable layout and sensor systems possible
- high flexibility on thin PET substrate
- mass production in a R2R proces



PolyIC synergy between PE and decoration

- On Drupa they presented several combinations of flexible, highly conductive PolyTC sensor foil.



PRINTED ELECTRONICS AT DRUPA

2016

COATEMA

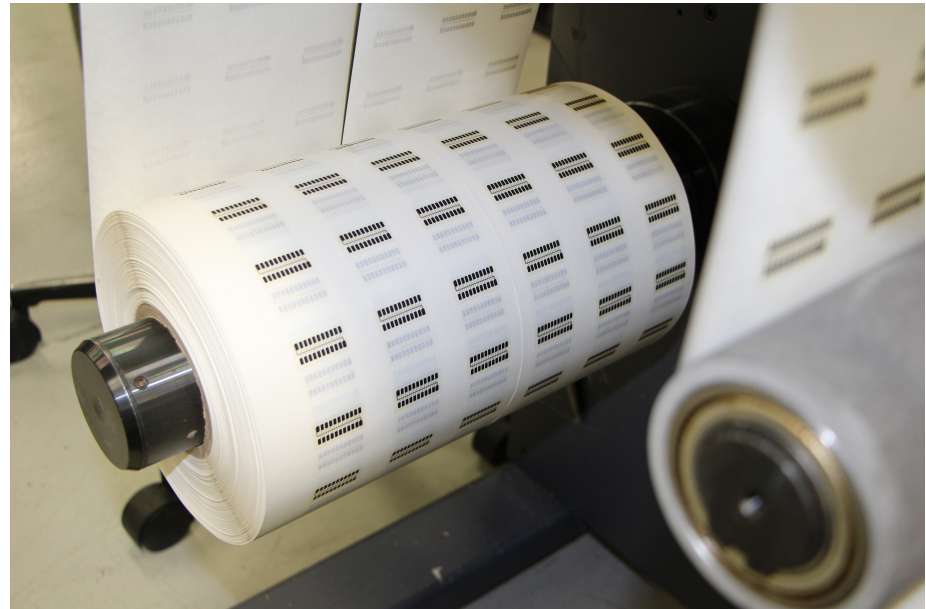
- Presented a live demonstration of its innovative and bestselling “Smartcoater” and proudly introduces its new joint brand Temicoat for pioneering printed nano structures.



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XEROX

- 🌀 Licensed the technology from [Thin Film Electronics](#)
- 🌀 Prints thin circuitry onto a flexible substrate – **printed memory labels** on one of its production lines in Webster, NY. This allows brand owners to add brand protection information, such as serial numbers, lot codes and expiration dates, to the labels.
- 🌀 Key markets include:
 - 🌀 pharmaceuticals,
 - 🌀 healthcare,
 - 🌀 beauty products,
 - 🌀 and food and beverage ...



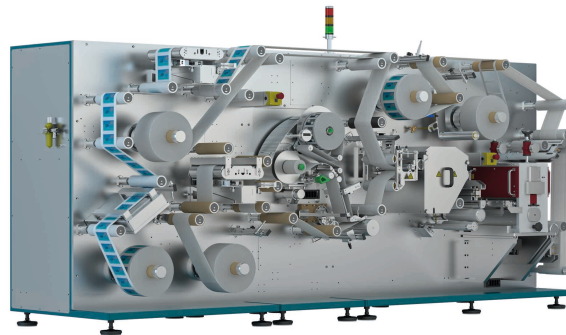
PRINTED ELECTRONICS AT DRUPA 2016

Mühlbauer GmbH & Co. KG

RFID Production Equipment

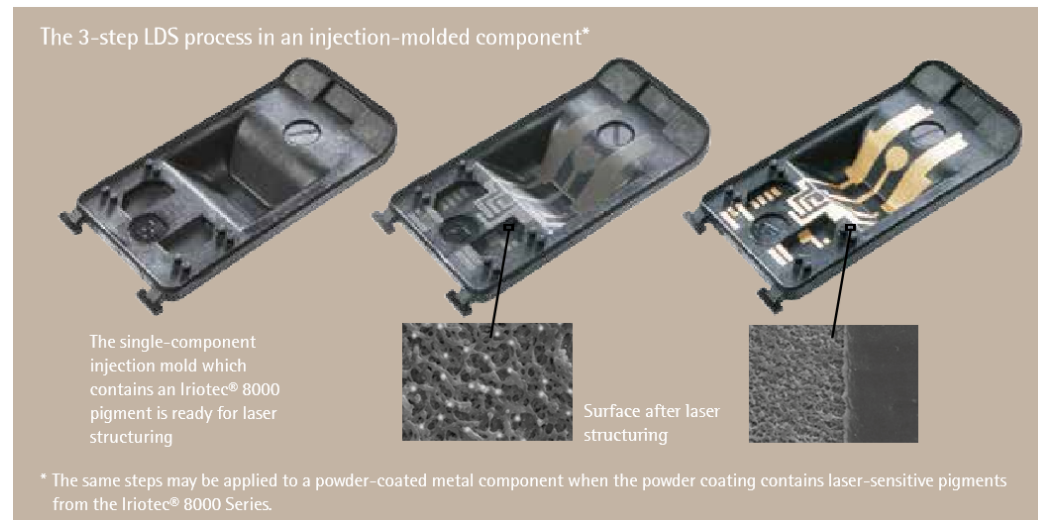
- ☐ Smart Labels from reel to reel
- ☐ Modular system: antenna web handling, label lamination, die cutting as well as output testing.
- ☐ Throughput of up to 10m/min (semi-rotative cutting), 30m/min for rotative cutting
- ☐ Fast changing applications

