



Engitec Technologies S.p.A.

Recycling Lead Acid Battery



ABC Macau 2009

Lead : the highest case of recycling

- The lead battery is the most recyclable of the consumer's waste.

Lead Acid Battery: 96.5% (Western World)

Steel Cans: 60.0%

Yard Trimmings: 56.3%

Paper and Paperboard: 67.8%

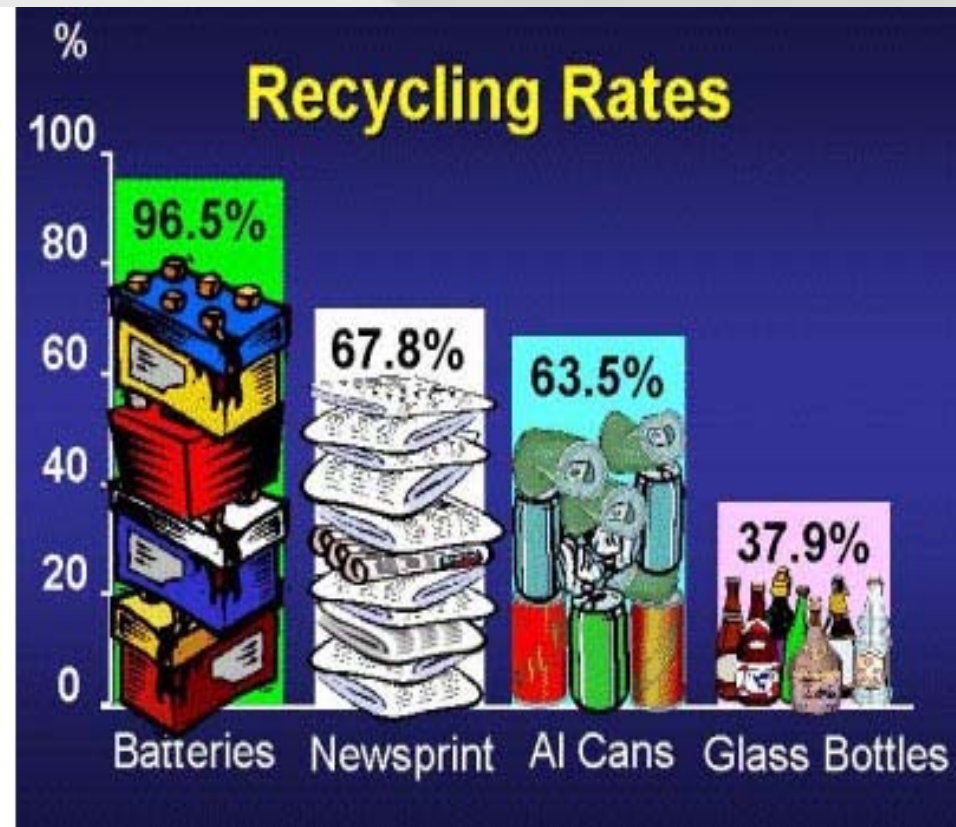
Aluminum Cans: 63.5%

Tires: 35.6%

Plastic Milk Bottles: 31.9%

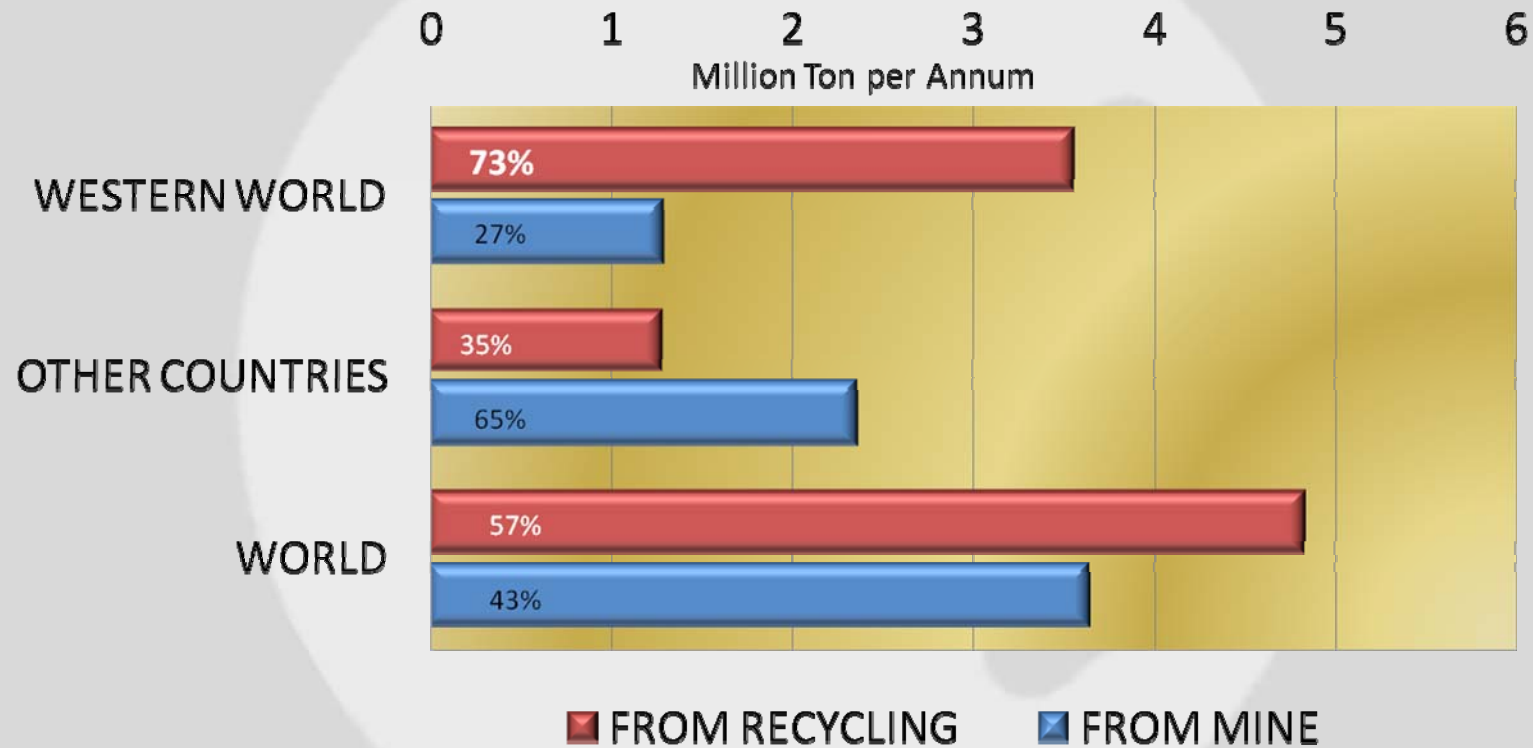
