

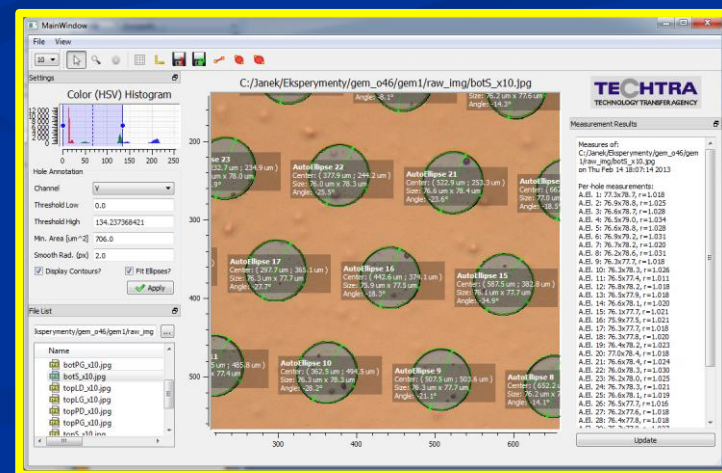


GEM production facility upgrade

Piotr Bielówka

Introduction

1. TTA Techtra was one of the first company that got CERN license for GEM production
2. In 2004 Techtra built the technology „demonstrator“ - complete line for 100x100 mm² GEM production
3. Techtra has delivered over one hundred 100x100 mm² GEM to CERN store
4. In 2012 we started the facility upgrade towards big GEM mass production



Steps towards big GEMs:

- to implement „single mask“ technique - CERN
- to acquire dedicated set of PCB machines - WPT



Access to EU funds through Wrocław Technology Park (WPT) - non profit organization.

Delivery Schedule

Machine	Producer	Delivery Time [weeks]	Status
Developer	WISE		NEW
Cu Etcher			
Kapton Etcher			
Washer			
Exposure	TECHNIGRAF		NEW
Microscope	OLYMPUS		NEW
Set of tanks for Stripping and Electro Etching	MATUSEWICZ		NEW
Oven, Laminator, Others	MEMMERT and others		Second Hand
Civil Works	WROCLAW TECHNOLOGY PARK		NEW
GEM Diagnostics System	TECHTRA + NATIONAL CENTRE FOR NUCLEAR RESEARCH	Unknown	NEW

„Delivery“:

- Installation
- Filling with consumables
- First run: "GEM like boards"
- Training: additional human resources

