

Aluminum Electrolytic Capacitor 电解电容器

代理商：广州荣肯电子科技有限公司

Hitachi AIC Company Profile

日立AIC公司简介

Factory 工厂

Sales Office 营业部

Cap. 3Main Works
P.Board 3Main Works

Boston AIC

HPC-Distribution

Hong Kong AIC

Singapore AIC

- **Annual Net Sales 年净销额** **400Million US\$(50Billion JPY)**
- **Employees 雇员** **1097 (about 2000)**

Products and Sale 产品和销售

Capacitor 电容器 45%

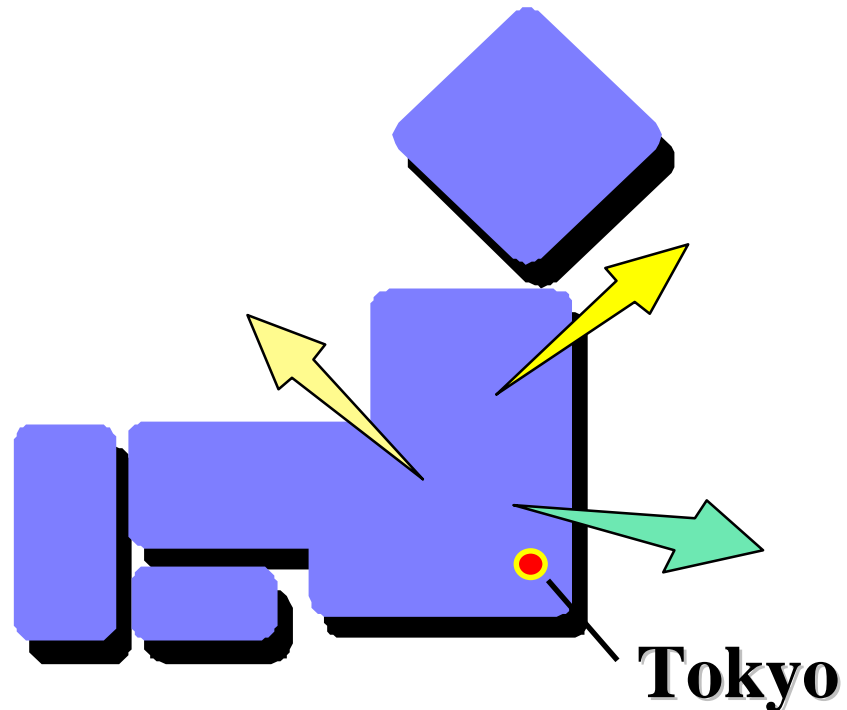
Printed Circuit Board 印刷电路板 50%

Other 其它 5%

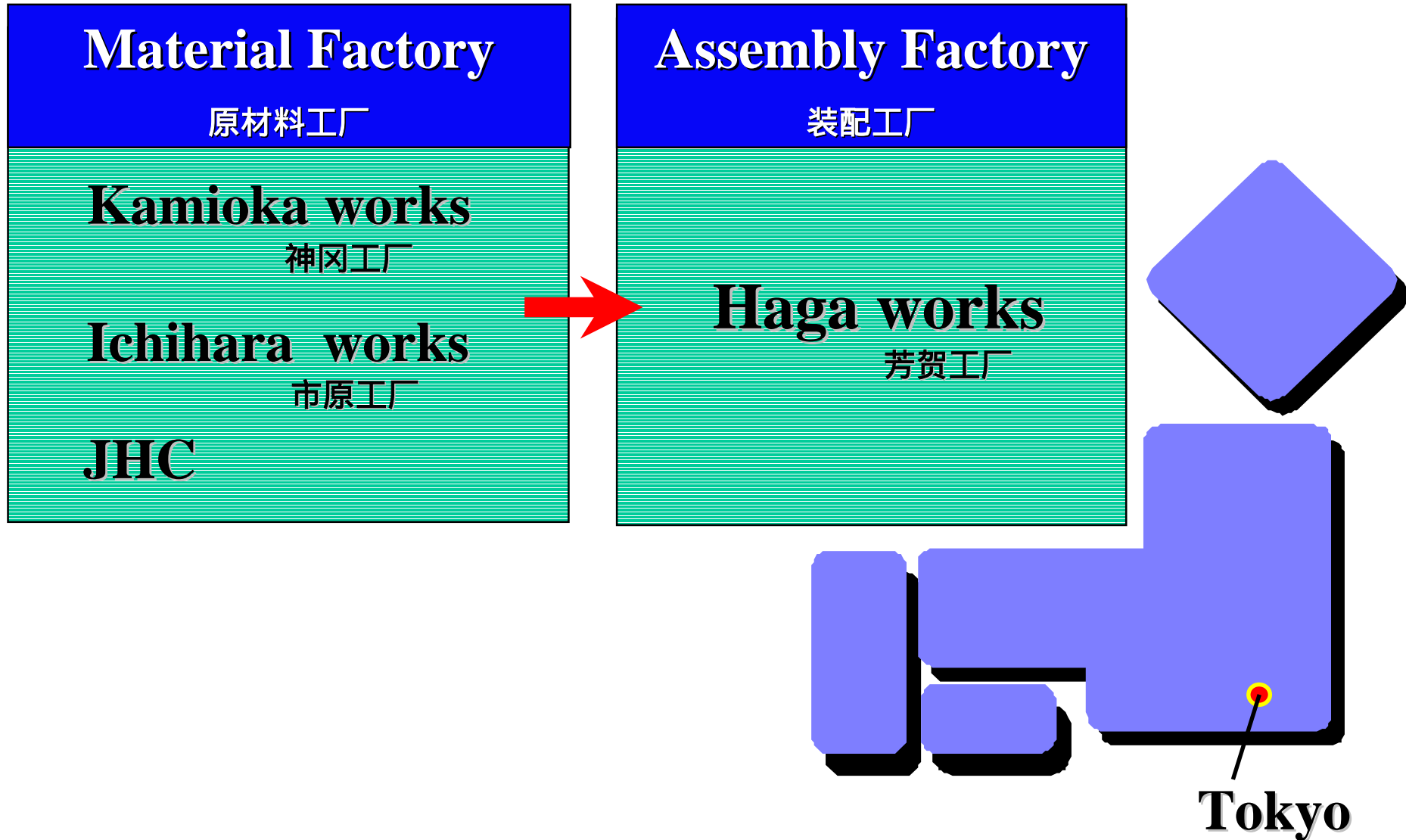
Products and Sale 产品和销售 (Capacitor 电容器)

Aluminum 铝电解电容(Haga works)	28 Million US\$	39%
Tantalum 钽电容	35	49
Film 薄膜电容	9	12
Total	72	100

(January-June, 2001)



Production Organization 生产机构



Hitachi AIC Inc.