Plastic Soft Drink Containers: 25.2%

Glass Containers: 37.9%





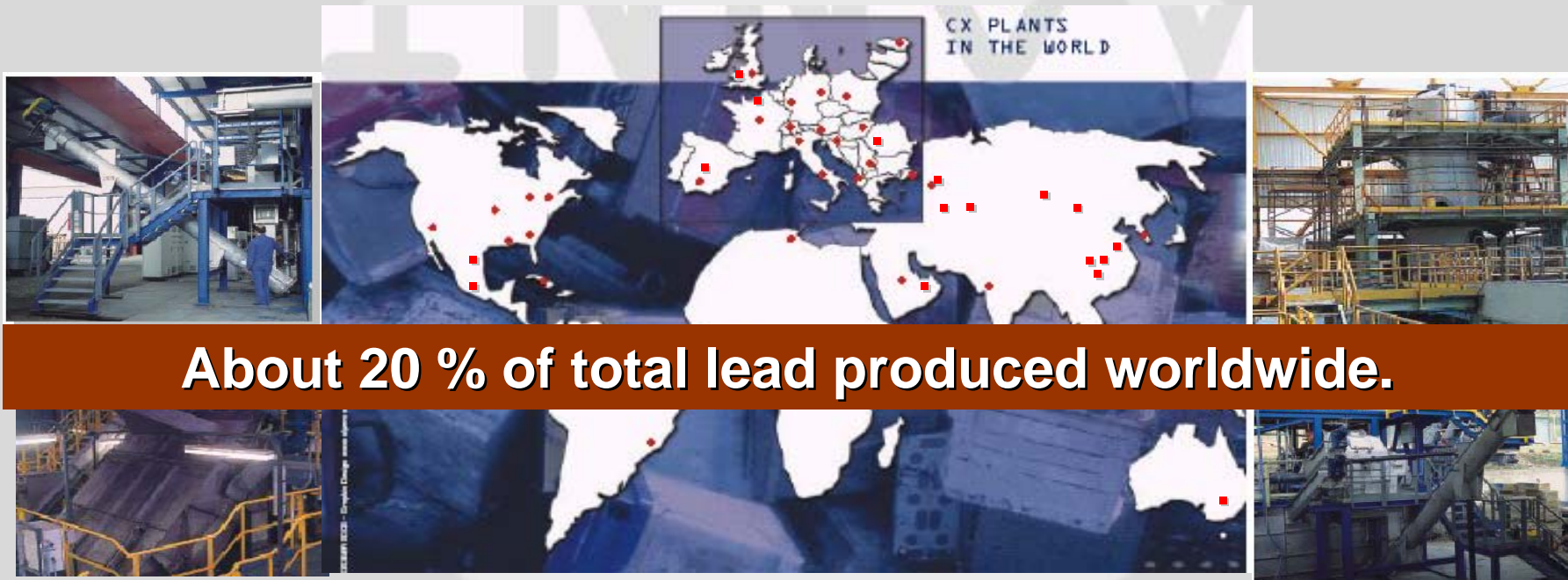
The lead production



The CX[®] Installations in the World

More than 50 Clients all over the world

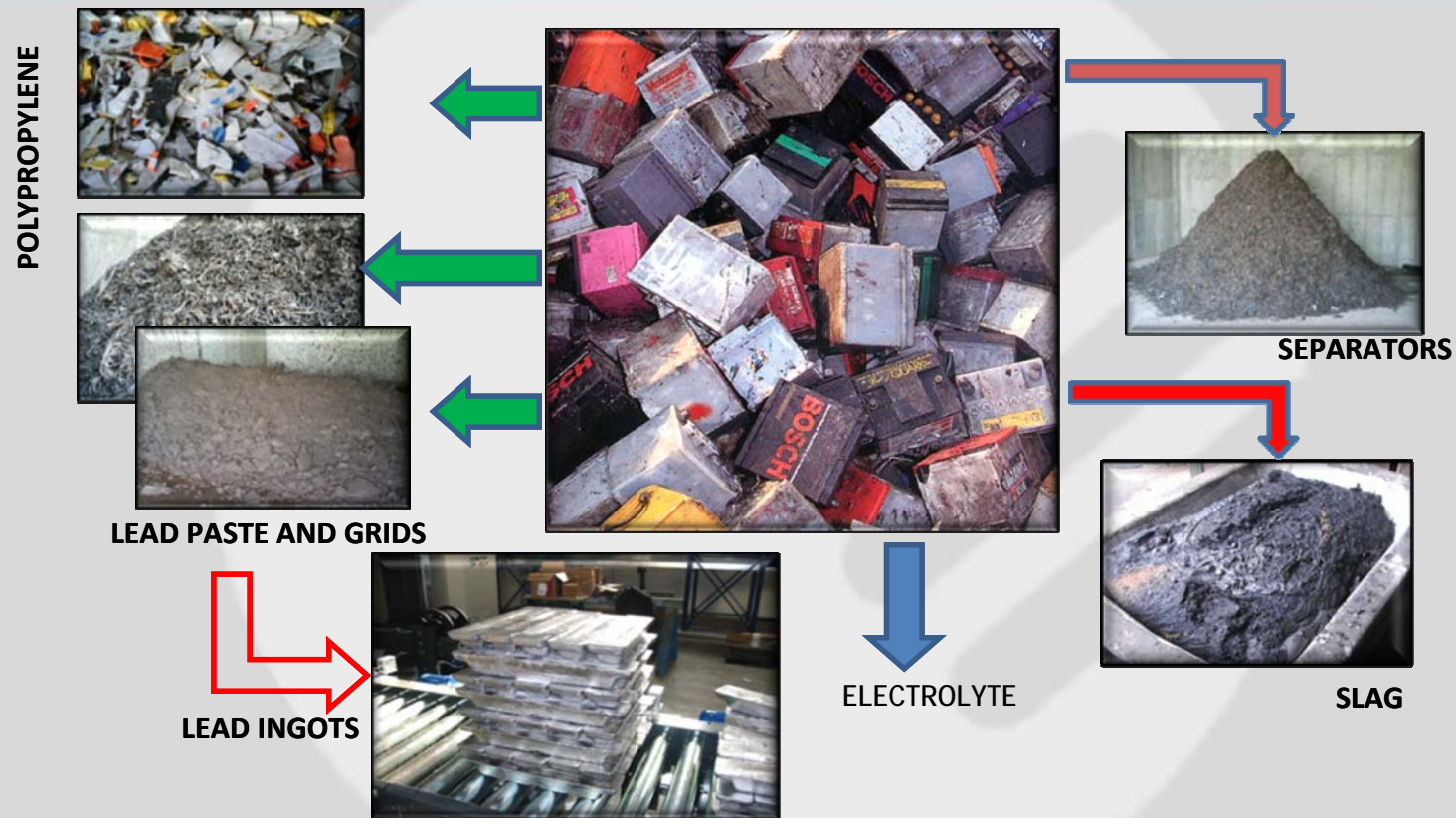
More than 3,000,000 t/y of batteries recycled

























































About 20 % of total lead produced worldwide.