„Dedicated line for big GEMs will be operational by the end of March 2013.“

RD51, CERN, Dec 2012

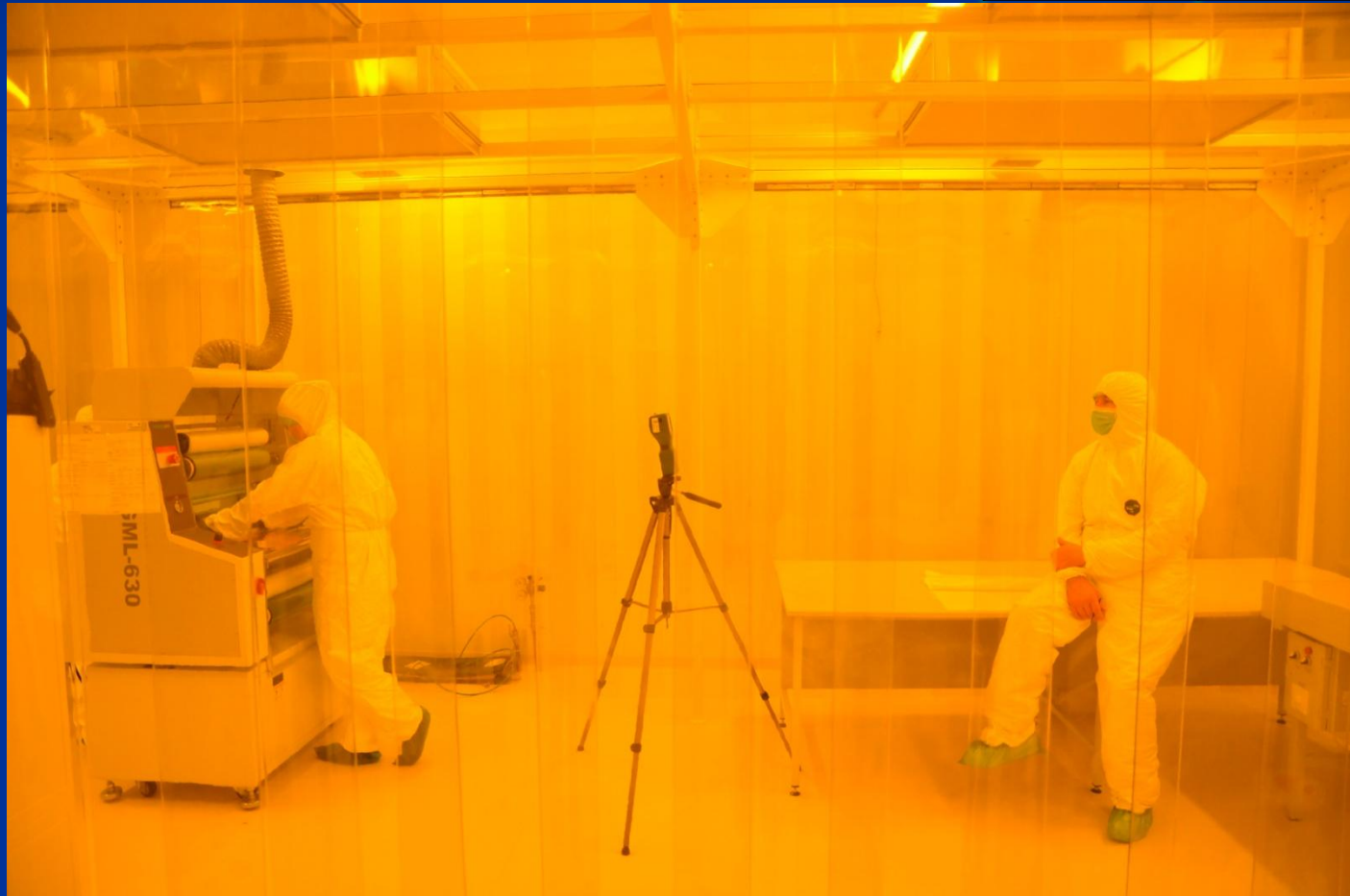
June 2014: the upgrade has been completed !

Type: **ISO 7 (Federal Class 10.000)**

Total area: **40m²**

Status: **operational since 12 June 2014**

Dust diameter	Class 7 (10000)	Validation
0,5 µm	max. 352 000	2 784
1 µm	max. 83 200	1 892
5 µm	max. 2 930	320



50% of
airflow
through
9 HEPA
filters

Type: **double sided**
Maximum panel width: **650mm**
Status: **operational since Sept. 2013**