Haga Works 日立AIC芳贺工厂

ISO9000 **ISO14000**
JUL. 1996 **MAY.1998**

ISO—国際品質保証規格登録取得



Applications of Aluminum Electrolytic Capacitors

铝电解电容的应用



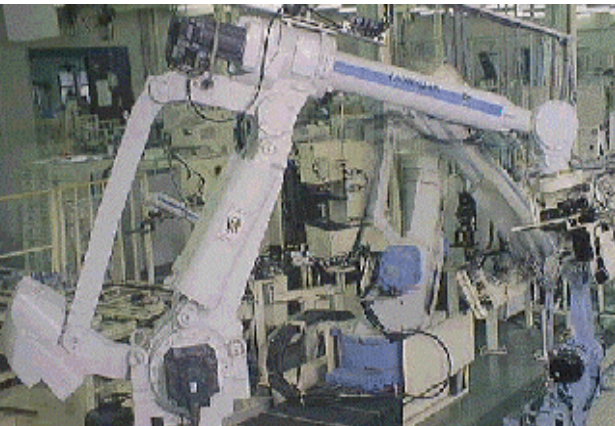
Photo Flash



S. P. S. for Personal Computer



Switching Power Supply



Robot



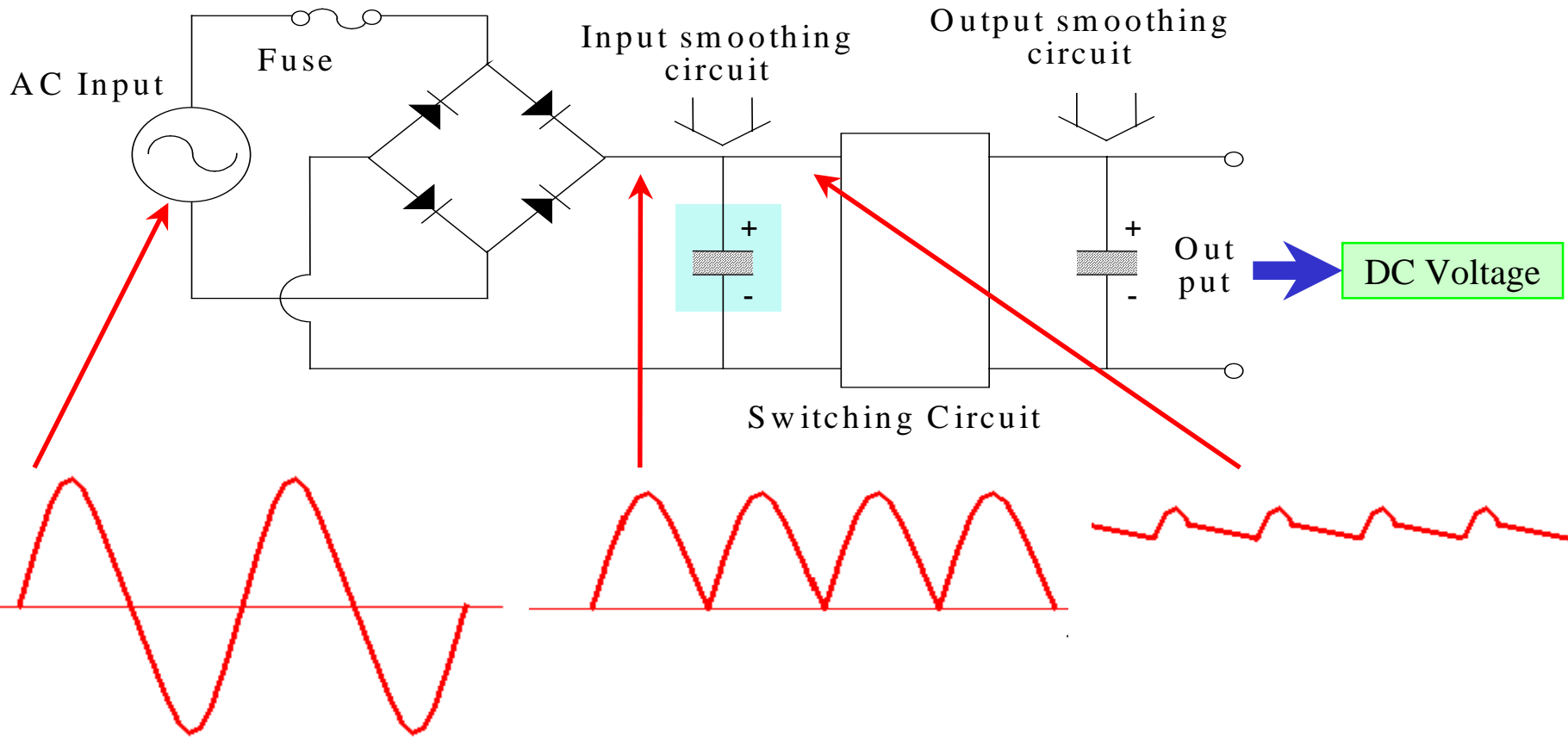
Inverters



Inverter for Train

Application Diagram 应用示图

[Functions at initial stage of SW power supply]



