



30 years

Excellence in Logistics,  
Manufacturing & Testing Solutions



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Raf Goossens and Luc Vereycken  
CEO's

# Welcome

## **Welcome to PEC !**

In an age where governments are struggling with high deficits, conflicts, an uncertain future and even bankruptcies being at the horizon for some, it is crystal clear that the economic circumstances have not been favorable for most businesses.

Effective leaders however are at a premium and where continuous change appears to be the order of the day, organizations align organizational change and management development strategically and operationally in order to maintain and increase their competitiveness.

PEC succeeded with closing another fiscal year with success, reflecting its global leadership in core markets. Our vision combined with the bright minds, hard work and unlimited passion of our employees and satisfied customers have led to these results.

With over 150,000 vehicles on the road and a total of one billion km electric 'driving experience' Nissan Motor co., is not only the most innovative but also the largest EV maker in this world and a happy PEC customer. The successful installation of the pilot cell finishing equipment for the new Nissan Leaf, is the next step on the road to our absolute leadership in cell finishing.

The ambitious country of Azerbaijan has chosen PEC as the sole supplier to design and implement their nation-wide cash management system; software that will be used at 7 locations from the Central Bank and interfaces with automatic cash management equipment, depository institutions and gross settlement.

This project is one of the most advanced in its kind and both cases once again prove that our game changing business solutions, cost effective manufacturing and an outstanding customer service continue to create and increase value for our stakeholders and the global community.

We are very grateful and proud to all of you that joined and will continue to join us during the next legs of our exciting and challenging journey.

Thank You.



# *"Excellence in Logistics, Manufacturing & Testing Solutions"*

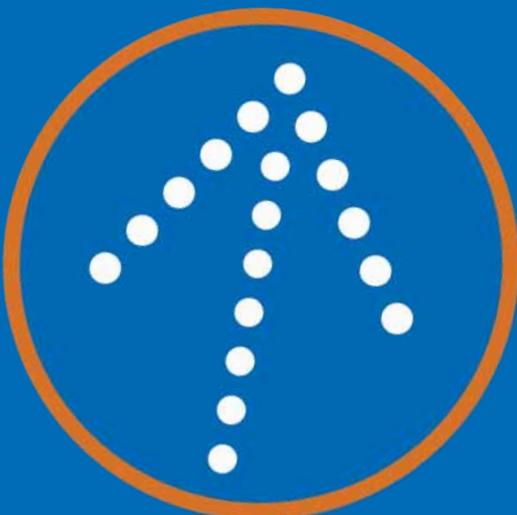
**For its global customer base,  
PEC offers solutions and expertise in:**