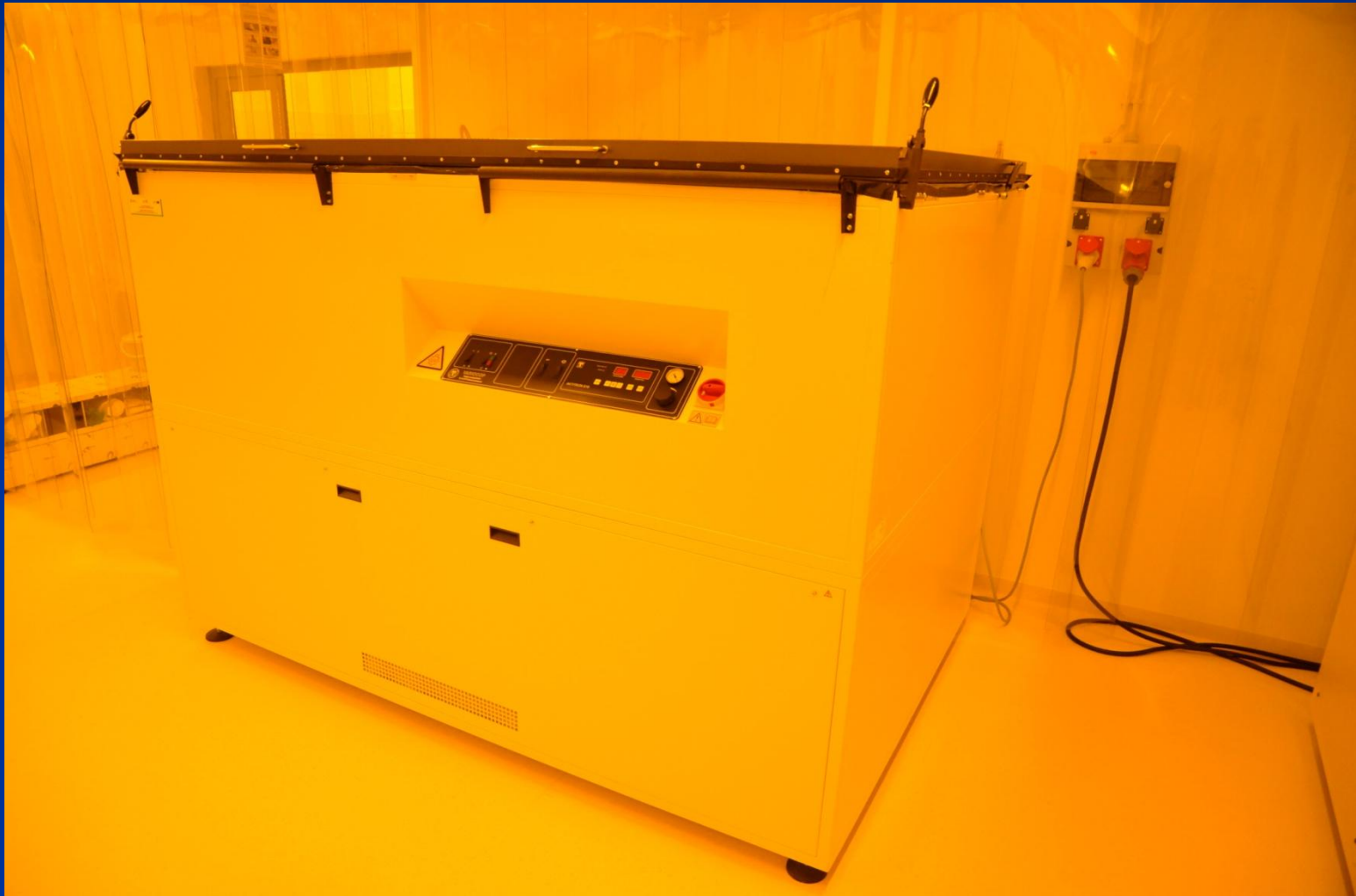


Type: **double sided**
Maximum panel size: **600x600mm**
Status: **operational since 2012**



Type: **singlesided**
Maximum panel size: **650x2000mm**
Status: **under commissioning**

UV Exposure 2



Type: **doublesided**
Maximum panel width: **650mm**
Status: **operational since Sept. 2013**



Type: **doublesided**
Maximum panel width: **650mm**
Status: **operational since Sept. 2013**

Copper etching



Stripping

Maximum panel size: 650x2200mm
Status: under commissioning



Type: **doublesided**
Maximum panel width: **650mm**
Status: **under commissioning**