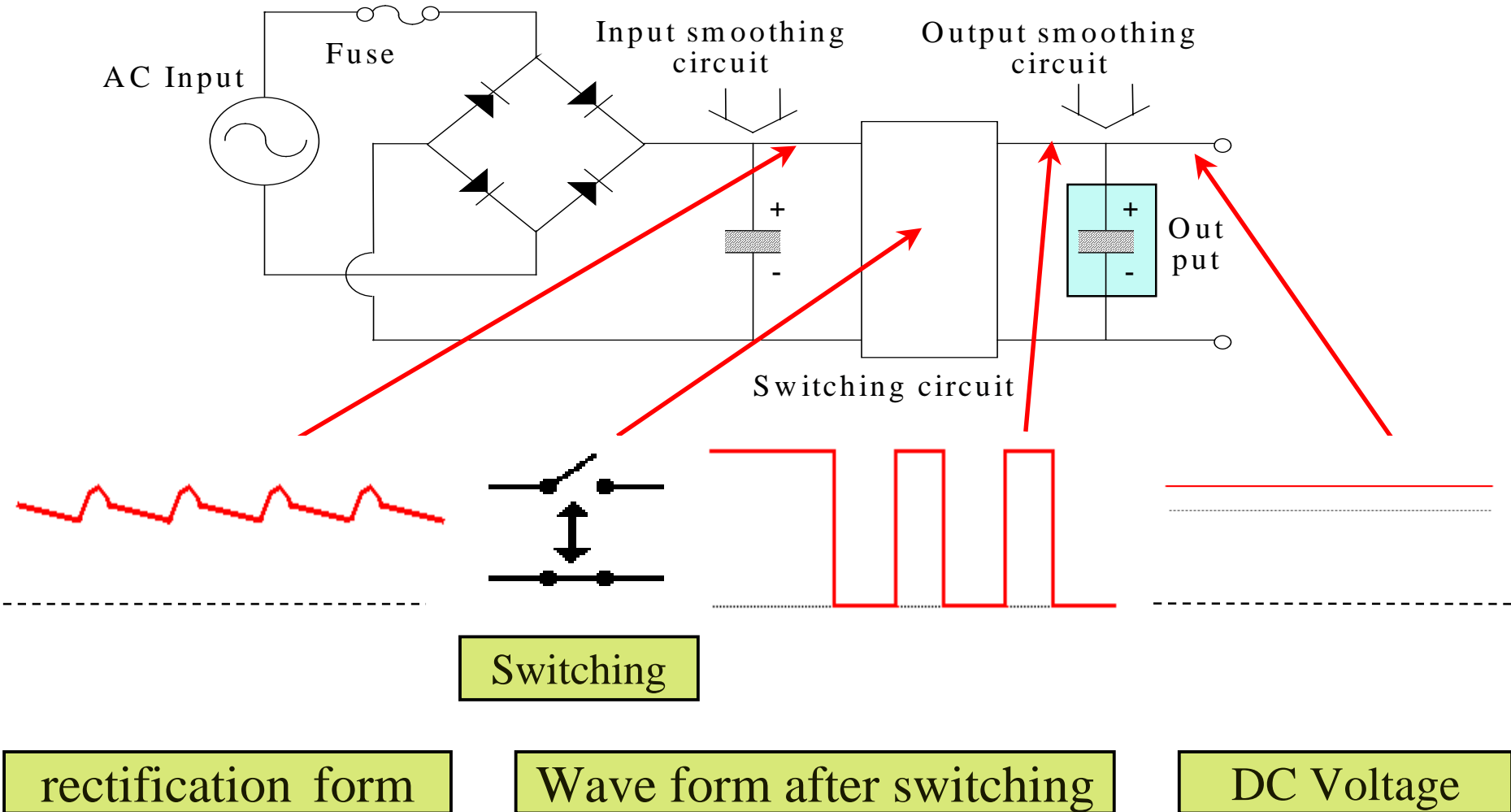
AC Voltage

Trancemission-wave
rectification form

rectification form

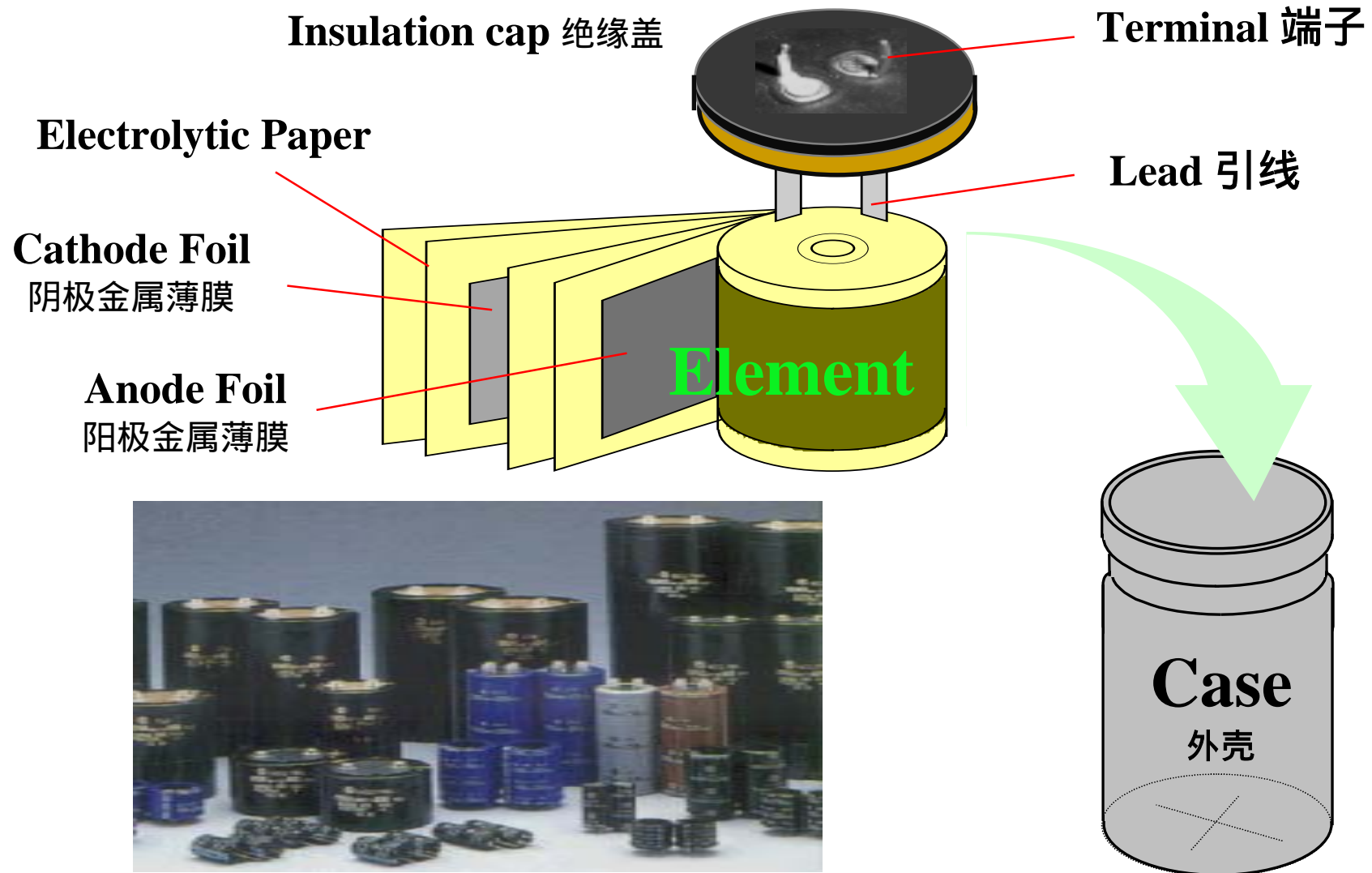
Application Diagram 应用示图

[Functions at second stage of SW power supply]

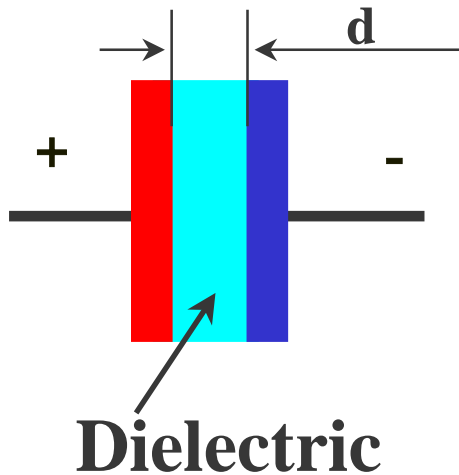


Construction of Aluminum Electrolytic Capacitors

铝电解电容的结构

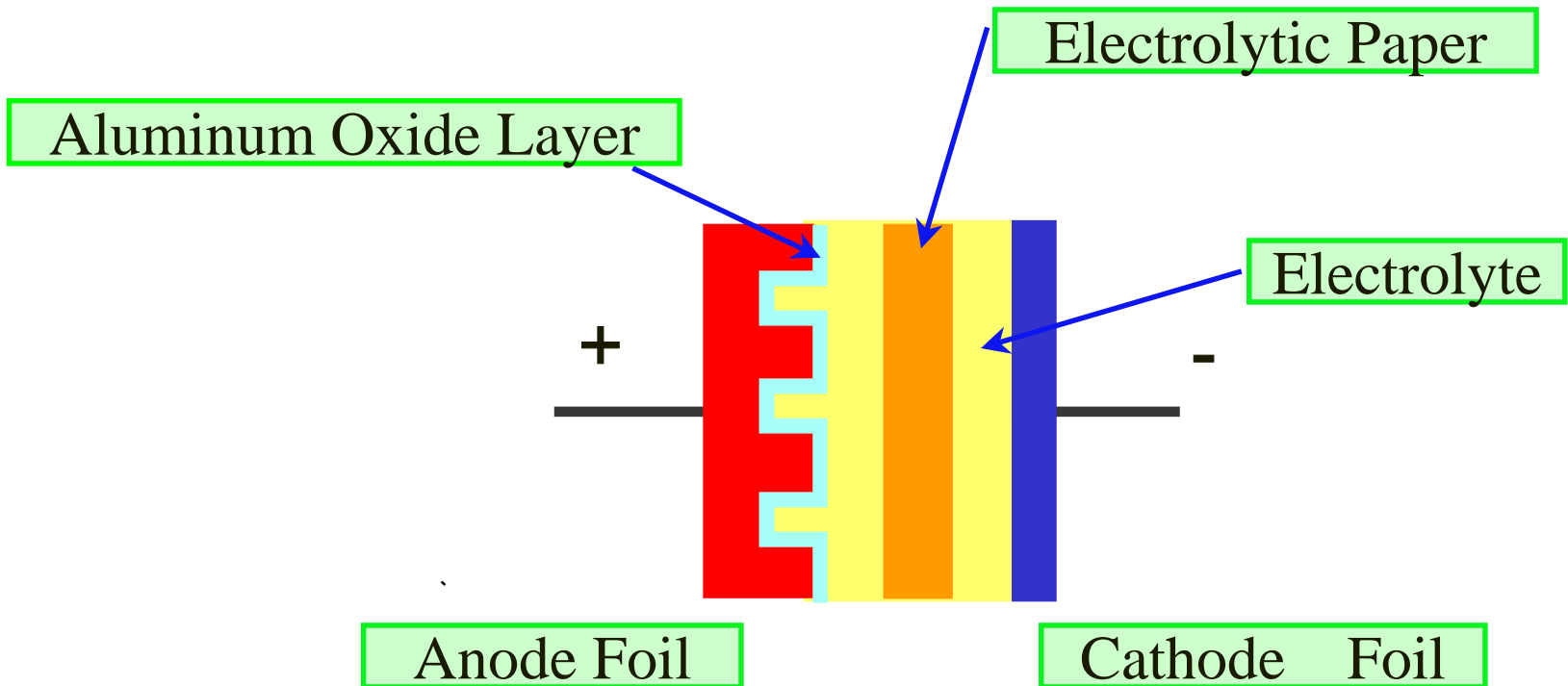


Basic Structure 基本结构



$$C = \epsilon_r \cdot \epsilon_0 \cdot S / d$$

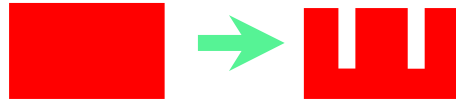
ϵ_r : Proportional dielectric constant
 ϵ_0 : Dielectric constant in a vacuum
 d : Distance between electrodes
 S : Electrode area



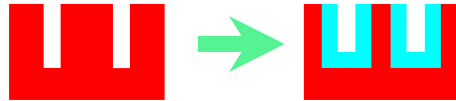
Manufacturing process 生产流程

Material Factory

1. Etching

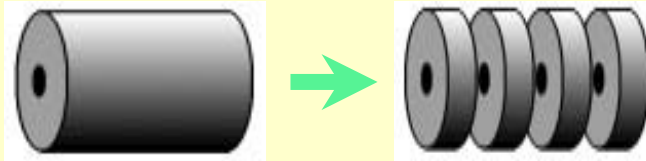


2. Anodization

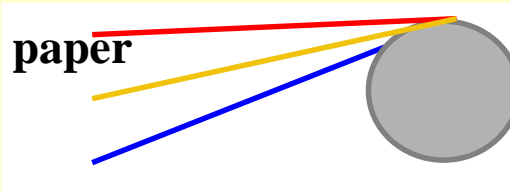


Haga Factory(assembly)