The friendly user interface, the intuitive handling of this converting machine and the low initial investment makes the CL light especially interesting for start-ups entering the RFID converting market.



Merck

- IRIOTEC® 8000
- Using lasers to add fine metal structures to components has its limitations.
- Newly developed pigments for metalization
- Thermoplastics and also duroplastics

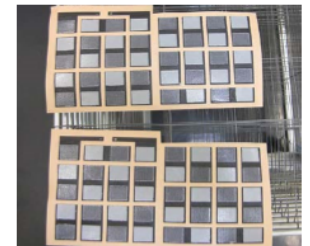
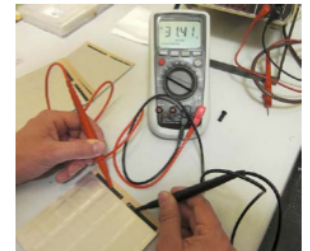
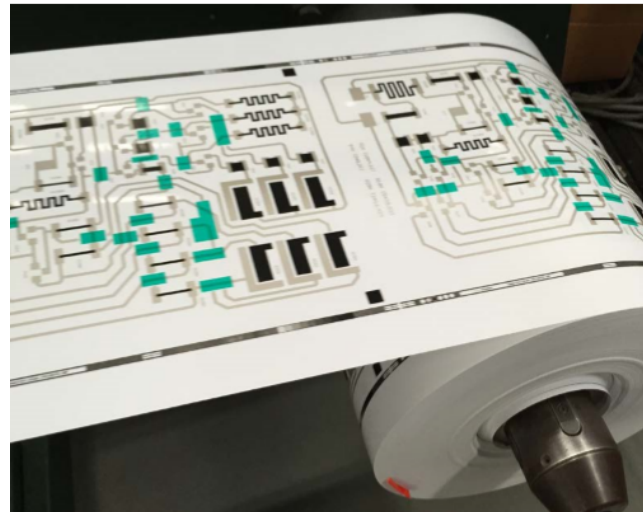
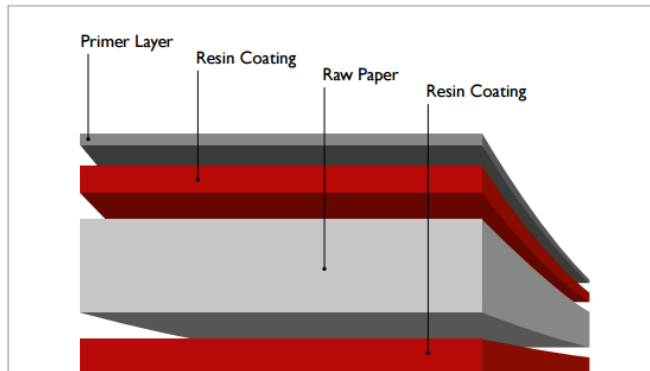


Felix Schoeller Group

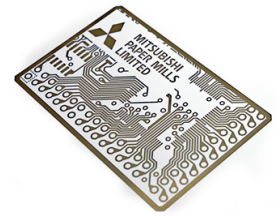
- High gloss paper specially developed for printed electronics (result of an EU funded project).

p_e:smart

● next level paper
p-e:smart



Mitshubishi Paper Mills



- Inks and Paper for Printed electronics
- Eco-friendly, aqueous, ***Silver Nano particle ink*** (used with Mitsubishi's specially treated paper or PET film media, the ink and special media together produced electric conductivity in seconds without the need for heating, flash exposure, or other sintering processes).
- ***Mitsubishi's Silver Nano*** series (rolls or sheets, Silver Nano special media includes resin-coated paper, and transparent and white PET films.)

So what can a classic printer implement from the presented solutions? Looking forward to the next Drupa 2020.

Recognition of an important trend: key industry sectors are starting to implement a variety of products based on organic and printed electronics.