Kapton etching



Maximum panel size: 650x2000mm
Status: under commissioning

Electro-etching



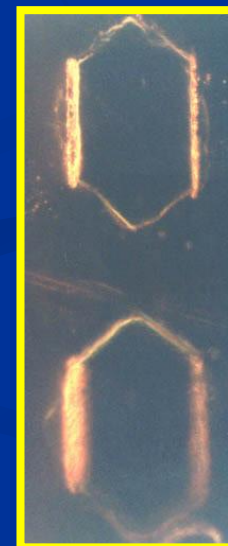
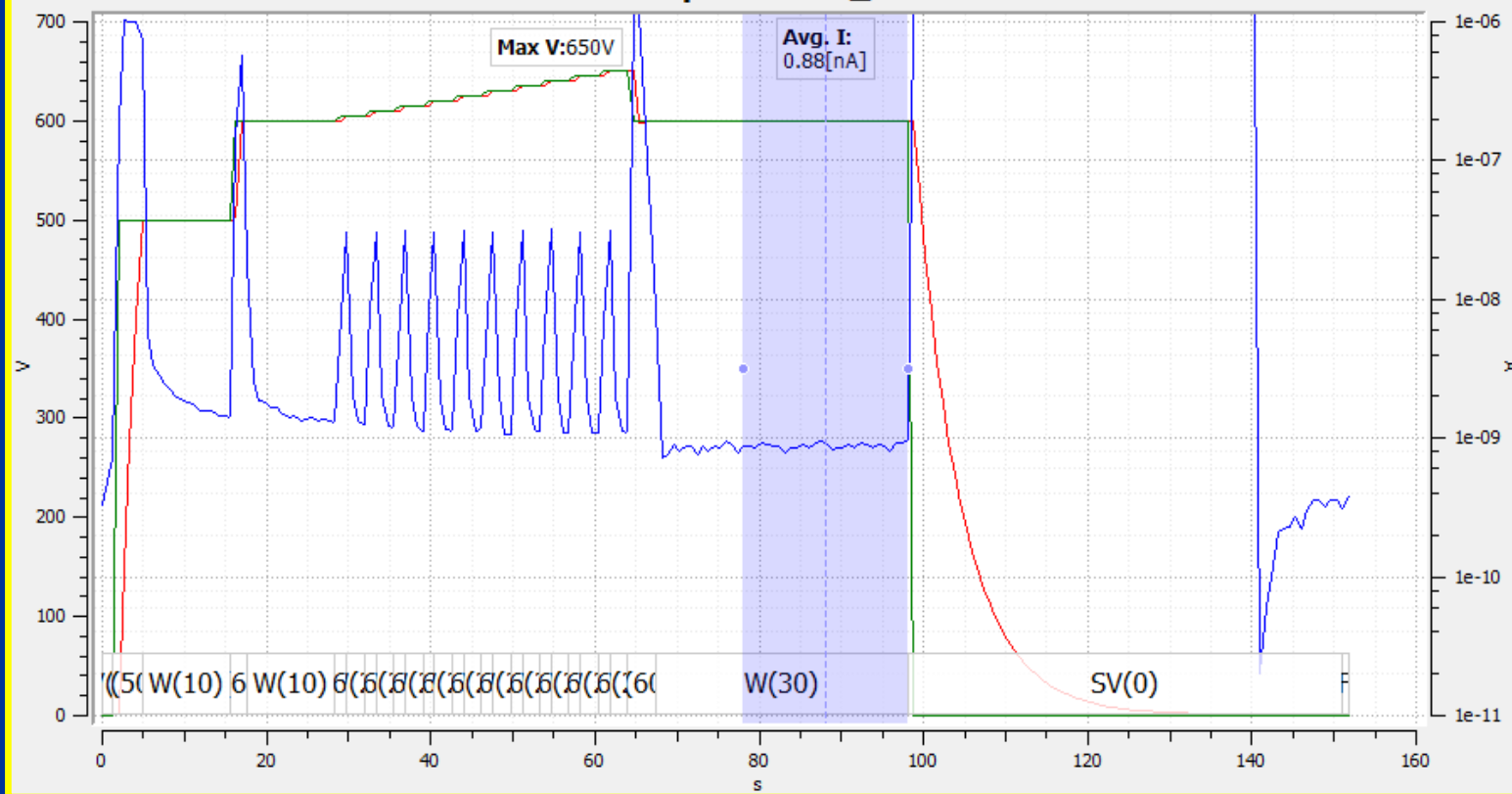
Type: **doublesided**
Maximum panel width: **650mm**
Status: **operational since Sept. 2013**