3. Slitting



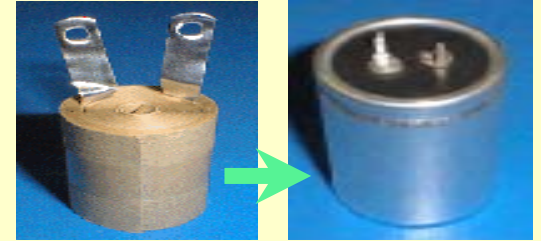
4. Winding



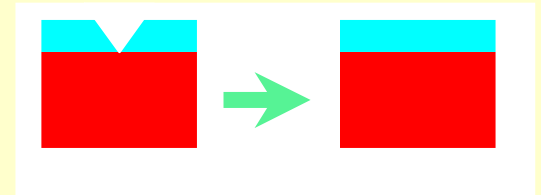
5. Impregnation



6. Assembling



7. Aging



8. Covering

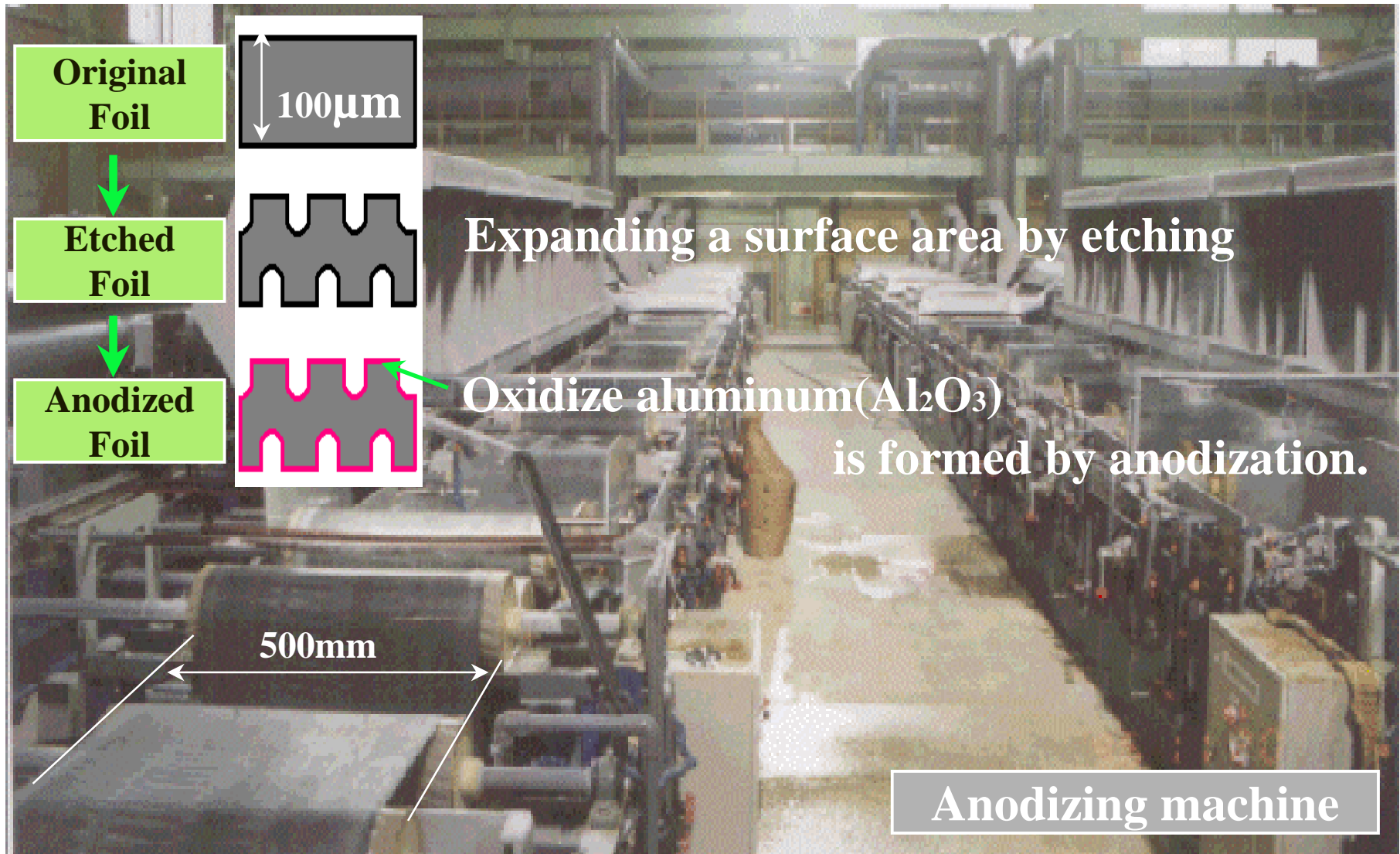


9. Piece by piece check

10. Final inspection

11. Packaging shipment

Production of Anode Foils 生产阳极箔



Etching 蚀刻

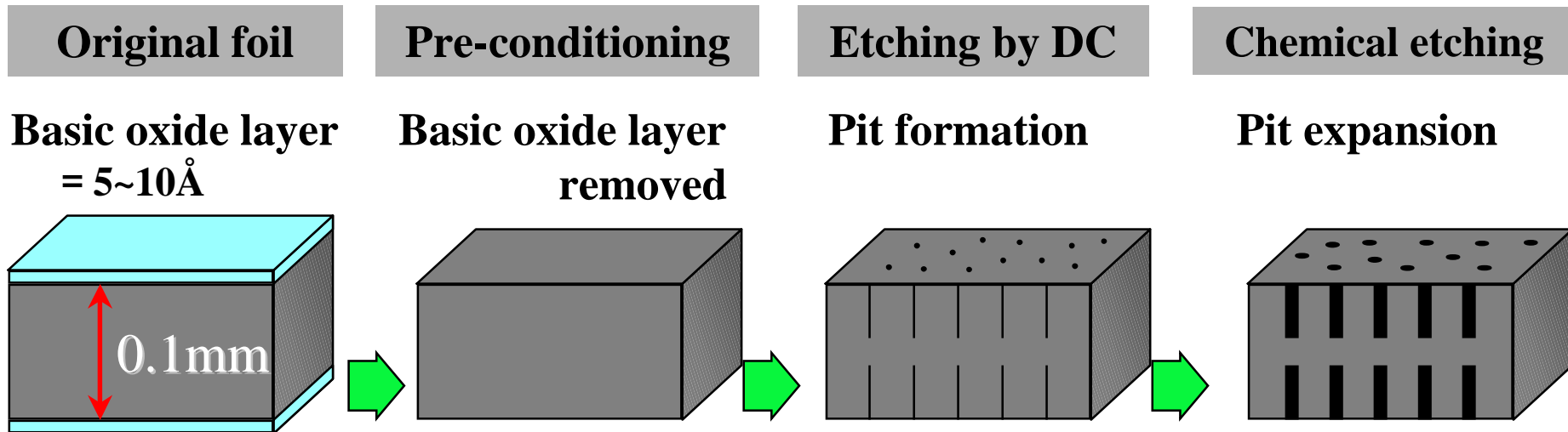
Process to expand a surface area of aluminum foil.

High purified aluminum foils

Taking away Basic oxide layer

Electrical treatment.

Treatment by aqueous chloride solutions Thus.



about 50 to 100 times surface area for low voltage type, about 10 to 40 times for high voltage type.

