

Introduction to Jacobi Carbons ELCD Products

Neal E. Megonnell, Global Director of Business Development

Agenda

- Introduction to Jacobi
- ELCD Product Offerings – Physical Properties
- Cyclic Testing – Test Method
- Cyclic Testing Data
- Additional Testing
- Summary

Jacobi-PICA

- Largest coconut shell carbon manufacturer in the world
- Largest exporter of Asian coal carbon
- 70,000 MT
- Coconut, Coal, Wood, Lignite
- & Resinex Ion Exchange Resins
- Sales > 1 10 MEUR
- 860 employees
- Broadest product range in the business

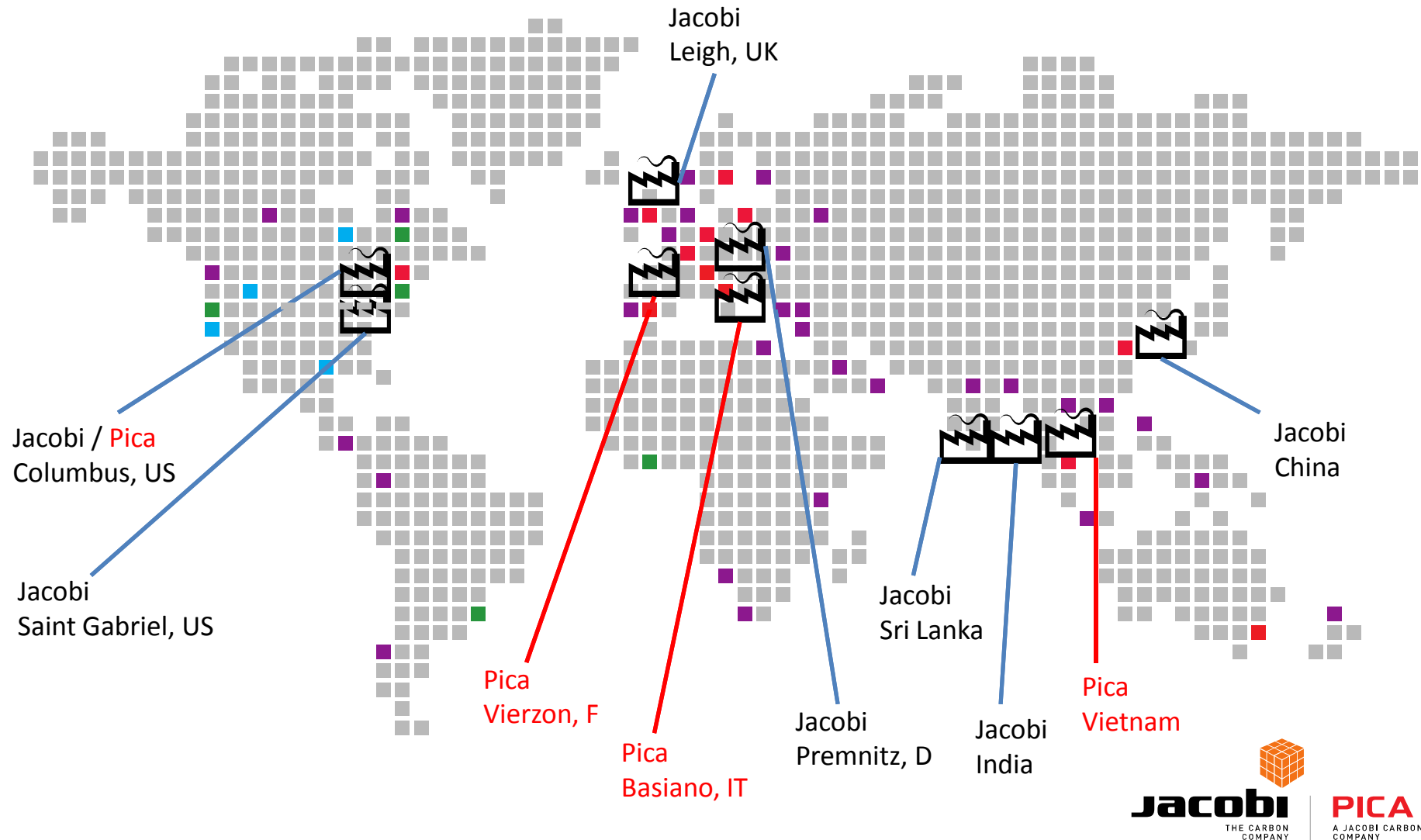


Our Mission

1. To be the highest quality / best value activated carbon supplier in the world.
2. To have the best customer experience in the industry.