Final cleaning



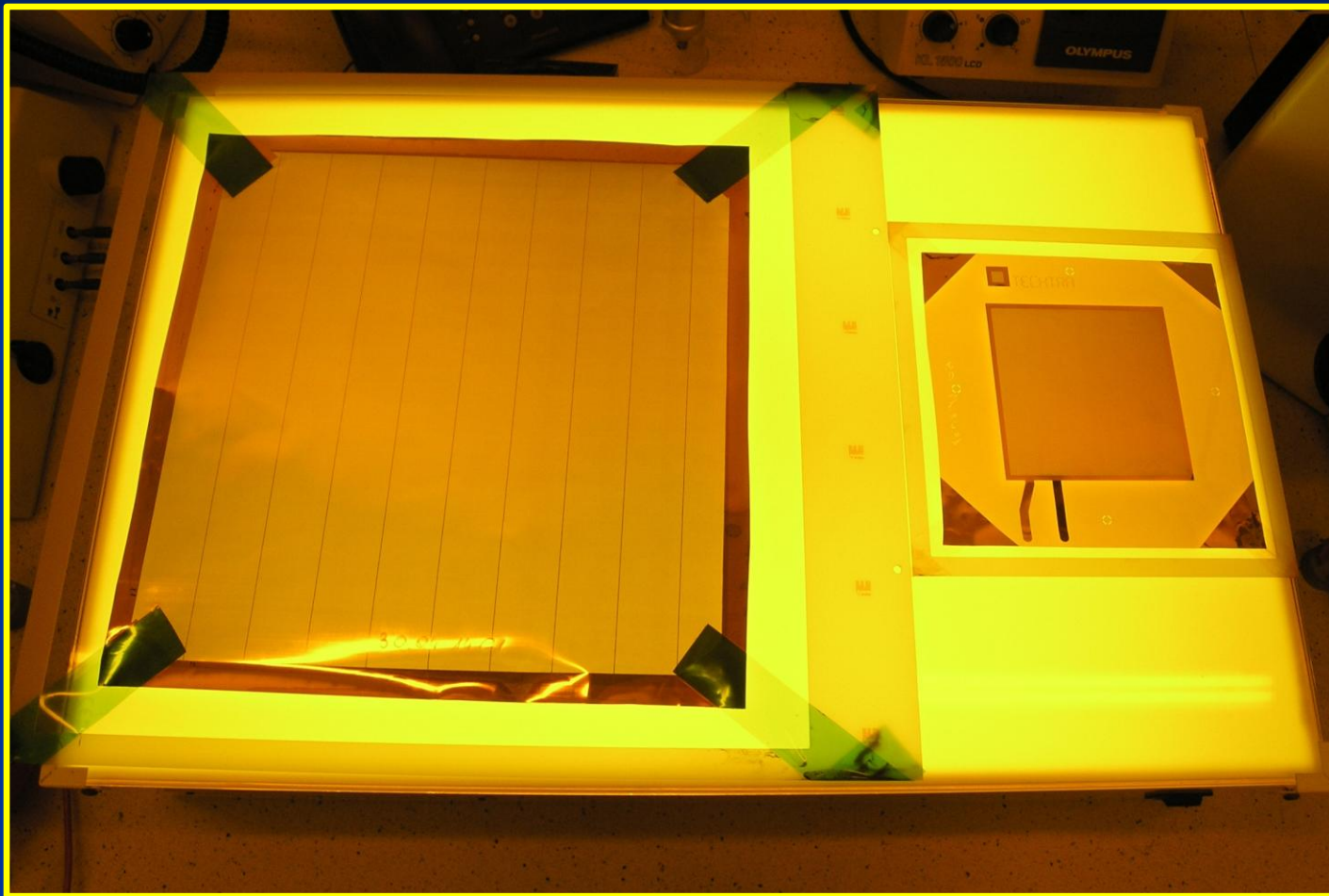
- Automated procedure
- Environment: 30% humidity
- Dry air or N₂
- Both polarities
- Optical system test: under evaluation
- Shipping procedures

03.10.13.G2top25-10-13_08-36-42.dat



„Demonstrator“:
laboratory line for
small prototypes





300x300mm and 100x100mm GEM, produced in double and single mask technique.

Conclusion:

- Whole upgrade is completed and production is on.
- Investment: about 900 kEuro (only in machinery) for **dedicated GEM production line.**
- Dedicated core team
- R&D work carried out with RD51 community help!
(technical assistance and Kapton supply)
- **We do welcome you (and your orders) at our facility in Techtra, Wroclaw**