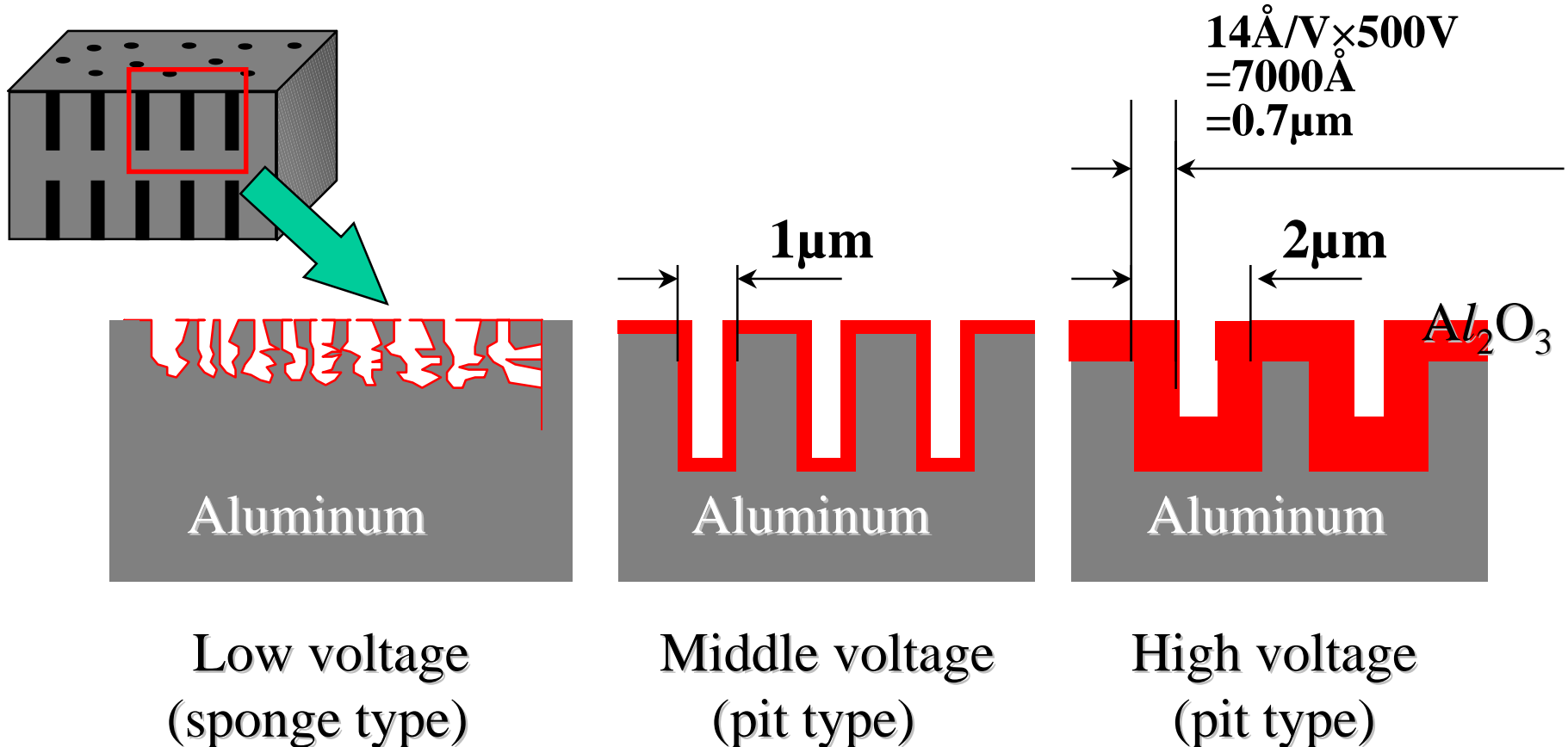
Anodization 阳极氧化

Process to form the dielectric formation(Al_2O_3) .

Etched foils are put into ammonium borate liquid.

Loading the voltage continuously

at around 100 to 200% rated voltage.



Picture of Anode foil by S.E.M.

Cross section

100 μm

$\times 400$

Surface

$\times 1000$

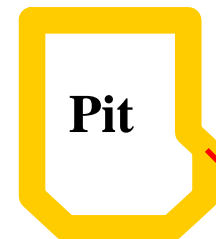
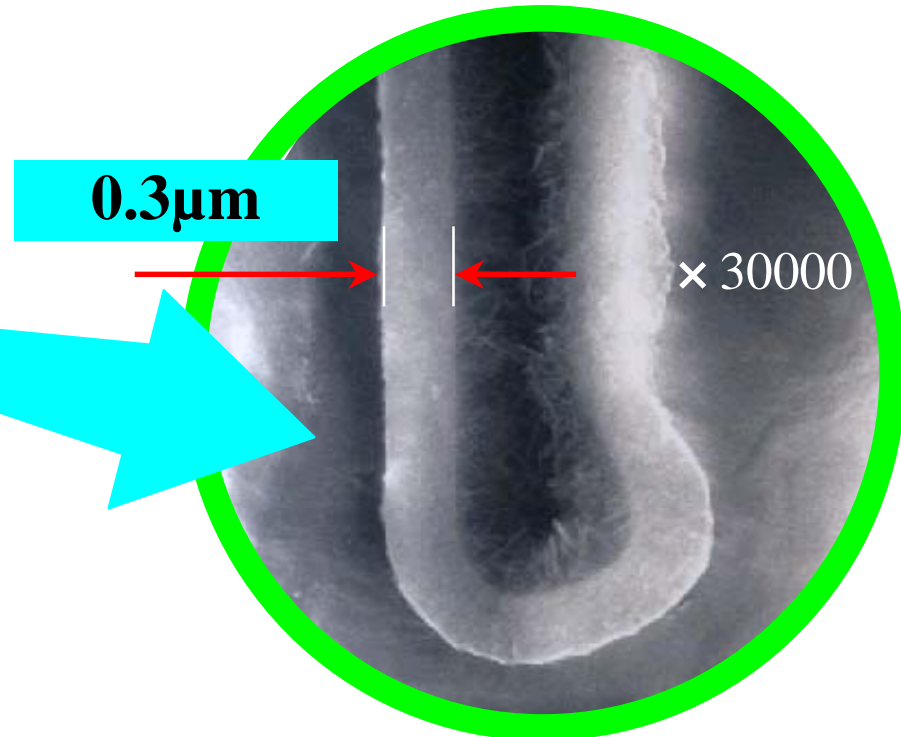
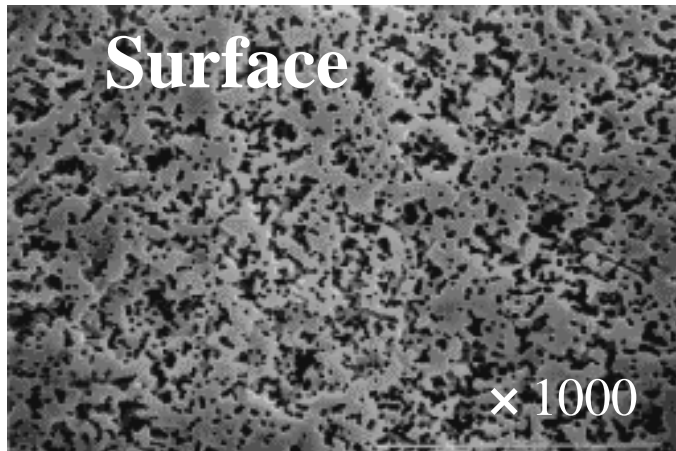
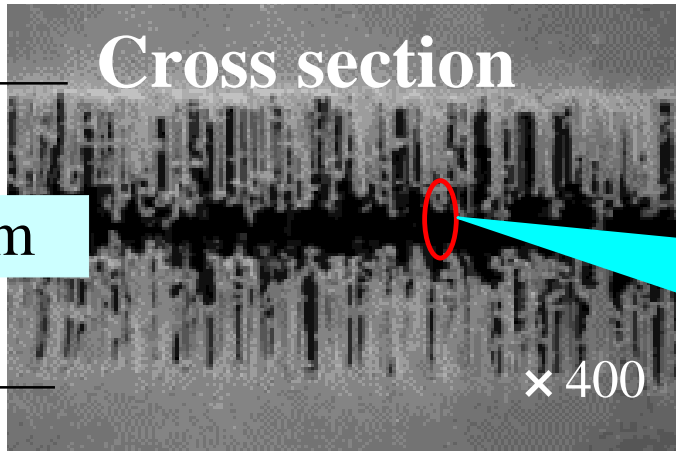
0.3 μm

$\times 30000$

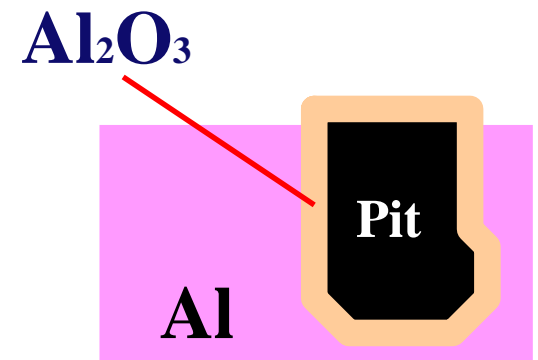
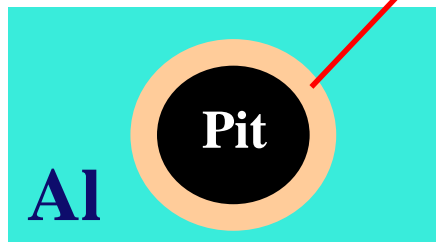
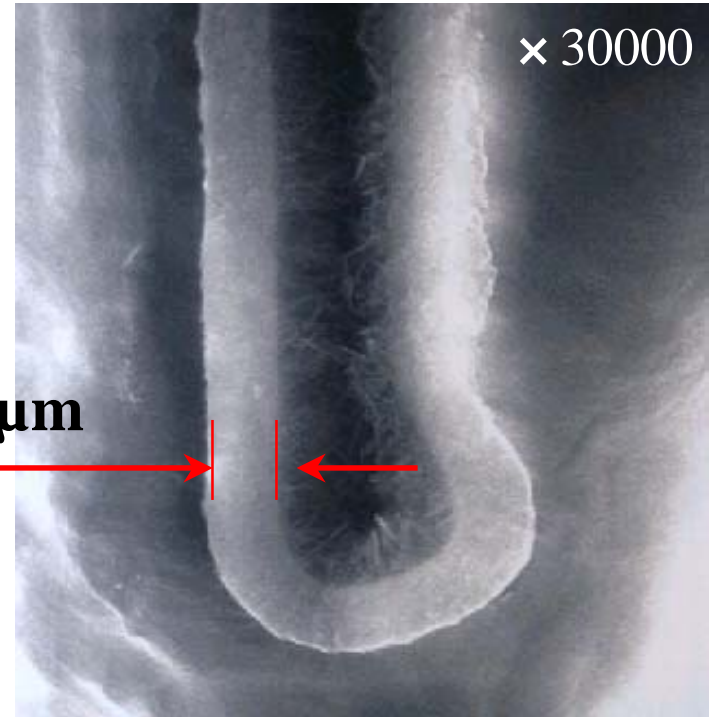
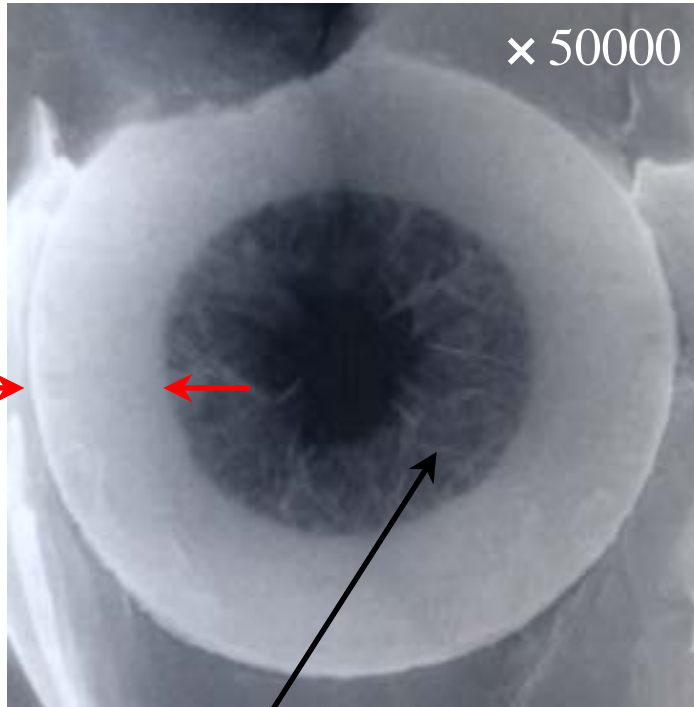
Pit