This all happens because we employ the best people in the business.

Sales Offices, Partners & Main Production Sites



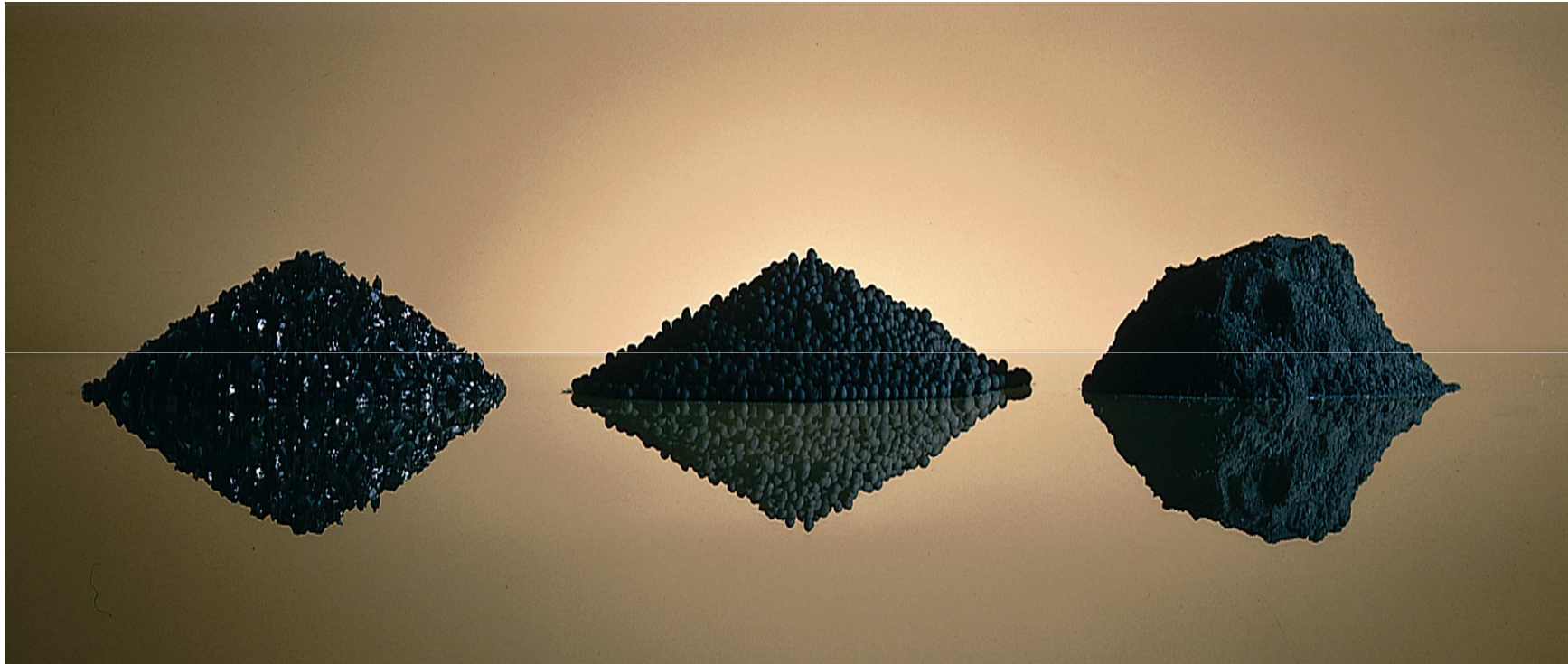
History and Future

- 1916 Ferdinand founds F.A.W. Jacobi
- 1921 Starts selling chlorinated solvents
- 1960 Starts selling dry cleaning equipment
- 1965 Dry cleaning machines need activated carbon
- 1990 Imports of Chinese activated carbon begin
- 1995 Jacobi Carbons Ltd, UK founded
- 1997 Jacobi Carbons GmbH, Germany founded
- 1999 Management Buy Out
- 2001 Jacobi Carbons, Inc., USA founded
- 2003 Jacobi Carbons Industry Co. Ltd., China founded
- 2004 Jacobi Carbons Asia Sdn Bhd, Malaysia founded
- 2005 Jacobi Carbons Lanka Pvt Ltd, Sri Lanka founded
- 2007 Jacobi Carbons AG, Switzerland founded
- 2008 Jacobi Carbons India Pvt Ltd, India founded
- 2008 Jacobi Carbons Service GmbH, Germany founded
- 2009 Jacobi Carbons Reactivation Service LLC, USA founded
- 2009 Jacobi Carbons Polska sp.zoo., Poland founded
- **2011 Jacobi acquires PICA**



