WELCOME TO THE FUTURE

- Fully Automated LCD Recycling
- Robotic Leading Technology
- High Volume Processing
- Legislation Compatible and Complainant
- The Process is Patented Protected
- Economic and Environmentally Success
THE WORLD HAS CHANGED...

AND IT’S TIME TO CHANGE WITH IT...

1970’s
PRODUCT BASED

1980’s
SERVICE BASED

2000’s
CUSTOMER FOCUSED

2020’s
RELATIONSHIP FOCUSED

WE NOW LIVE IN A GLOBAL SUBSCRIPTION ECONOMY

$420B spent on subscriptions in the US in 2015, up from $215B in 2000

Credit Suisse

THE COMPANIES WHO ADAPTED AND CHANGED:
BOEING
IBM
KELLOGG
PROCTER & GAMBLE
WHIRLPOOL

AND THE COMPANIES WHO DIDN’T:
BLACKBERRY
COMPAQ
KODAK
NOKIA
PAN AM

62% of Fortune 500 companies have disappeared since 1995

Fortune 500
Recycling companies are playing a bigger and bigger part of this changing world. This is driven by the demand on our natural resources and is evident in the new supply chain models being implemented by producers.

At Votechnik we provide solutions today which address this growing market for both recyclers and producers. Our approach is to provide solutions today that address the “here and now” need but also the future potential coming from these markets. We believe partnering with recyclers in a changing world to deliver the best outcome.

**THE OLD WORLD**

- Adoption to material flow evolution (CRT to FPD) challenges and changing products
- Changing Legislation
- Maintenance risk and poor aftermarket support
- High CaPex
- Competing business and revenue models

**THE NEW WORLD**

- Partnering with business and technical innovators to capitalise on the opportunity from change
- Global after sale market support and maintenance for technology, ensures risk mitigation
- Alignment with your business and revenue model by reducing capex for state of art technologies and introducing subscription based model to facilitate this
- Winning future recycling contracts by having access to technology

It is designed and built for the recycling environment while using leading technology and proven equipment.
Electronic products are part of everyday life and there is an increasing demand. The lifespan of new products is decreasing resulting in the increasing of waste. Representing the last two decades, Figure 1 illustrates the volumes placed on the market. Whilst LCD screens have replaced CRT screens with an associated reduction in weight, in individual units, much more TVs are purchased per household.

The recycling of Liquid Crystal Displays (LCD) is a particular problem for recyclers as, according to the legislation and Directive, most notably mercury and liquid crystals containing component must be removed from LCDs before the traditional treatment of shredding.

According to NDP Display Search global there were 180 million units of TV LCDs sold by the end of 2010 globally. Given that many LCDs have a short lifespan of 7-9 years, a large number of LCDs are made redundant each year and require proper disposal (150,000 units in 2014). It was estimated that 500 million LCDs would be stockpiled by 2014.

**LCD FRACTIONS**

LCDs include a large number of different components and materials among which many are considered critical raw materials (CRMs). There will be a huge push to recover these in the coming years due to their rarity and price volatility. Along with the positive value fractions there are hazardous materials identified within LCDs including mercury which poses a health risk due to personnel expose to broken or damaged backlights.
**INTRODUCING THE ALR3000**

**ENVIRONMENTAL AND ECONOMIC BENEFITS**

| 480,000 screens | 8000 operation hours | 60-80 screen per hour | 4324 tonnes Per year | High quality fractions |

By processing 60 units per hour we can liberate 4324 tonnes of LCD materials per year allowing for:

- Environmentally friendly containment, and preventing the annual emission of:
  - Mercury 23 Kg
  - Liquid Crystals 8.7 Kg

Facilitating the recovery of items currently lost in processing:

- Indium 16.6 Kg
- Phosphor Powder 5.8 Kg

The mainstream recovery of the core materials over 1 year operation of the machine are:

<table>
<thead>
<tr>
<th>Material</th>
<th>Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>310000 Kg</td>
</tr>
<tr>
<td>Printed Circuit Board</td>
<td>900000 Kg</td>
</tr>
<tr>
<td>Plastic</td>
<td>1020000 Kg</td>
</tr>
<tr>
<td>Cable</td>
<td>43000 Kg</td>
</tr>
<tr>
<td>LCD Glass</td>
<td>300000 Kg</td>
</tr>
<tr>
<td>Steel</td>
<td>1930000 Kg</td>
</tr>
</tbody>
</table>

**Figure 2. Weight % of material content of an LCD screen (based on Salhofer et al. 2012)**

**Figure 3.**

*The ALR3000™*

The treatment capacity and cost efficiency of the manual process can be easily improved with the ALR3000™, whilst producing good quality output fractions.
We believe the resource challenges of the future must be solved today with innovation, tomorrow will be too late. We are currently working with people addressing these issues to deliver the best outcome for us all.