The recycling

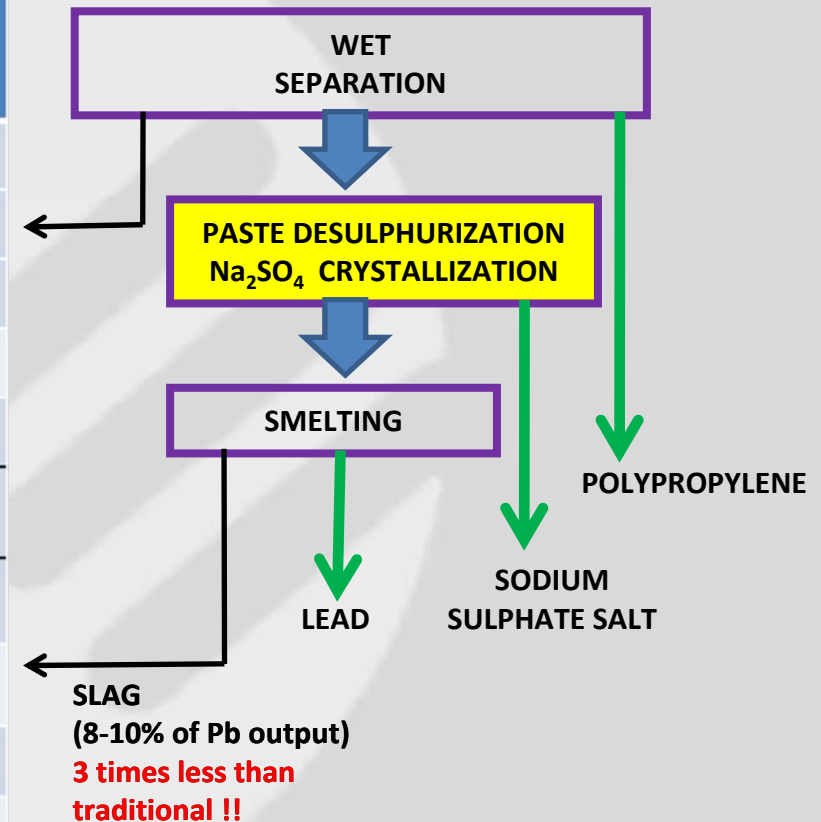


The recycling techniques Yesterday

	BACKYARD TREATMENT	SAWING AND SMELTING	DIRECT SMELTING	DRY SEPARATION & SMELTING	HYDRAULIC SEPARATION & SMELTING
CASE (POLYPROPYLENE)					
ELECTROLYTE (H ₂ SO ₄)					
SEPARATORS (PE, PVC)					
GRIDS (LEAD ALLOYS)					
ACTIVE MASS (LEAD PASTE)					
WORKERS HEALTH					
WATER POLLUTION	YES	YES	YES	YES	NO
SOIL POLLUTION RISK	  	  	 	 	
AIR POLLUTION RISK	  	  	  	 	 

The recycling techniques Today

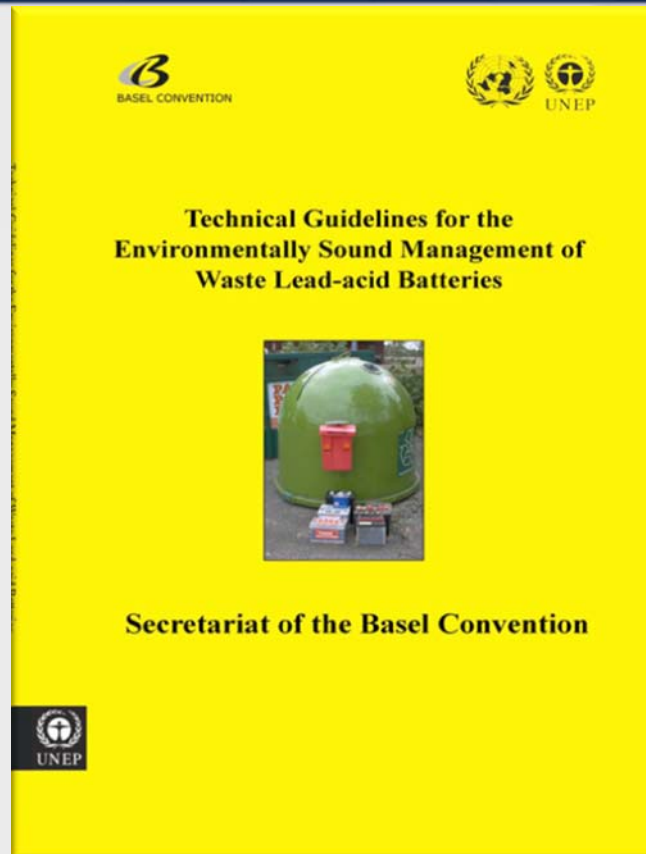
HYDROSEPARATION DESULPHURIZATION - CRYSTALLIZATION SMELTING		
POLYPROPYLENE CASE		PRODUCT : PP
SEPARATORS		SPECIAL LANDFILL
ELECTROLYTE		PRODUCT: SALT
GRIDS (LEAD ALLOYS)		PRODUCT : LEAD
ACTIVE MASS (LEAD PASTE)		PRODUCT: LEAD
WORKERS HEALTH		Personnel Protection (mainly at Smelting)
WATER POLLUTION		FREE – NO LIQUID DISCHARGE
SOIL POLLUTION RISK		SPECIAL LANDFILL
AIR POLLUTION RISK		LOW (SO ₂ <100 ppm)
FUEL CONSUMPTION		30% LOWER



The Institutional Recognitions

the CX System today is recognized as the Best Available Technique (BAT)

United States, Canada, Germany, Italy, France, Austria, UK, Spain, Belgium, Bulgaria, Romania, China, Estonia, Serbia, Emirates, Switzerland, Slovakia, Poland, Brazil, Tunisia, Saudi Arabia, Dubai, South Korea, Cuba, Russia, Ukraine, Australia.



IPPC :