Founder: Ferdinand Jacobi - 1916

Activated Carbon – High Performance Adsorbent



Granular Activated Carbon (GAC) Extruded Activated Carbon (EAC) Powder Activated Carbon (PAC)



An infinite Number of Applications

WATER & ENV



- Drinking water
- Process water
- Waste water
- Flue gas
- Deodorization

AIR & PREP



- ➔ Personal protection
- ➔ Cigarette filter
- ➔ Indoor air filtration
- ➔ VOC recovery

INDUSTRIAL



- Food & Bev.
- Chemicals
- Pharma
- Gold mining
- Automotive

Activated Carbon Product Range - PICA

WATER & ENV

- Drinking water
- Industrial waters
- Landfill leachate treatment
- Soil remediation
→ **PICAHYDRO®**
- Environmental protection
 - flue gas
 - deodorization
 - Biogas
 - Soil remediation→ **PICACLEAN®**

AIR & PREP

- Respiratory Protection (gas masks...)
→ **PICATOX / PICARESP**
- Environmental protection (IAQ)
→ **PICACLEAN**
- Nuclear
→ **PICATOM**
- VOC recovery
→ **PICACARB**
- Cigarette filter
→ **PICACTIF**

INDUSTRIAL

- Food&Bev&Pharma
→ **PICAPURE**
- Oil&Gas
→ **PICACHEM**
- Medicinal
→ **PICACTIF**
- Auto
→ **PICACLEAN**
- Catalyst support
→ **PICATAL**

Gold Mining

- **PICAGOLD**

Activated Carbon Product Range - Jacobi

AquaSorb®

Steam activated carbon optimised for liquid phase applications e.g. drinking water treatment, ..

ColorSorb®

Steam and H_3PO_4 activated carbon for purification and decolourisation applications e.g. sugar decolourisation, ..

EcoSorb®

Steam activated carbon optimised for gas phase applications e.g. air treatment, cigarette filters, ..

GoldSorb®

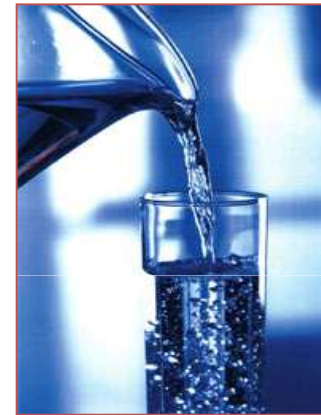
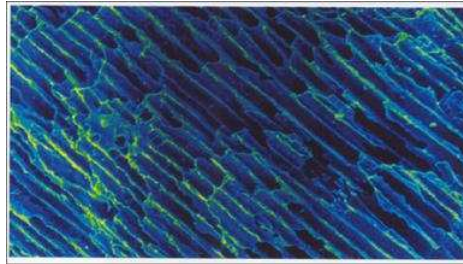
Steam activated carbon for precious metal recovery e.g. gold recovery, ..

AddSorb®

Chemically impregnated activated carbon for special gas applications e.g. Hg removal, respirator carbon, biogas, ..

Advanced Activated Carbon Solutions

- **PICABIOL[®] 2**
Adsorption of biodegradable pollutants
+ metabolization by means of bacteria
- **PICAHYDRO[®] SOL**
Stable concentrated PAC suspension to be used in case of polluted resources
- **PICAHYDRO[®] REN**
Renewable based make-up to compensate reactivation losses



UCAP Plan

24H / 24

7days / 7

Jacobi
THE CARBON
COMPANY

PICA
A JACOBI CARBONS
COMPANY

Jacobi Carbons Lanka



Production always close to raw material!