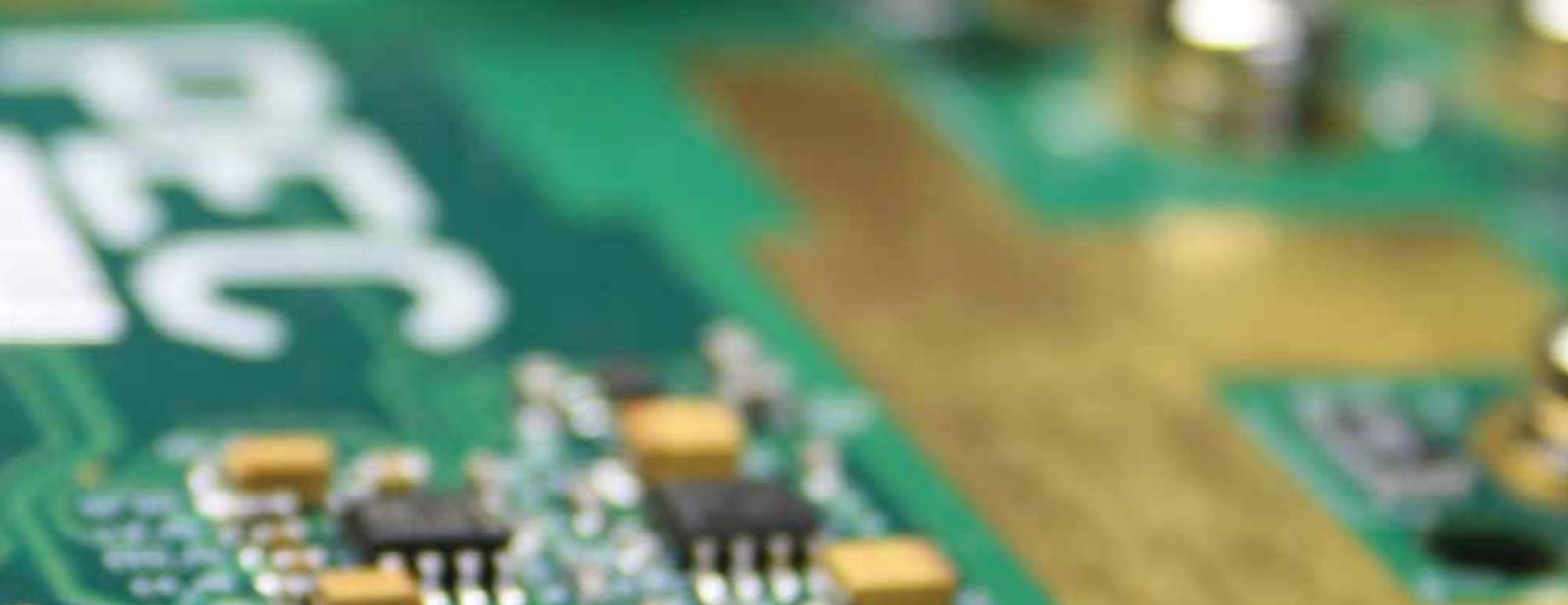
#### **Energy Storage Devices**

- Battery Testing
- Laboratory Automation in Battery Testing Labs
- LiION Cell Manufacturing

#### **Cash Operations of Central Banks**

- Automated Vaults
- Cash Center Automation
- Cash Management Systems





## TECHNOLOGIES

Our commitment to these global markets and PEC's continued R&D efforts, have resulted in a significant growth in all major economical regions.

Founded in 1984, PEC is now headquartered in Leuven, Belgium with R & D and project management groups in Belgium, Germany, Hungary, the United States, China and Japan.

Our company is staffed with highly educated experts in different technological and functional domains : Robotics, Material Handling, Power Electronics, Embedded Controls, Software Development and IT Security.

This multidisciplinary skill matrix forms the core of PEC's technological leadership, and creates substantial competitive advantages for our customers, in terms of quality, reliability and operational cost.

## SERVICES & SUPPORT

PECs' skilled, knowledgeable project managers, engineers and installation teams can help you successfully integrate, automate, implement and run our technology, maximize the value of your investment, and address your critical business needs.

Services include:

### Implementation Services

- Contract and Project Management
- Business Consulting
- Engineering
- Software Development

### Field and Support Services

- Installation
- Commissioning
- Preventive Maintenance
- Remote and on-site support
- Mission critical 24/7 support

With our devoted team members and genuine 24/7 support, PEC can truly help you optimize your organizational performance and maximize your business success.

## MANUFACTURING & SUPPLY CHAIN

PEC has established a global manufacturing and supply chain group. This group is responsible for the on-time sourcing, manufacturing, quality assurance and delivery of our products and solutions.

Our main manufacturing plant is located in Shanghai. This factory was officially inaugurated during the Shanghai World Expo in 2010 and doubled over the course of 2011 and 2012.

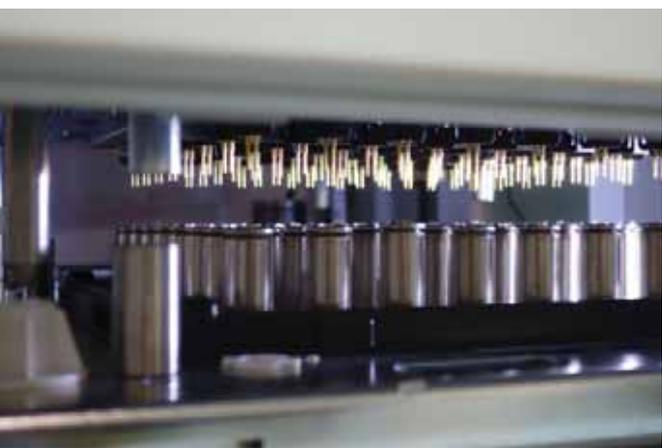
Besides Shanghai, PEC operates 2 plants in Coconut Creek, Florida and Hungary.