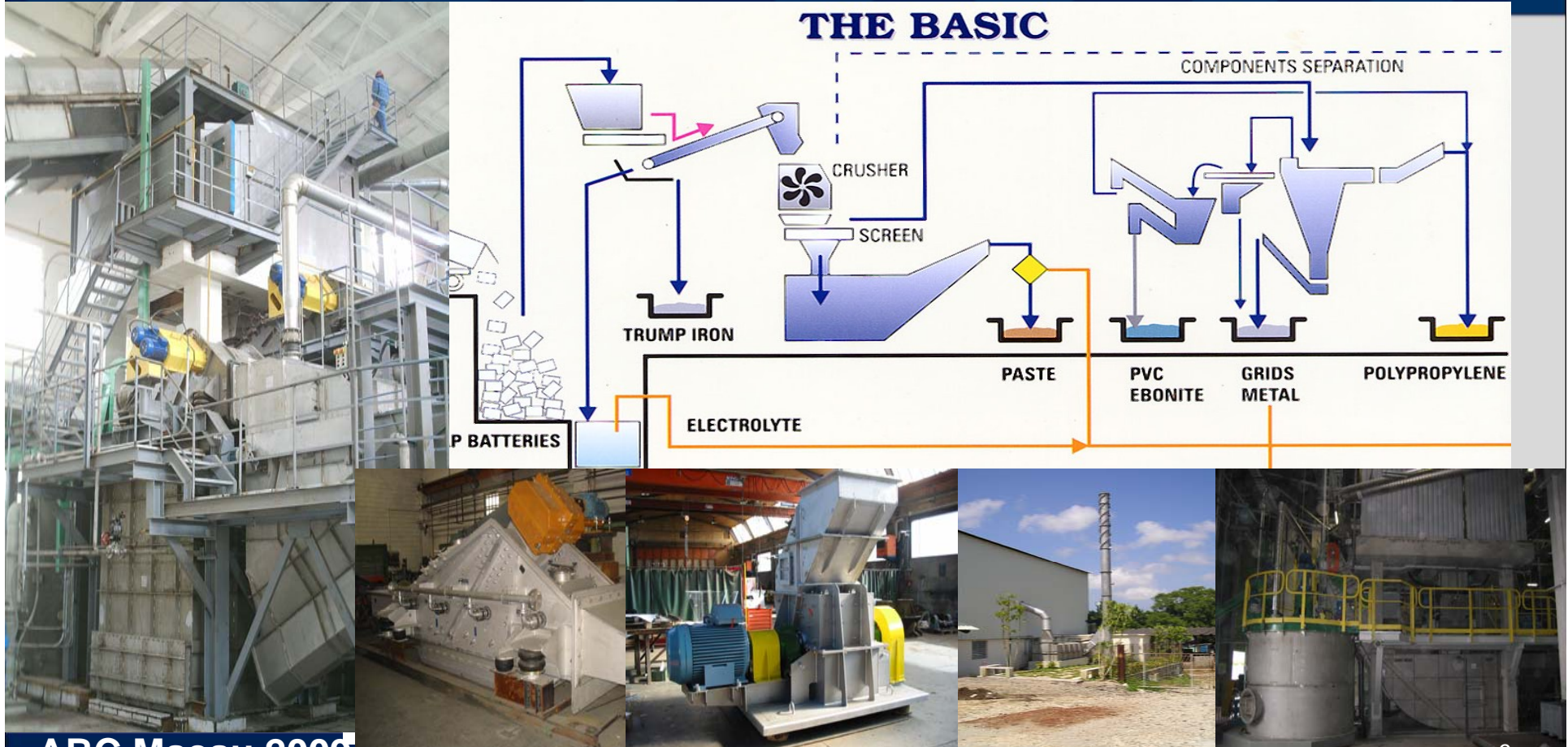
Reference document on
B.A.T. for non-ferrous
metals industries

Basel Convention
“Technical Guidelines for
the Environmentally sound
Management of Waste
Lead-acid Batteries”



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CX[®] - The breaker



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CX[®] - The breaker

- BATTERIES CRUSHING
- HYDRODYNAMIC SEPARATION
- PASTE SQUEEZING
- ELECTROLYTE COLLECTION AND FILTRATION



Polypropylene



Heavy Plastics



Grids and Posts



Paste

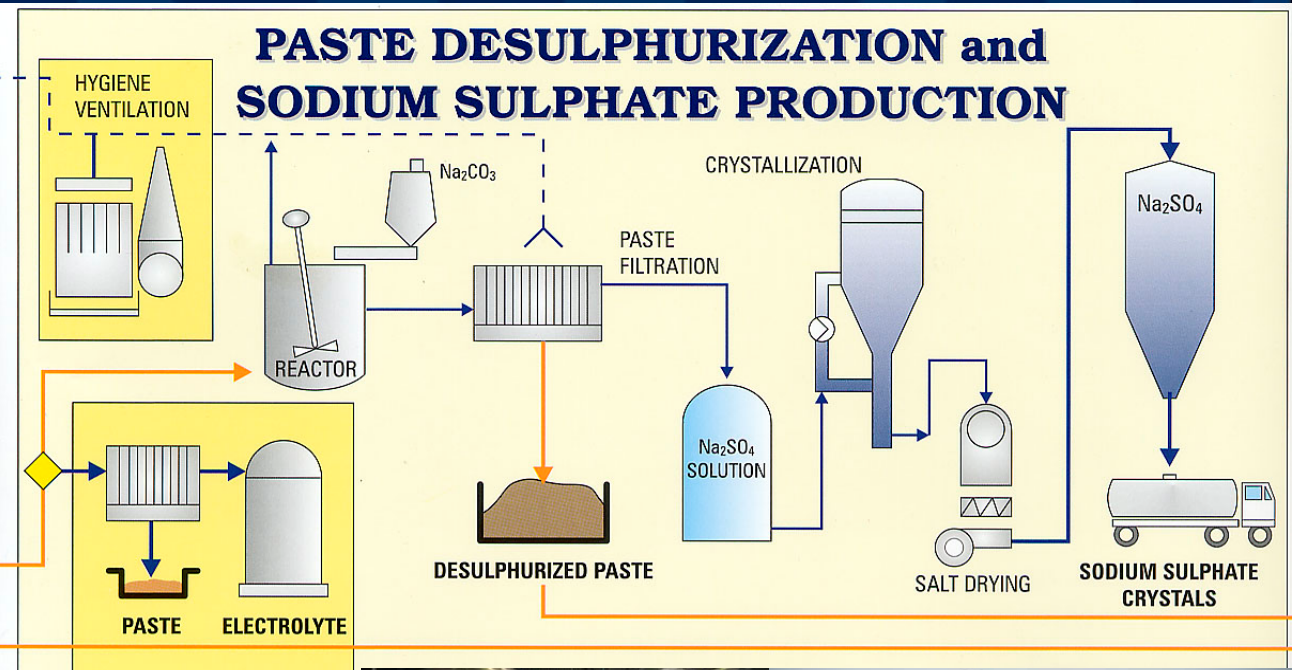


Clean Electrolyte



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CX[®] - The Paste Desulphurization



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15.02.2001 13:17



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CX[®] - The Paste Desulphurization

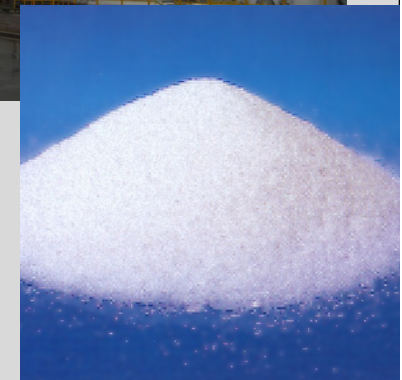
- PASTE REACTION AND FILTRATION
- ELECTROLYTE NEUTRALIZATION
- SULPHATE SOLUTION PURIFICATION (Patented)
- SULPHATE SOLUTION CRYSTALLIZATION
- SALT DRYING AND STORAGE