Al

Al_2O_3

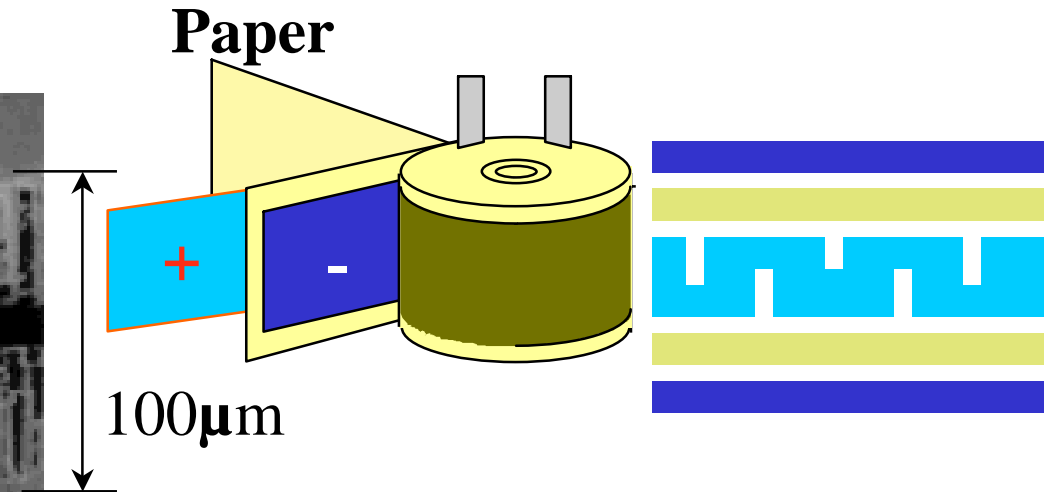
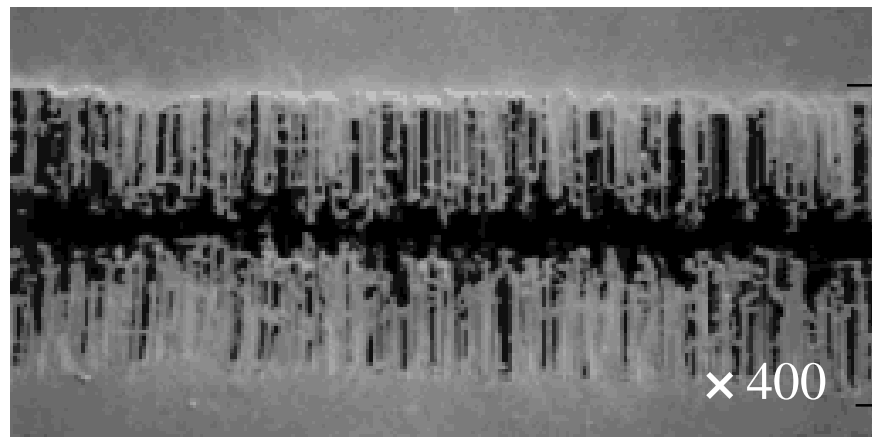


Picture of Anode oxide film by S.E.M.

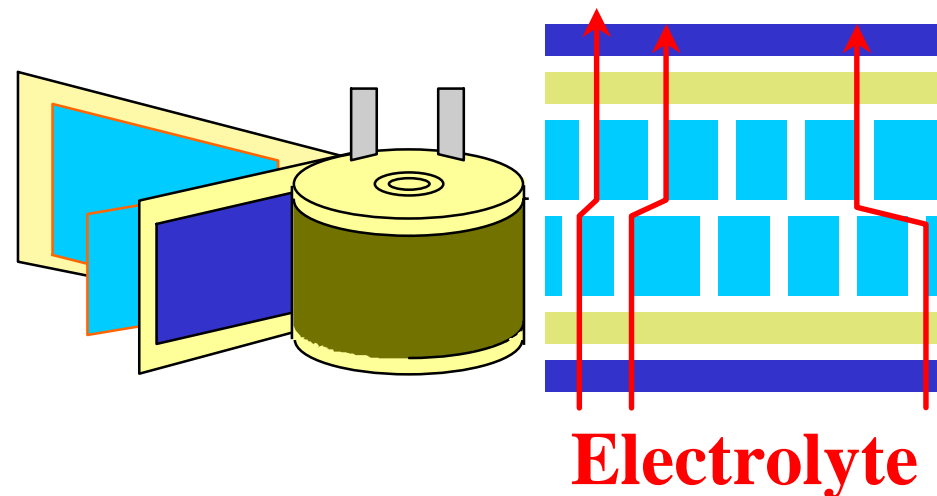
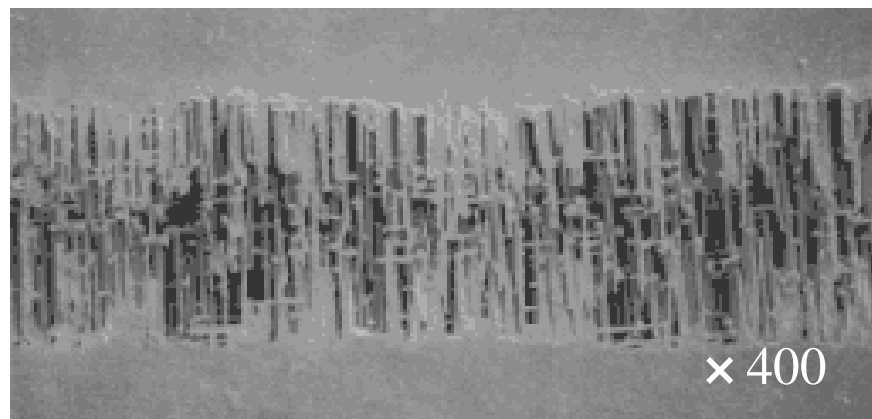


Picture of Anode foil by S.E.M.

for single anode



for double anode

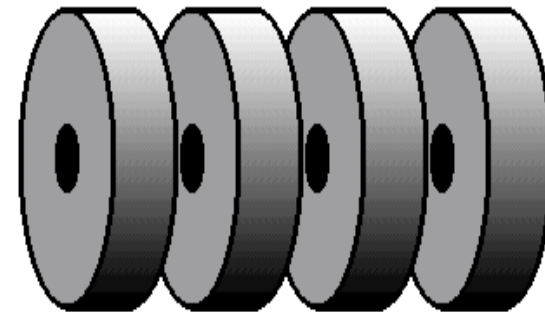
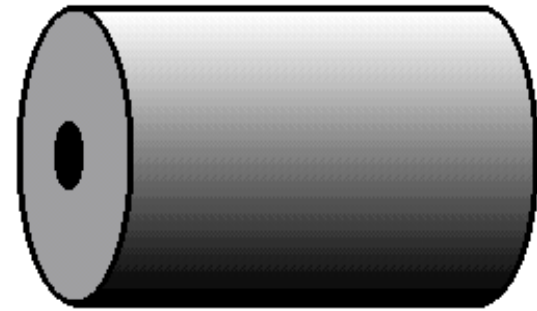