These plants are performing the final assembly before shipment to customers in North America and Europe.

This approach has given PEC the advantage of shortened delivery times to our global customer base, as well as an important price competitiveness.



## Test Equipment



## Cell Formation Systems



## Automated Cell Finishing Lines

# TEST AND MANUFACTURING SOLUTIONS FOR ENERGY STORAGE DEVICES



For more than 25 years PEC has supplied the energy storage industry with test and manufacturing equipment. All equipment uses PEC's 3rd generation water cooled technology, with a major focus to cost, safety, accuracy, reliability and stability in the day-to-day usage of the system. The power requirements are tuned to the customers need, and range from cell to module and complete pack voltages, and from a few Amps to hundreds of Amps.

We find many OEMs and tier 1 automotive suppliers, as well as leading cell and battery manufacturers, aerospace and defense players amongst our clients.

## TESTING SOLUTIONS

- Test equipment for evaluation and inspection of cells, modules and packs
- Quality Assurance equipment for cells and modules
- Laboratory Management System for battery testing labs

## MANUFACTURING SOLUTIONS

- Inline production testing systems
- Pilot production equipment including cell formation and grading systems
- Automated cell finishing lines for mass production of large format LiIon cells

### Automated Cell Finishing Lines

The cell finishing lines are designed for modular expansion and most important for fully automatic operation. PEC believes that automation during all stages of production is essential in achieving consistent quality and throughput at a competitive manufacturing costs. It is the only way for cell and battery suppliers to move away from the pilot production stage and establish a reliable high volume supply chain for a HEV, PHEV or EV car assembly plant.

In-house, PEC covers all technologies from right after the electrolyte filling to assembly and final testing of the battery pack. Cell or module handling, initial testing, roll pressing, formation, degassing, aging and grading are all integrated in one turn-key production system, using robots, automated storage and retrieval systems and PECs well-known electronics for cycling and testing cells.

The complete system is managed by a Manufacturing Execution System, that controls the material handling equipment, guarantees individual cell traceability, and presents management with accurate yield reports.

The operator tasks are limited to supervising these 24/7 running systems. This guarantees cost-effective operations in all geographies.



# Automated Vault Technology



# Cash Management System (CMS)



# Cash Handling & Packaging

# AUTOMATED SOLUTIONS FOR CASH OPERATIONS IN CENTRAL BANKS



Our solutions are seamlessly integrated and are collaborating to support the complete automation of the cash operations in Central Banks.

## **Automated Vaults**

The heart of the automated cash center is the vault. The vault is the storage place for sealed containers, loaded with security paper, coins or banknotes. An integrated Automated Storage and Retrieval System (ASRS), will automatically pick up the containers, store them in the racks and finally retrieve them for processing, or payout orders.

Using an Automated Storage and Retrieval System has a very positive influence on bank security and floor space. The unique concept of our ASRS design allows very dense 4-deep storage of coin and notes containers in a relatively small highly secured area.

## **Cash Center Automation**

The transport between the vault interior and the different processing and receiving rooms is done via AGV systems. The AGV's or Automated Guided Vehicles receive their transport tasks from the Cash Management System, which will create, schedule and monitor the execution.

The combination of both automated material handling systems is preventing human vault access during the cash center operation hours, and creates a detailed physical trail of all cash movements in the cash center.

This system can be extended with automated pre and post-processing, as well as automated payout systems. This approach will eliminate most of the operator activities in order to achieve a "Zero-Touch" cash center.