**Desulphurized paste
(Insoluble S < 0,4%)**



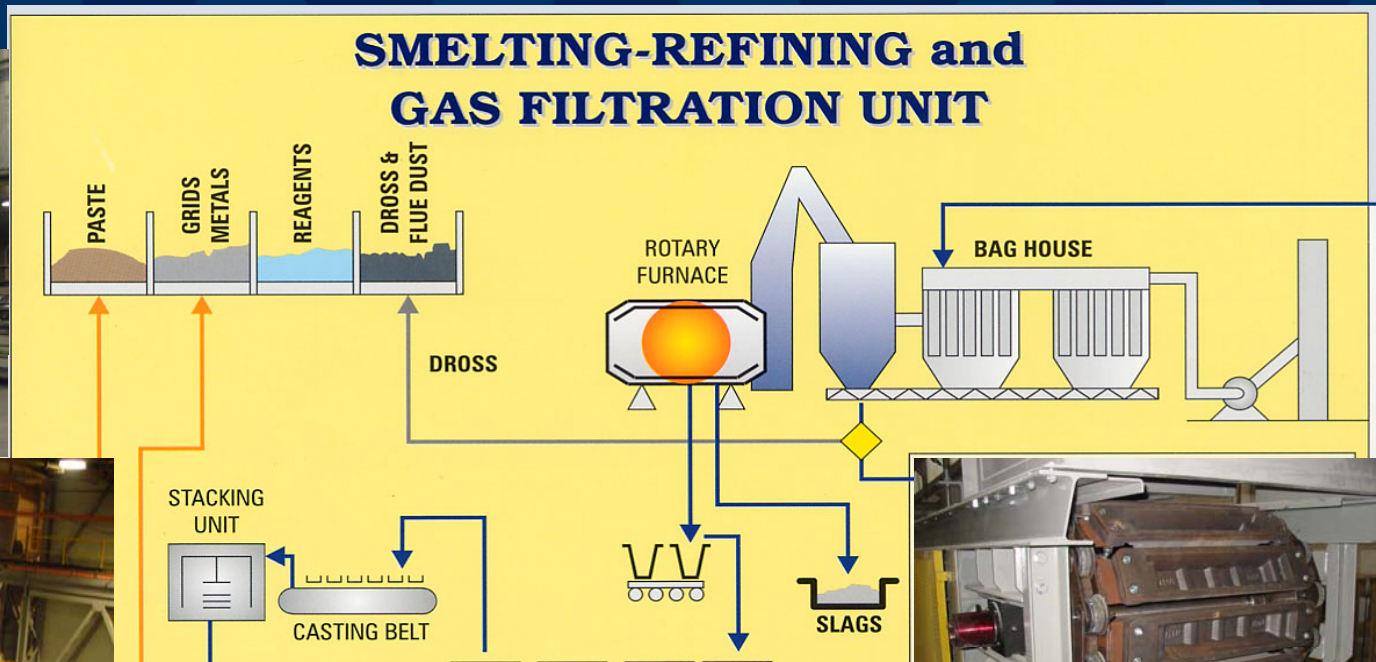
**Sulphate salt
(Purity > 99,7%)**





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CX[®] - The Smelting and Refining

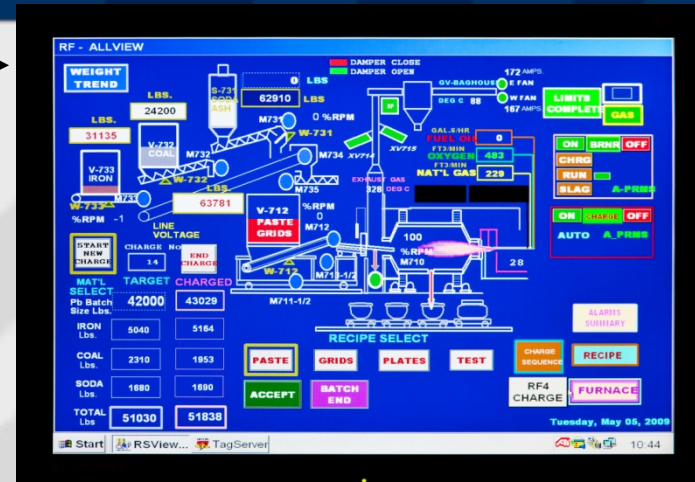


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CX - The Smelting and Refining

- AUTOMATIC PREPARATION OF FEEDING RECIPE
- SMELTING IN ROTARY OR REVERBERATORY FURNACE
- METAL REFINING IN KETTLE
- INGOTS CASTING – STACKING - STRAPPING



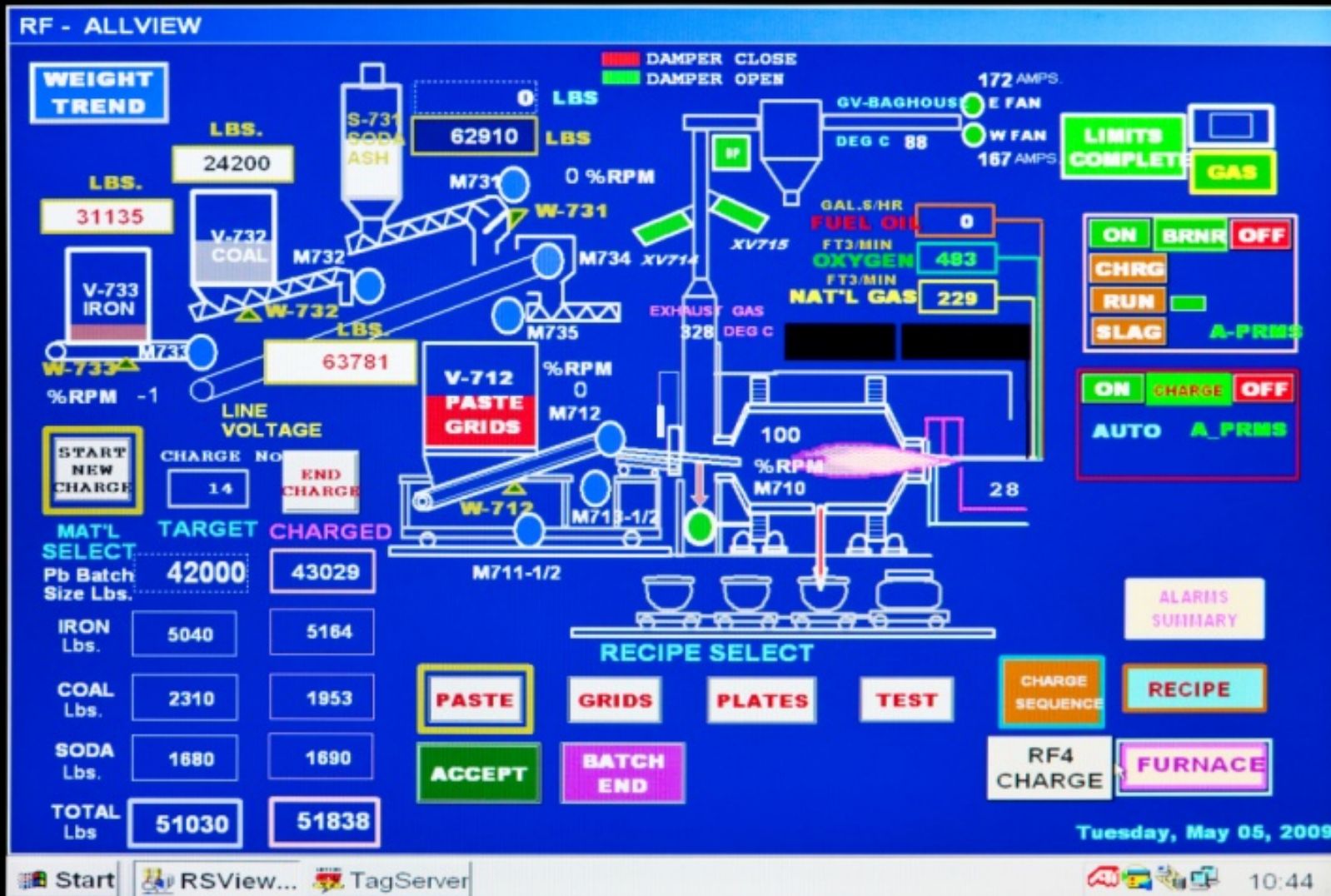
Slag
(Pb content 4% - 6%)