For a better overview application areas are grouped into five clusters:

- ☐ **Organic LED (OLED) Lighting**

- ☐ **Organic Photovoltaics (OPV)**

- ☐ **Flexible Displays**

- ☐ **Electronics and Components**

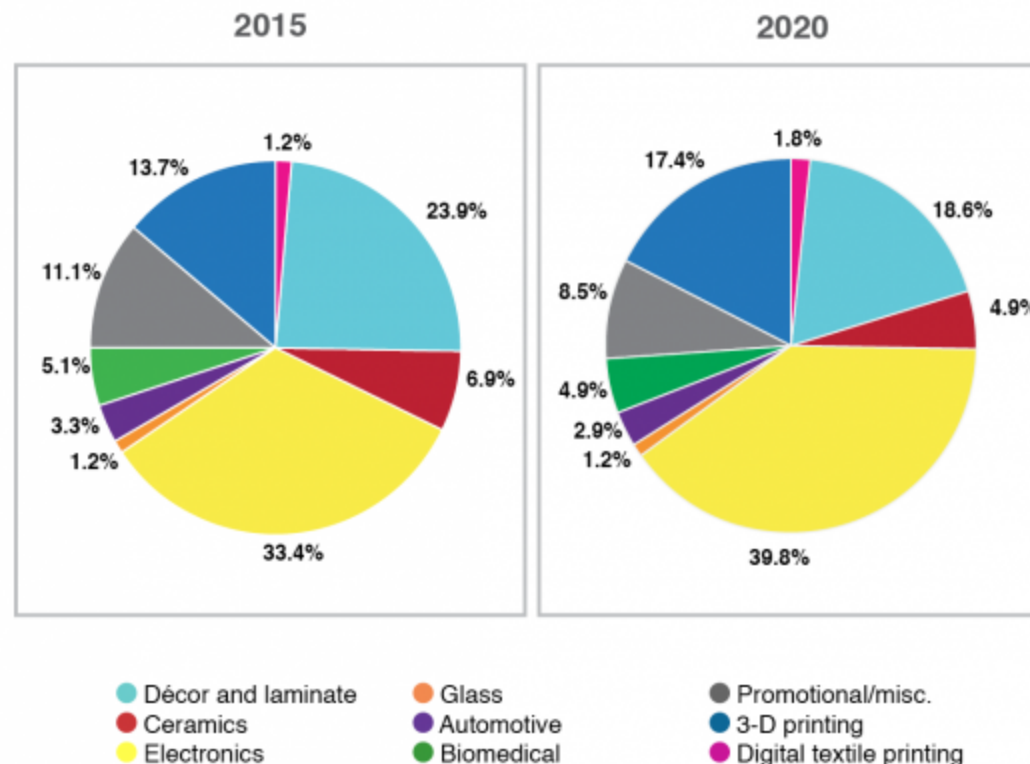
(printed memory and batteries, active components and passive components)

- ☐ **Integrated Smart Systems**

(ISS, including smart objects (also RFID), sensors and smart textiles)

Predictions and trends for the industrial printers

Global Functional and Industrial Print by Value



Smithers Pira, "The Future of Functional and Industrial Print to 2020,"

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ROADMAP

Key Application Parameters

- ☐ Complexity (number of circuits and different kinds of devices)
- ☐ Flexibility / bending radius
- ☐ Lifetime / stability / homogeneity / reliability
- ☐ Efficiency (power consumption, energy conversion)
- ☐ Environmental and toxicological safety
- ☐ Cost

Key Technology Parameters

- ☐ Mobility / electrical performance
- ☐ Resolution / registration
- ☐ Barrier properties / environmental stability
- ☐ Flexibility / bending radius
- ☐ Fit of process parameters
- ☐ Yield



PRINTED ELECTRONICS – OE-A

ROADMAP

Key Challenges

Based on an analysis of the application and technology parameters, the recent progress in materials and process technology and the expected future technology development, the following key challenges ("Red Brick Walls") were identified for which major breakthroughs are needed:

- ③ Processes: resolution, registration, uniformity and characterization
- ③ Encapsulation: flexible transparent barriers at low cost
- ③ Materials: improvement of electrical performance, processability and stability
- ③ Development of appropriate standards and regulations for organic electronics

Smart labels and packaging

- 🌀 Package printers have the possibility of implementing the newly developed printed/smart sensor packaging solutions.
- 🌀 This will push the printers/suppliers to Big Data waters regarding data collection and redesigning the supply chain models in terms of optimization.
- 🌀 Suppliers printers will have to find a collaboration model regarding data protection, data harvesting and smartlabel handling.

To choose the right technology you have to learn and think,
Because if you select the wrong one your boat will sink.



Pletna
DOPOLJENO SAMO ZA GOSTE
PENZIJSNA PLETNA
FOR GUEST-HOUSE PLETNA
GUESTS ONLY
NIM FÜR PENSIONSGÄSTE
SOLE PER GLI OSPITI
DELLA PENSIONE PLETNA