## **Cash Management System**

PEC's Cash Management System (MWare CMS) controls every physical transaction on the cash and electronically enforces the bank security procedures. MWare CMS supports and integrates all individual steps, such as cash receipts, cash orders, storage, sorting, bundling, canceling and destruction.

MWare CMS works independent from, but is integrated with other central bank systems taking care for reconciliation, invoicing and clearance.



# 2014 Highlights

## PRODUCT ANNOUNCEMENTS



### 2014 – ACT0550 High Accuracy, High Power Cell Tester

In a continuous effort to improve PEC's product offering and reduce the cost for its customers, PEC is announcing its 4th Generation Cell Tester, the ACT0550, replacing the current SBT0550 24 channel model.

The Advanced Cell Tester (ACT) delivers this promise and sets the new bar in large format cell testing systems. A quick view at the specifications shows 80 channels per rack, 50A per channel, full parallel capability at a 100  $\mu$ sec internal sampling frequency.



### 2014 – New Products and Solutions in Cash Center Automation

- *Cash Handling:*
  - Automated bundle packaging and containerization system
  - New banknote container supporting the automated containerization system
  - New gold container for secure gold storage
- *Cash Management System:*
  - A Web Portal module as part of PEC's Cash Management System for the communication between the central bank and its commercial clients and CIT companies



**Tokyo, JP – December 1, 2013**  
**PEC completes first automated cell finishing line at Nissan**

PEC is successfully fulfilling its ambitions to become a major player on the Japanese market, to date the leading country in advanced Batteries as well as EV/HEV car manufacturing. In the fourth quarter of 2013 PEC has completed its first fully automated cell finishing line in Japan. The delivered system is equipped with formation towers, ageing areas and peripheral equipment for the automated production of large format pouch type cells for the EV market.



**Tokyo, JP – February 26, 2014**  
**PEC presents the new ACT0550 at Battery Japan**

Battery Japan got the worldwide premier of the ACT0550. The system was presented to a wide range of Japanese and international customers and received excellent feedback. Especially the flexibility of having a single system that can test from  $\mu$ Amps to 4000 Amps is highly appreciated. In the mean time the new ACT0550 systems are shipping to customers worldwide.



**Boca Raton, FL – April 30, 2014**  
**BEST Test and Commercialization Center Grand Opening**  
**A Successful Public-Private Partnership to Support Clean Energy**

On April 30th, NY-BEST and DNV GL (formerly DNV KEMA) announced that the Battery and Energy Storage Technology (BEST) Test and Commercialization Center is open for business at Eastman Business Park in Rochester, New York. PEC supplied all test equipment for the NY Best facility as well as the LifeTest Laboratory Management Software.



**Leuven, BE – August 5, 2014**  
**PEC hosted the Belgian Solar Team**

PEC has been a sponsor of the Belgian Solar Team for years. During the 2014 Belgian solar tour, the team made a brief stop at the PEC HQ facilities. During the last edition in October 2013 the team achieved the 6th position and won the technical innovation award for the design of the solar car's battery pack. To encourage new technologies and talent, PEC invests in young innovative teams like the Belgian Solar Team. PEC has been long term sponsor and supports the team in the pre-race drive cycle testing of the battery pack.



**Leuven, BE – September 1, 2014**  
**The Central Bank of Azerbaijan rolled out the PEC Cash Management System nationwide.**

PEC announces that the Central Bank of Azerbaijan (CBA) has rolled-out the PEC Cash Management System (CMS) for its Cash Center operations to all regional offices.



**Berlin, Germany – September 15, 2014**  
**PEC is opening its sales and support office in Germany**

PEC Germany formed the logical next step in PEC's global expansion over the last 15 years. Because of PEC's growing share in Germany's battery testing and manufacturing equipment market, PEC decided to start up a sales and support office for the German market.

**Leuven, BE – October, 2014**  
**PEC celebrates its 30th years in business**

October 1984 marked the start of PEC as an industrial automation company selling a wide range of manufacturing and logistics automation projects. The skills and experience of the company has been turned into industry-leading solutions for the energy storage and cash logistics market.