Furnace metal
(Raw Pb)



Lead ingots
Soft Pb 99,985%
All Pb Alloys

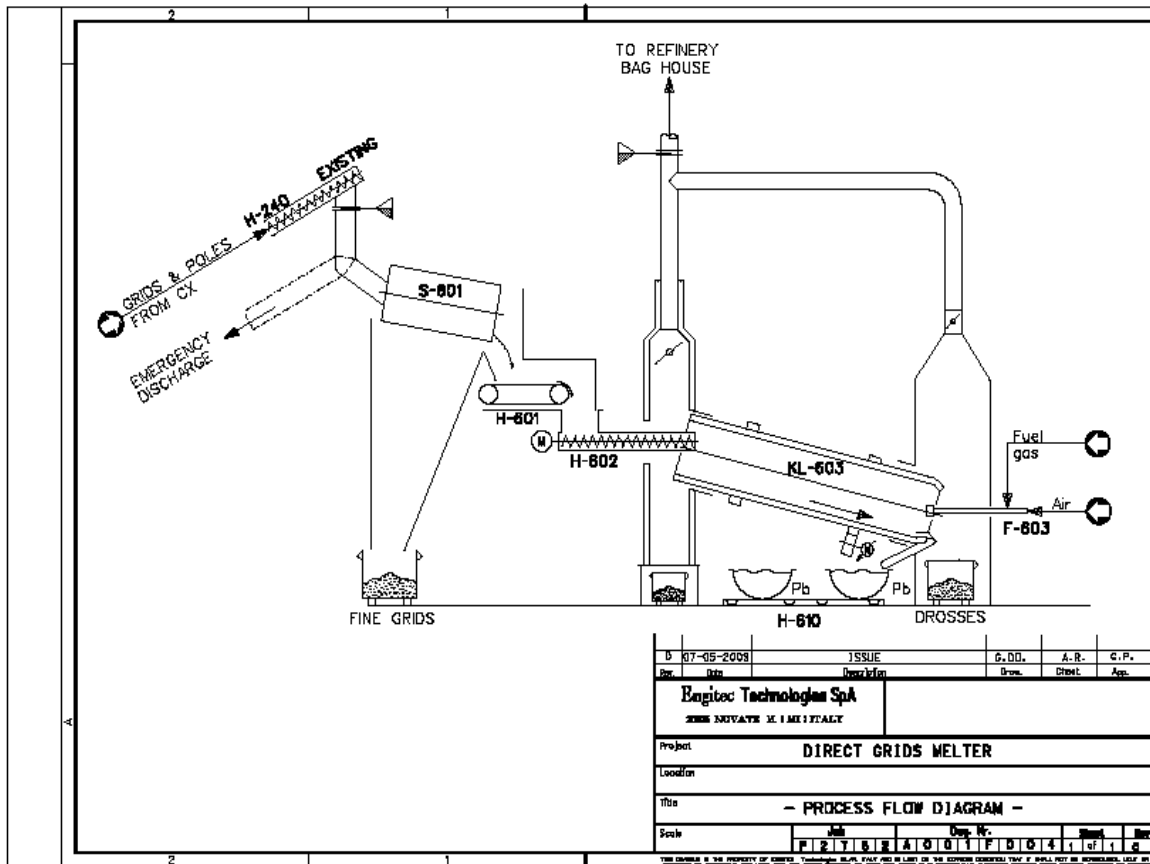


(Pb

\$
5%
S



CX[®] - The Direct Grids Melting



BREAKER PLANT

BATTERIES 20 tph x 16h = 320 t/d
 GRIDS CONTENT ($\approx 25\%$) = 80 t/d

INPUT:

GRIDS > 6mm ($\approx 60\%$) = 50 t/d

OUTPUT:

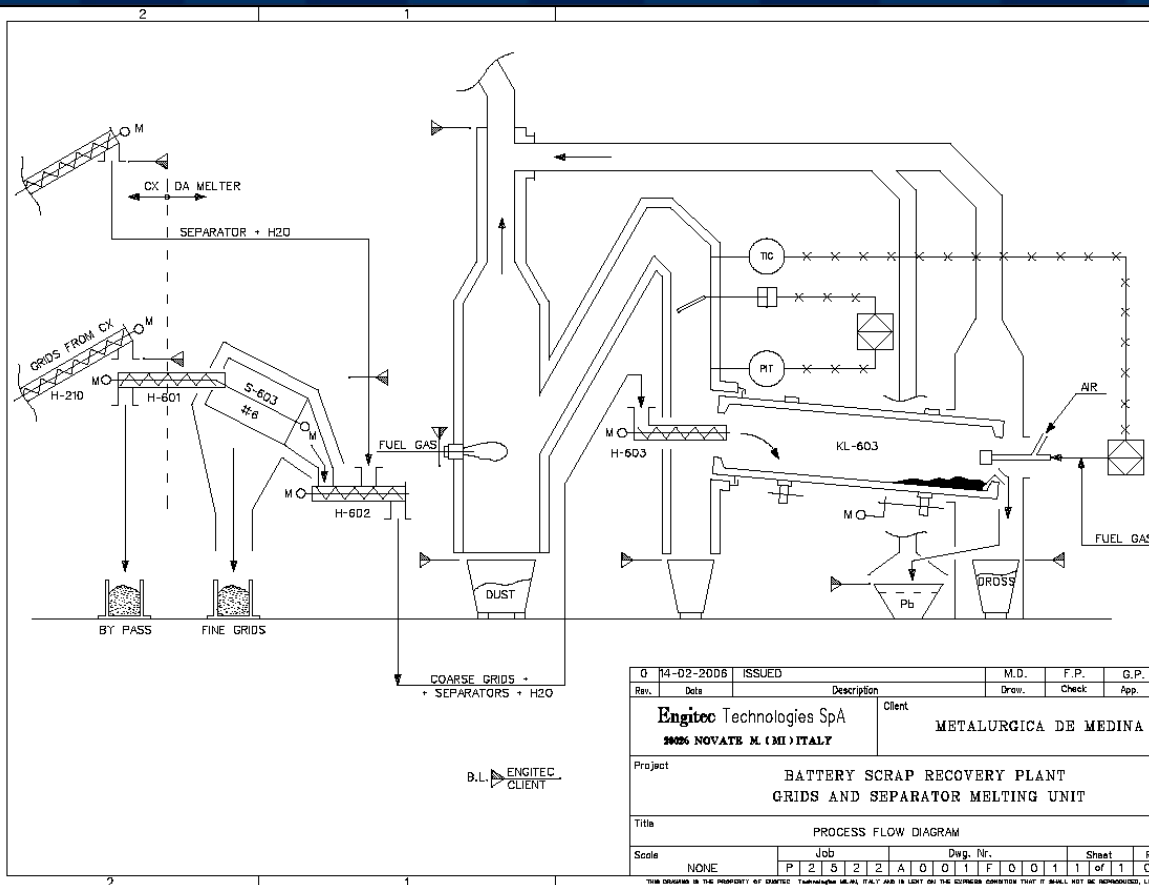
RAW LEAD ($\approx 90\%$) = 45 t/d
 DROSS (to be recycled) = 5 t/d