Slitting 分割

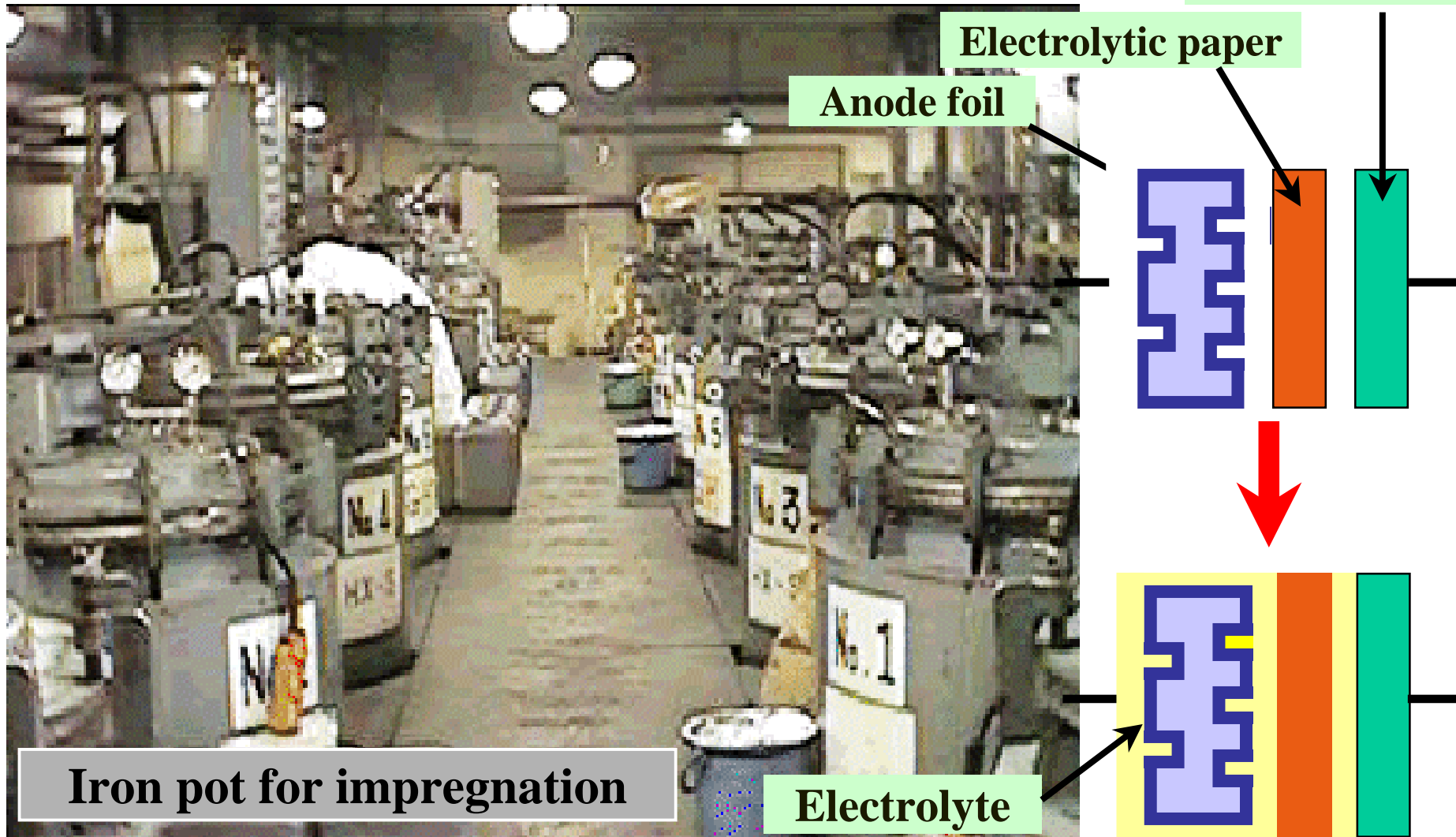
Aluminum foils and separator papers are cut ,
according to the capacitor element designs.



Slitting machine



Impregnation 注入



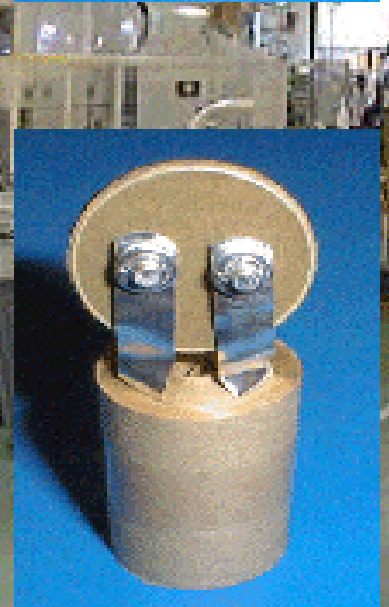
Process to soak the element with electrolyte.

Assembly (1) 装配

After making holes on lead
Insulation cap are connected to lead .

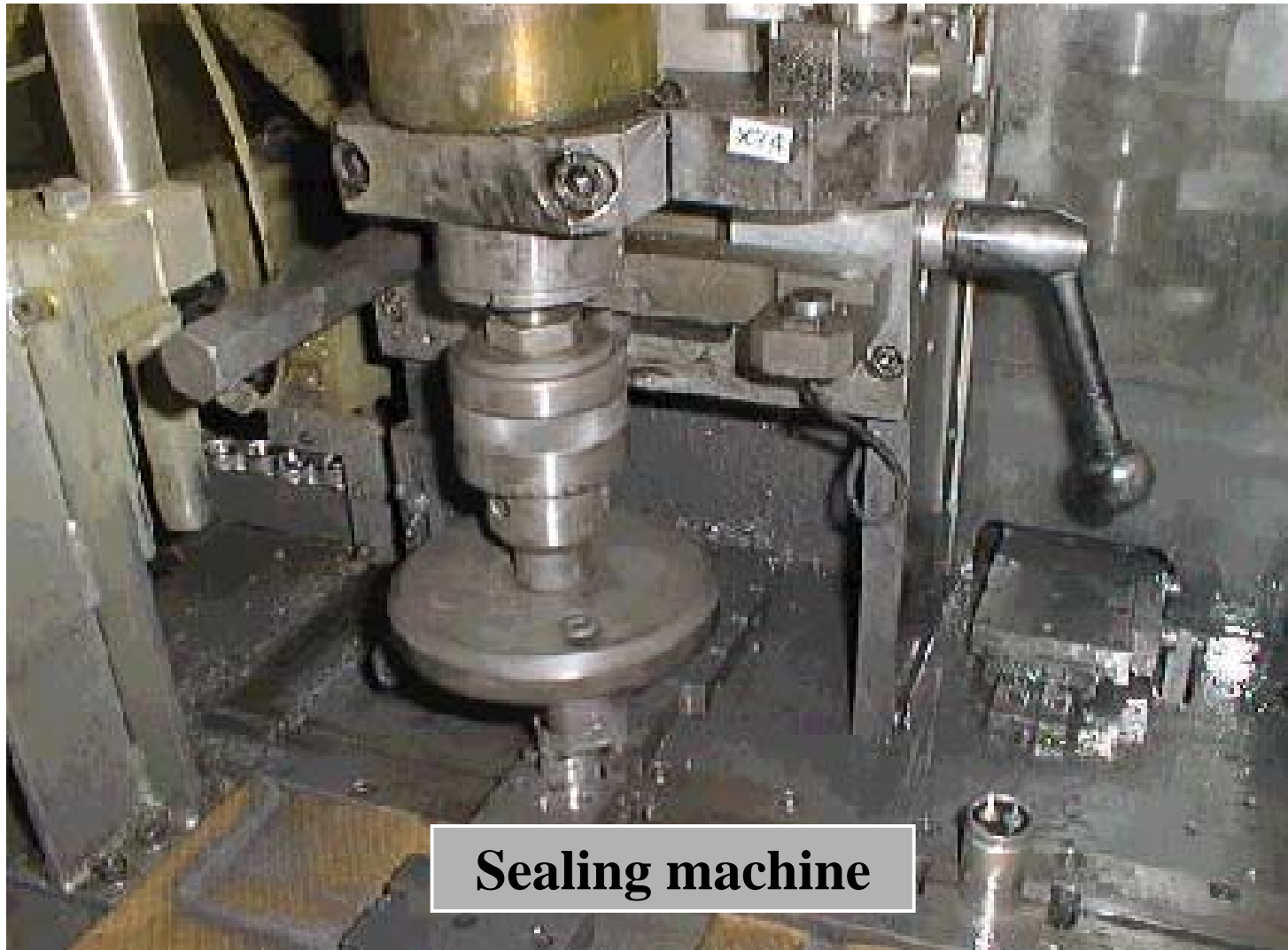


Assembly machine



Assembly(2)装配

The element is put into aluminum case.
The brim of case is curled to seal.