Currently PEC operates globally with fully owned subsidiaries in 6 countries (Germany, Belgium, Hungary, USA, China and Japan), representing the key economic regions in 2015.

# Reference



## PROJECT SCOPE

### *Location:*

- Budapest, Hungary
- New Cash Center

### *Automatic vault:*

- More than 3000 container locations
- 4-double deep high-bay warehouse
- 2 Automatic Stacker Cranes

### *Automated material handling:*

- 4 Laser navigated AGV systems for automatic transport between the different pick and drop positions in the vault, the processing rooms as well as the paying and receiving rooms

### *Storage Containers:*

- More than 2500 aluminum containers for notes storage

### *Cash Center Management and Control System:*

- MWare

### *Project time frame:*

- 2006 – 2008

## PROJECT DESCRIPTION

### **The new Logistics Centre of the Hungarian National Bank.**

The Magyar Nemzeti Bank, the central bank of Hungary has replaced its traditional, downtown area cash centre with a state-of-the-art new facility located in the logistics zone of Budapest. The Magyar Nemzeti Bank was looking for a location offering high security and ease of access as well as a highly functional facility suitable for cash distribution, storage, sorting and destruction. Creating a new facility specifically for cash logistics via a green-field investment right next to major motorways offered the potential to increase significantly both the efficiency and the security of the cash operations of the Magyar Nemzeti Bank.

While it represents its largest investment in the past 15 years, the Logistics Centre project enabled the Bank to concentrate all its cash related activities in a single facility, to reduce the cash related staff level by 30 per cent and to consolidate all other central bank functions into the downtown headquarters building.



# Reference



## PROJECT SCOPE

### *Location:*

- Meadowbrook – Holland, MI
- Li-ION Manufacturing Plant

### *Automated Cell Finishing Lines:*

- Formation
- Grading
- Ageing
- OCV
- Sorting
- Storage

### *Project Time Frame:*

- 2010 – 2012

## PROJECT DESCRIPTION

Johnson Controls is continually developing new and innovative technologies that provide automotive manufacturers with the most advanced energy systems available. Johnson Controls is committed to supplying the premium battery systems required to power the hybrid vehicles of today and creating energy storage technology for the electric vehicles of tomorrow.

PEC supplied the Johnson Controls Meadowbrook facility with the automated cell finishing line, used to form, age, grade and sort the cells.

President Barack Obama's tour of the new Johnson-Controls Meadowbrook advanced battery center in Holland, Mich. on Aug. 11, 2011, led to praise for the facility and Johnson Controls' leadership in the advanced battery industry.

The new Meadowbrook facility is the first in the United States to produce complete lithium-ion battery cells and systems for hybrid and electric vehicles, producing battery systems for U.S. based automakers, such as Ford's Transit Connect, as well as oversees customers such as Mercedes's S-Class 400 Hybrid, E-Class Hybrid, ... .

# References

## Cell, Module & Battery Test Equipment

### Customers:

- ABB
- Akasol
- BAE Systems
- Berner Fachhochschule
- Bosch
- CEA
- CETC
- Chungbuk Technopark
- DNV-GL
- Dong Feng
- Duracell
- Erasmus Hogeschool Brussel
- ETC
- Energy Power Systems
- EOS
- Exide
- Flanders Drive
- GM
- Hyundai Mobis
- IBT Co.Ltd
- IFE
- Intertek
- Jacobs
- Johnson Controls
- METU
- NASA
- Navsea
- Nissan
- NY Best
- Panasonic
- Pellenc
- QinetiQ
- Rayovac
- Recupyl
- SABS
- Saft
- Samsung
- Scania
- SEEO
- SGS
- Shanghai Institute of Space Power Sources
- Sony
- Spectrum Brands
- Tatung University
- SwRi
- TSE
- TUV Rheinland
- TUV Sud
- UEP
- UltraLife
- Universidad de Oviedo
- Université de Picardie
- University of Hawaii
- Varta Consumer
- Varta Micro Batteries
- Vito
- Vrije Universiteit Brussel
- Westfälische Wilhelms-Universität (MEET)
- Yigitaku
- ...and many others





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