Votechnik product’s deliver critical infrastructure to enable a truly circular economy for screens with Liquid Crystal Display (LCD), allowing Critical Raw Material recovery (CRM) that is otherwise lost. Votechniks subscription business model allows access to state of art robotics for the most advances, safe and efficient recycling bringing the future of recycling to the present day.

We build relationships with people that are at the forefront of addressing the growing electrical waste problem and solving the raw materials resource challenges that face the global community.

We are leading innovators with a vision to address industry and societal requirements which drives our planets resource sustainability and our product portfolio and business model is focused on making the most advanced technologies accessible to the majority of the market.

**OUR APPROACH TO BUSINESS**

**Relationship based**
We prioritise outcomes over products. We want to work with people solving their cog in the wheel of the circular economy to ensure the best outcome.

**Business Model**
We firmly believe in aligning our customers business with Votechnik’s. We will work with you to configure a business relationship which gives you a tailored solution as opposed to selling a product.

**Revenue Model**
We reduce the capital investment required to allow for easier adoption and align our revenue model with yours.

**Technology**
Votechnik is disruptive technology solution provider. Our market approach for our customers is delivering constant advancements, not planned obsolescence in a changing world.

**Certainty**
We remove the burden of new technology ownership and provide cost certainty operation. We hold a global process patent giving advantages to our customer such as exclusivity in a market.

**WHY THE ALR 3000©?**

The ALR 3000© is the only fully automated patented technology which depollutes the hazardous components from Liquid Crystal Displays (LCDs).

After processing in the ALR 3000© the hazardous components are safely removed and the LCD can subsequently be processed through existing WEEE process lines.

ALR 3000© brings a disruptive and innovative technology to the recycling industry:

- Fully Automated
- Patent Protected
- Highest Available Processing Capacity
- Operational Leasing Model
- Low Operational Running Costs and Low Capex
ALR 3000® ADVANTAGES TO OUR INDUSTRY

Cost Effectiveness ALR 3000® has a cost effective spectrum from low volume to high volume LCDs and unlike other technologies can be operated at low volumes cost effectively.

High Performance Recognition and separation occurs at maximum speed. ALR 3000® is the highest performing depollution process available on the market.

Efficiency ALR 3000® efficiency is based on the speed of throughput, the number of operatives and very low electrical consumption.

Flexibility The technology can be integrated into existing waste process facilities or can be stand alone.

Full Support remote monitoring, highly reliable and global support network.

Compliance allows the recycler to easily comply with his national licenses and EU WEEE directives while high throughput process allows the recycler to competitively tender for waste LCD recycling.

High Reliability The ALR 3000® is specified to foundry specifications, with a robust controls and user interface.

Sustainability Future proofing your business and adopting to change to ensure success.

ALR 3000®

The ALR 3000® is the global market leader in LCD recycling. It is designed and built for the recycling environment while using leading technology and proven equipment.

Votechnik carefully selected the equipment suppliers after a rigorous evaluation on experience, support and product range as well as aligning with business goals.

The ALR 3000® leverages the best of ABB robotics and automation divisions. Having one of the largest internationally installed base as a robotic supplier has considerable advantages in.

The ALR 3000® has a unique combination of innovative thinking implemented with industry proven equipment technology.

<table>
<thead>
<tr>
<th>Technical Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCD size range</td>
<td>19” to 60”</td>
</tr>
<tr>
<td>ALR3000® size (m)</td>
<td>6(L) x 5(W) x 4.5(H)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>+5c to 40c</td>
</tr>
<tr>
<td>Electrical supply</td>
<td>400V 50Hz 30A</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>3 Phase and earth</td>
</tr>
<tr>
<td>Electrical Load</td>
<td>9.5Kw</td>
</tr>
<tr>
<td>Process Rate</td>
<td>60-80 LCDs per hour</td>
</tr>
<tr>
<td>Operators</td>
<td>1 to run machine</td>
</tr>
<tr>
<td>Extraction System</td>
<td>1500m³ per/hr</td>
</tr>
<tr>
<td>Filtration System</td>
<td>Activate carbon</td>
</tr>
<tr>
<td>Internet connection</td>
<td>CAT 6 / 5MB</td>
</tr>
<tr>
<td>Compressed Air</td>
<td>6 Bar</td>
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CE Certified technology built to the EU Machinery Directive.
Engineering carried out by a leading machine design engineering business.
Control System connected platform with full remote monitoring capability and remote diagnostics.
Maintenance Support Votechnik provide a full maintenance contract for the lifecycle of the machine.
Patented Design Votechnik hold the global process patents.
Equipment Selection IP67 & foundry grade equipment.
CCFL Removal is completely internal to the machine ensuring safe operation of the ALR 3000©.
Environmental Friendly very low electrical usage and environmental impact in manufacture.
Consumable supplied by Votechnik and low level of usage.
Equipment Partner ABB Robotics UK and Ireland.
Install Time Quick install and commissioning time.
Rugged designed to be durable and for standard shipping in modular.
Efficient ALR 3000© is cutting edge technology to maximise process efficiency.
WEEE LABEX compatible technology.