Jacobi-Pica Vietnam



Ben Tre province has been selected because of the raw material availability (coconut shell) as well as the quality of the infrastructures offered by the Giao Long Industr. Zone



Production commenced in September 2010

→ regional diversification strategy to strengthen our charcoal sourcing



Jacobi-Pica Vietnam



Sieving units to produce fine mesh granular carbon



State of the art activation technology

Jacobi
THE CARBON
COMPANY

PICA
A JACOBI CARBONS
COMPANY

Jacobi Carbons India



Rotary kiln technology – easy to multiply (2009)

Jacobi Carbons China



- All our Chinese produced carbons are processed at Jacobi Carbons own plant at Tianjin, China
- Coal and wood based GAC, EAC and PAC
- Steam activation or chemical activation



China – THE source for high performance coal & wood based carbons



Jacobi Carbons China



- Unique product
 - GAC/EAC/PAC
 - Agglomerated GAC
 - Selected grades of coal
 - Acid washing / Water washing
 - Rigorous dedusting
 - European packaging
- Quality Control
 - Most extensive in the industry (China)
 - ISO-9000, NSF 61



Acquisition of PICA SASU by Jacobi Carbons

- Acquired from Veolia Group 1.9.2011
- Incorporated in 1956
- 47 M€ sales in 2011
- > 200 employees
- 7 locations: France, Italy, UK, USA, Australia, Singapore, China
- 4 industrial facilities: France, Italy, USA, Vietnam
- Manufacturer of Coconut shell & Wood based Activated Carbons
- ISO 9001:2000 certified
- ISO 14001:2004 certified
- REACH, AFSSAPS
- Sustainable Development policy



Pica France – Vierzon Site

European Production

Chemically activated GAC & PAC

Speciality PAC

Particle size distribution (UF grades, etc.)
Medicinal carbon (Pharmacopoeia)

Speciality GAC

High performance
Low attrition, High purity

Carbon processing plant

crushing, sieving & dedusting
packing
impregnation

Reactivation and adsorber site services incl. mobile adsorbers
Modular Filtration Units

R&D Laboratory incl. NBC test equipment, application support center

Warehousing, bulk truck loading

ISO 9001:2000 & 14001:2004 certified



Vierzon – Jacobi-Pica's Western European multipurpose production site

Pica Italia – Basiano Site

European Production

Speciality PAC

Particle size distribution (UF grades, etc.)

Carbon processing plant

crushing, sieving & dedusting
packing

Adsorber site services

Mobile adsorbers / Modular Filtration Units

Warehousing, bulk truck loading

ISO 9001:2000 & 14001:2004 certified



Basiano — Jacobi-Pica's Southern European multipurpose production site

Jacobi Carbons Germany – Premnitz Site

European Production

Speciality PAC

Particle size distribution (UF grades, etc.)

Carbon processing plant

crushing, sieving & dedusting

packing

spent carbon removal & disposal

Impregnation plant

Reactivation and adsorber site services

Mobile adsorbers / Modular Filtration Units

R&D Laboratory, application support center

Warehousing, bulk truck loading

ISO 9001:2008 & 14001:2004 certified



Premnitz – Jacobi-Pica's Central European
multipurpose production site

Jacobi Carbons UK – Leigh Site

European Production

Carbon processing plant
crushing, sieving & dedusting
packing
spent carbon removal & disposal

Impregnation plant

Adsorber site services

Mobile adsorbers / Modular Filtration Units

R&D Laboratory, application support center

Warehousing, bulk truck loading

ISO 9001:2008 & 14001:2004 certified



Leigh – Jacobi-Pica's UK multipurpose carbon processing site

Jacobi Carbons Unites States – Columbus Site

US Production

Carbon processing plant
crushing, sieving & dedusting
packing
spent carbon removal & disposal

Impregnation plant

Adsorber site services

Mobile adsorbers / Modular Filtration Units

R&D Laboratory, application support center

Warehousing, bulk truck loading

NSF certifications



Columbus – Jacobi-Pica's US multipurpose
carbon processing site

ELCD Product Offerings

| Carbon | AD | Butane Activity | Butane Working Capacity |
|-------------|---------|-----------------|-------------------------|
| | g/100ml | % | g/100ml |
| | | | |
| FX184 8x35 | 357 | 35 | 9.5 |
| FX1084 8x35 | 309 | 46 | 10.5 |
| FX1184 8x35 | 307 | 51 | 12 |
| | | | |
| FX1084 2mm | 332 | 46 | 10.5 |
| FX1184 2mm | 348 | 51 | 12 |

Cyclic Testing – Test Method

BWC measurements on canisters (800 ml) filled samples

1) Technical procedure for BWC measurement

Adsorption : 50%v C₄H₁₀ / 50%v N₂ at 15 g/h (=> 12,65 l/h at 25°C), up to a cumulated breakthrough of 2 g C₄H₁₀.