FUMES TO FILTRATION:

10.000 Nm³/h at 200 °C



CX[®] - Grids and Separators Melting



BREAKER PLANT

BATTERIES 20 tph x 16h = 320 t/d
 GRIDS CONTENT (≈ 25%) = 80 t/d

INPUT

GRIDS > 6mm (≈ 60%) = 50 t/d
 SEPARATORS (≈ 5%) = 16 t/d

OUTPUT

RAW LEAD = 45 t/d
 DROSS (to be recycled) = 15 t/d









FUMES TO FILTRATION:

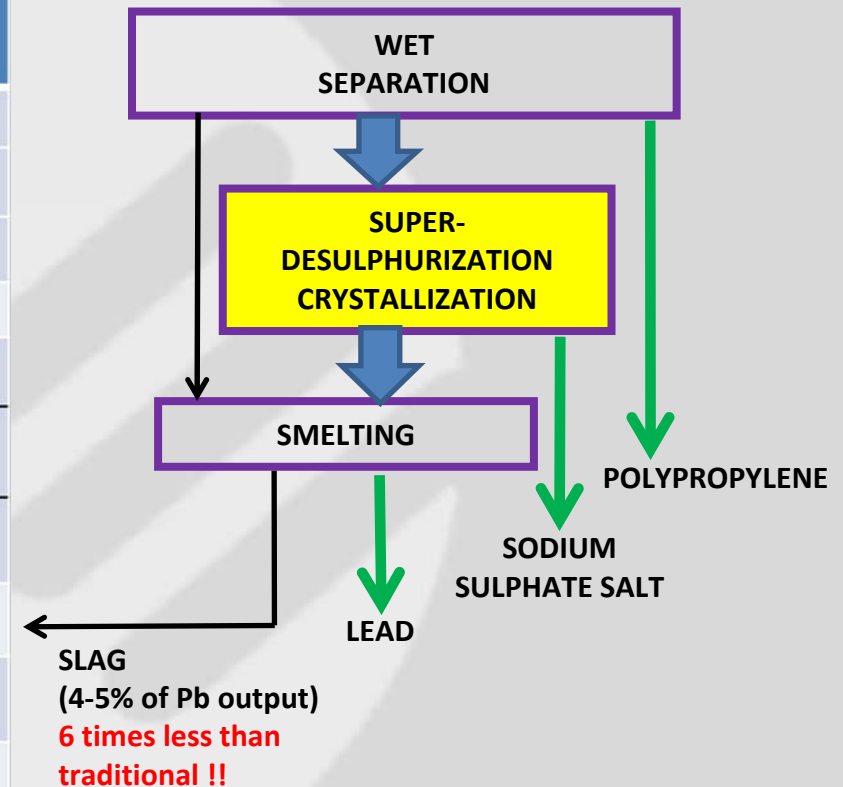
30.000 Nm³/h at 300 °C

0	14-02-2006	ISSUED		M.D.	F.P.	G.P.
Rev.	Date	Description		Draw.	Check	App.
Engitec Technologies SpA 20026 NOVATE M. (MI) ITALY			Client	METALURGICA DE MEDINA		
Project BATTERY SCRAP RECOVERY PLANT GRIDS AND SEPARATOR MELTING UNIT						
Title PROCESS FLOW DIAGRAM						
Scale NONE						
Job		Dwg. Nr.		Sheet		Rev.
P 2 5 2 2		A 0 0 1 1		F 0 0 1 1		1 of 1

The recycling techniques

Tomorrow Pilot trials + Industrial test completed

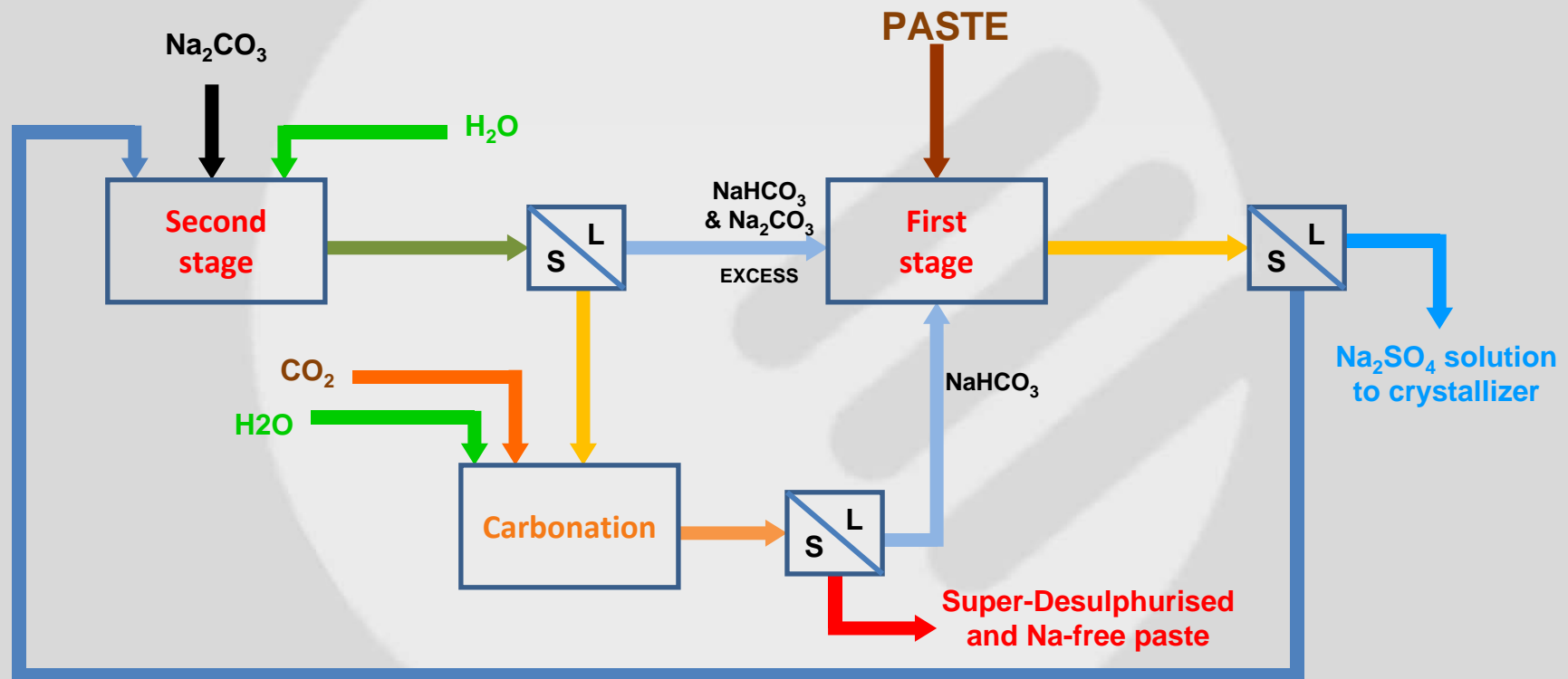
HYDROSEPARATION SUPER-DESULPHURIZATION - CRYSTALLIZATION SMELTING		
POLYPROPYLENE CASE		PRODUCT: PP
SEPARATORS		RECYCLED TO ENERGY
ELECTROLYTE		PRODUCT: SALT
GRIDS (LEAD ALLOYS)		PRODUCT: LEAD
ACTIVE MASS (LEAD PASTE)		PRODUCT: LEAD
WORKERS HEALTH		Personnel Protection (mainly at Smelting)
WATER POLLUTION		FREE – NO LIQUID DISCHARGE
SOIL POLLUTION RISK		SPECIAL LANDFILL
AIR POLLUTION RISK		LOWEST LEVEL (SO ₂ <50 ppm)
FUEL CONSUMPTION		40% REDUCTION