Desorption : 22,7 l/min air, 300 times the canister volume (=> 240 l)

Testing was conducted at the Jacobi-PICA Vierzon facility

Cyclic Testing Data

| Carbon | AD | Butane Activity | Butane Working Capacity |
|-------------|---------|-----------------|-------------------------|
| | g/100ml | % | g/100ml |
| FX184 8x35 | 357 | 35 | 9.5 |
| FX1084 8x35 | 309 | 46 | 10.5 |
| FX1184 8x35 | 307 | 51 | 12 |
| FX1084 2mm | 332 | 46 | 10.5 |
| FX1184 2mm | 348 | 51 | 12 |
| BAX1100 2mm | 363 | 38 | 11 |
| BAX1500 2mm | 278 | 65 | 14 |
| CNR115 2mm | 361 | 42 | 11 |
| WV 11 8x35 | 275 | 46 | 10 |

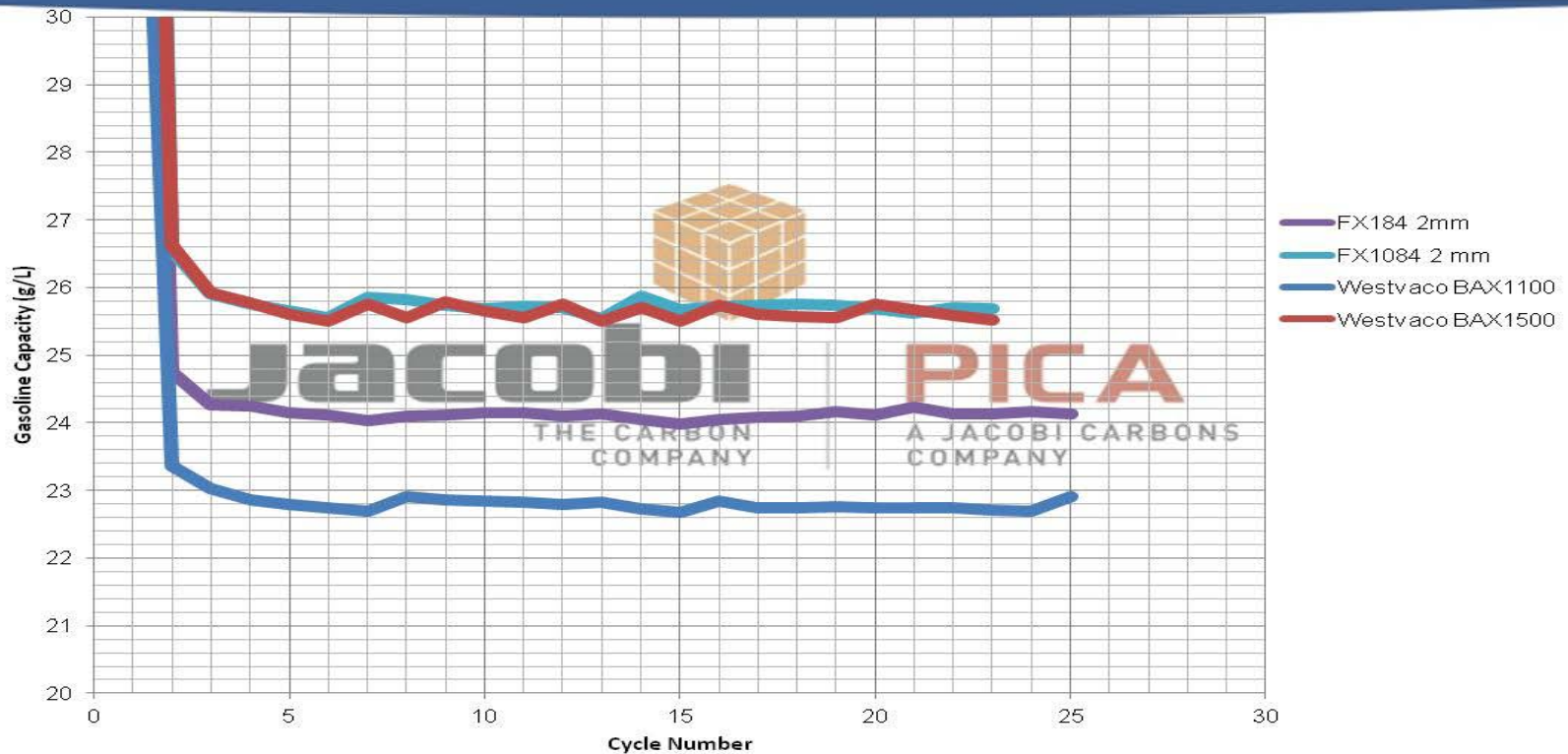
Cyclic Testing Data

Granular ELCD Product Comparison Data



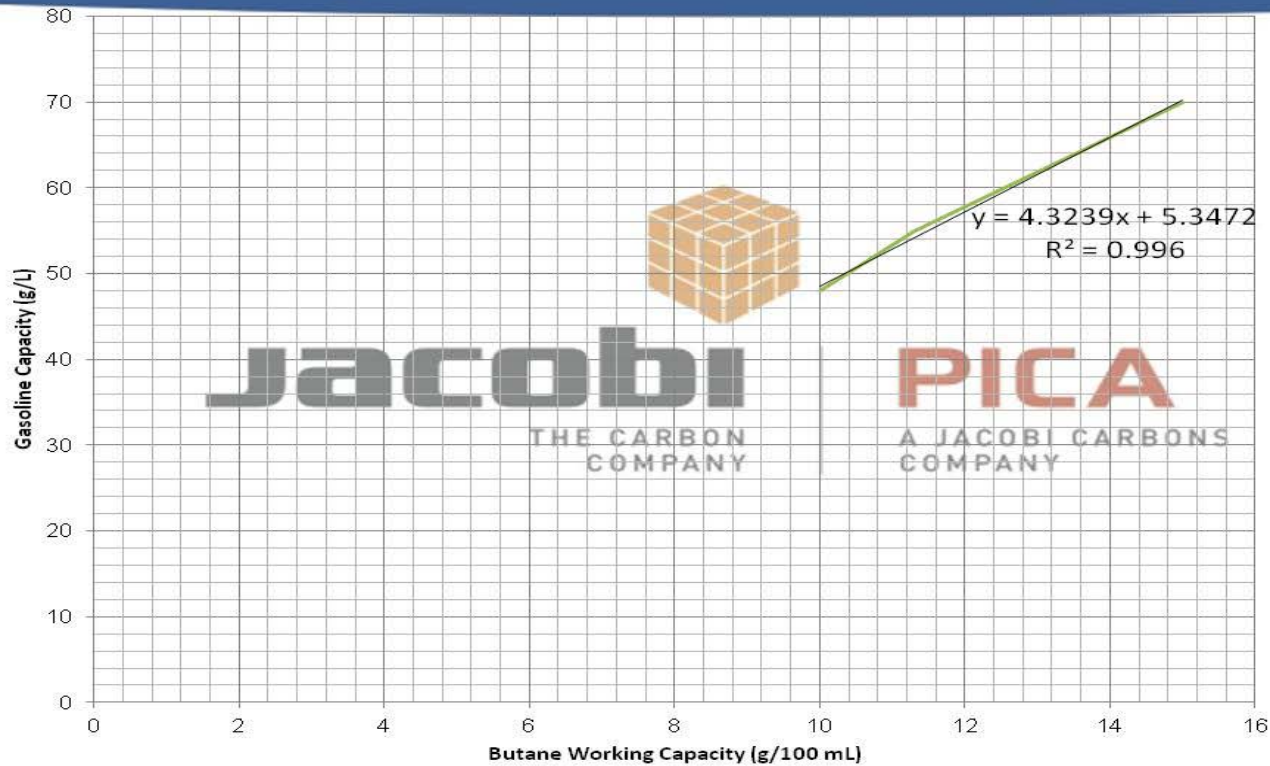
Cyclic Testing Data

Pelleted ELCD Product Comparison Data



Cyclic Testing Data

Correlation Between Butane Working Capacity and Gasoline Working Capacity



Additional Testing

- Future would may include diurnal leak testing.
- Rough handling testing.
- Additional customer specific testing.

Summary

- Jacobi Carbons, with the acquisition of PICA is now the third largest activated carbon company in the world.
- Most extensive product line offering.
- ELCD product line has been developed to offer competitive products.
- Testing data supports the performance.

Thank You!!