The recycling techniques

Lead paste Super-Desulphurization

Pilot trials + Industrial test completed



The recycling techniques

Ammonium Sulphate salt production

Pilot trials in progress

Lead Sulphate converted
to **Lead Carbonate**







Ammonium Salts converted
to **Ammonium Sulphate**

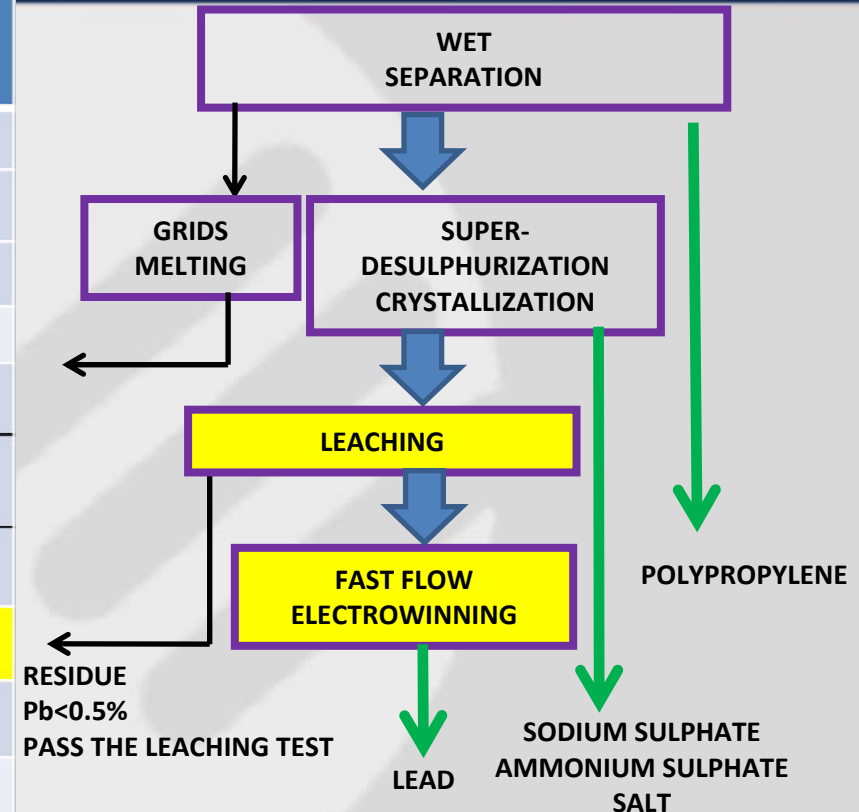


The recycling techniques

After Tomorrow

Pilot trials in progress

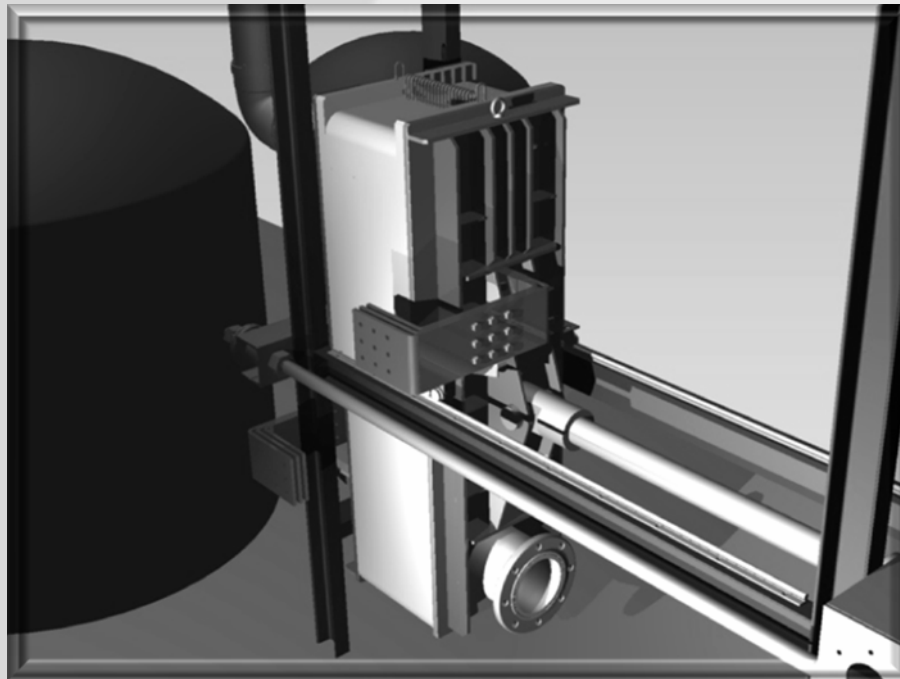
HYDROSEPARATION SUPERDESULPHURIZATION - CRYSTALLIZATION LEACHING - ELECTROWINNING	
POLYPROPYLENE CASE	 PRODUCT - PP
SEPARATORS	 TO ENERGY
ELECTROLYTE (H ₂ SO ₄)	 PRODUCT - SALT
GRIDS (LEAD ALLOYS)	 PRODUCT - LEAD
ACTIVE MASS (LEAD PASTE)	 PRODUCT - LEAD
WORKERS HEALTH	 Personal Protection NOT required
WATER POLLUTION	FREE – NO DISCHARGE
SOIL POLLUTION RISK	NONE - TO RECYCLING
AIR POLLUTION RISK	FREE – NO DISCHARGE
FUEL CONSUMPTION	NEGLIGEABLE



The recycling techniques

After Tomorrow PILOT TRIALS IN PROGRESS

THE FAST ELECTROWINNING FOR A REALIZABLE DREAM: FROM PASTE TO METALLIC LEAD WITHOUT SMELTING



1. Avoids the formation of slag
2. Avoids SO₂ emissions
3. Avoids the presence of dust in the workplace
4. Cuts the cost and the need of additives
5. The Pb quality is easily > 99.99%
6. The production cost is lower than the traditional way
7. Low energy consumption : 2 kWh/kg Pb



Engitec Technologies S.p.A.

Engitec: Proprietary Design and Original Equipment Manufacturing





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THANK YOU - ARRIVEDERCI !

Engitec Technologies S.p.A.

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