Sealing machine



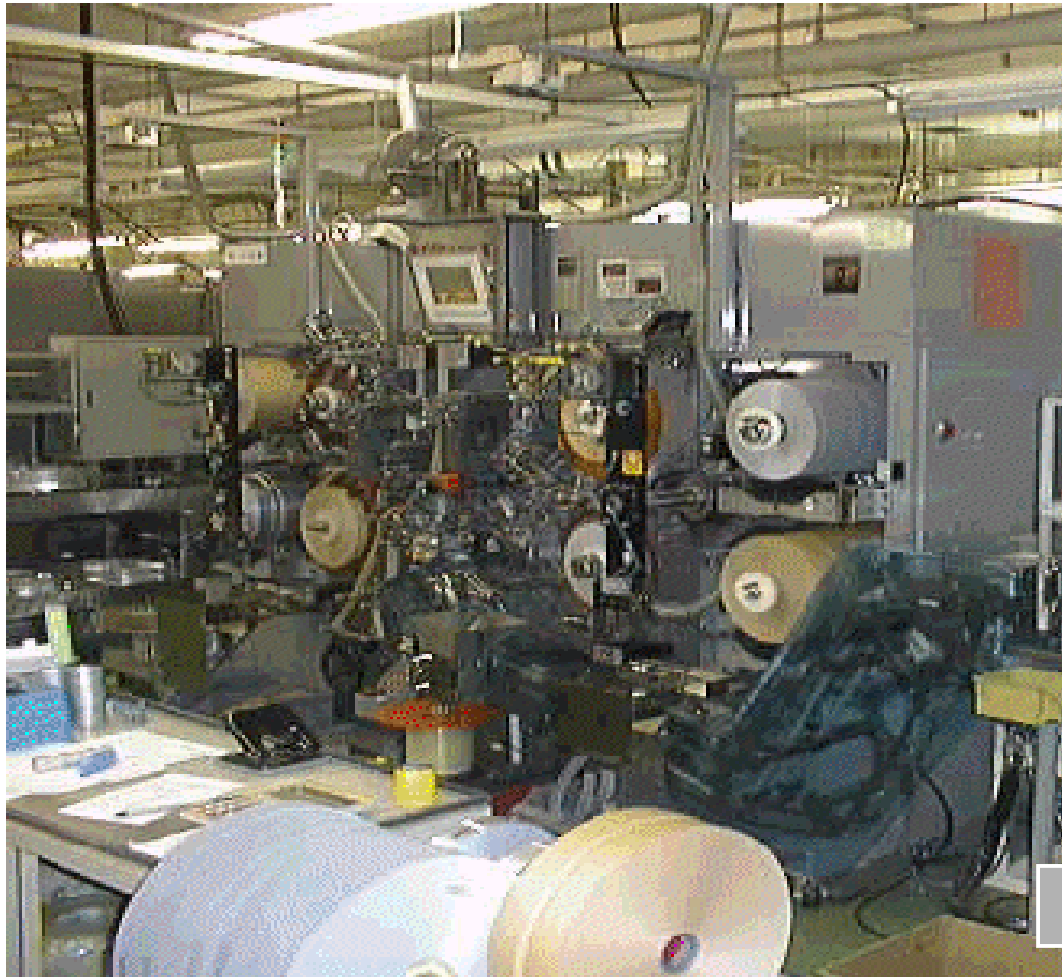
Aging 老化



Aging machine

**Process to repair the formation damaged
by cutting foil and winding foil.**

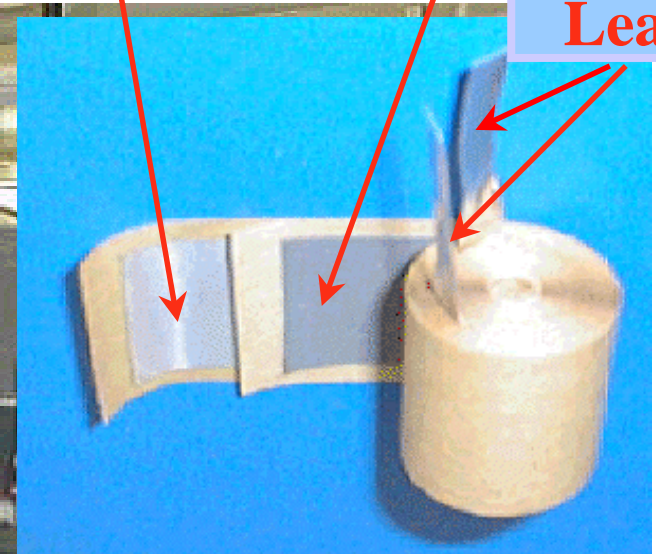
Winding 圈绕



Cathode foil

Anode foil

Lead

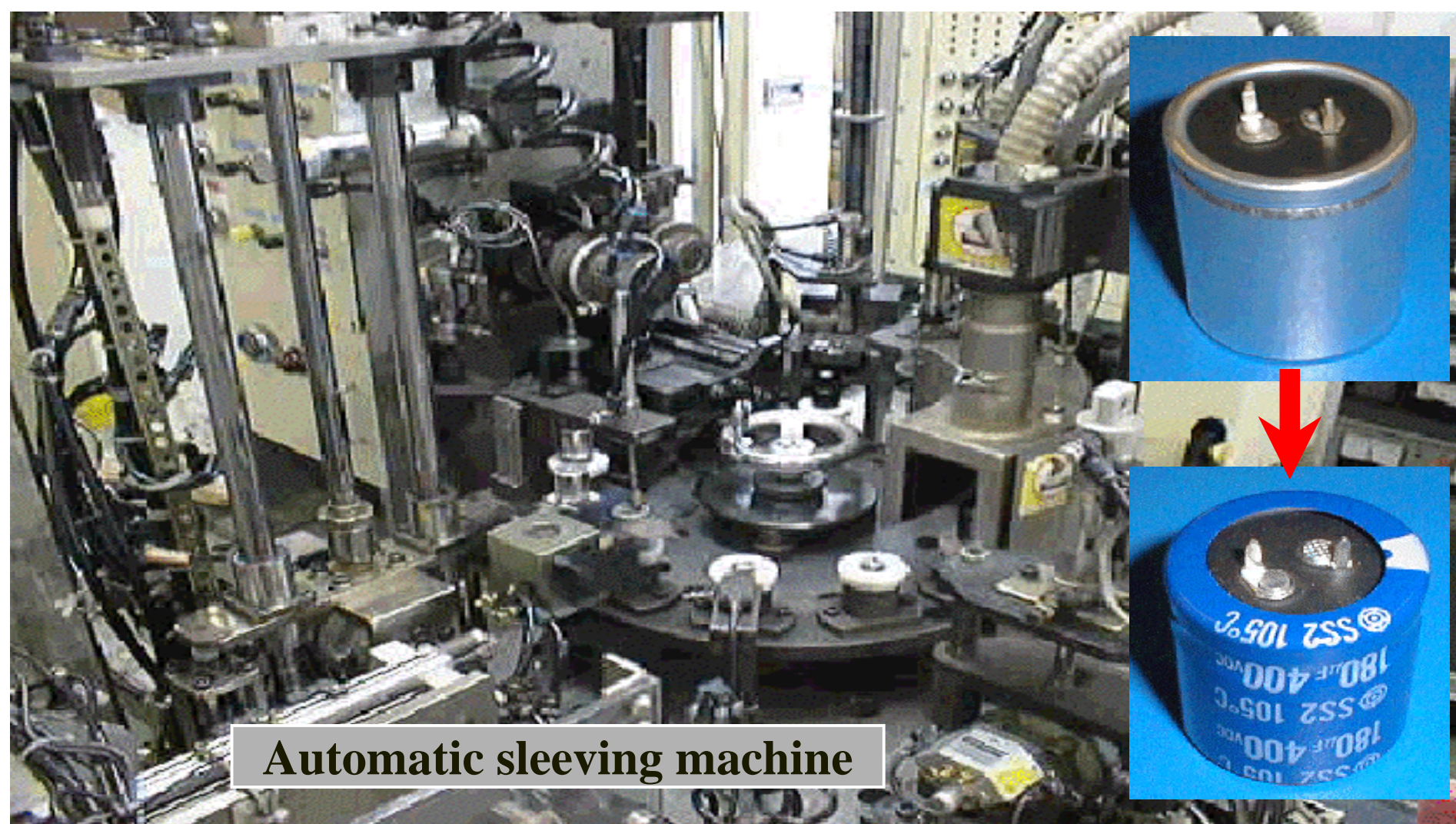


Winding machine

- Electrolytic papers are inserted between anode foils and cathode foils.
- They are wound in a cylindrical shape.
- Aluminum lead are connected to the element.

Sleeving 套管

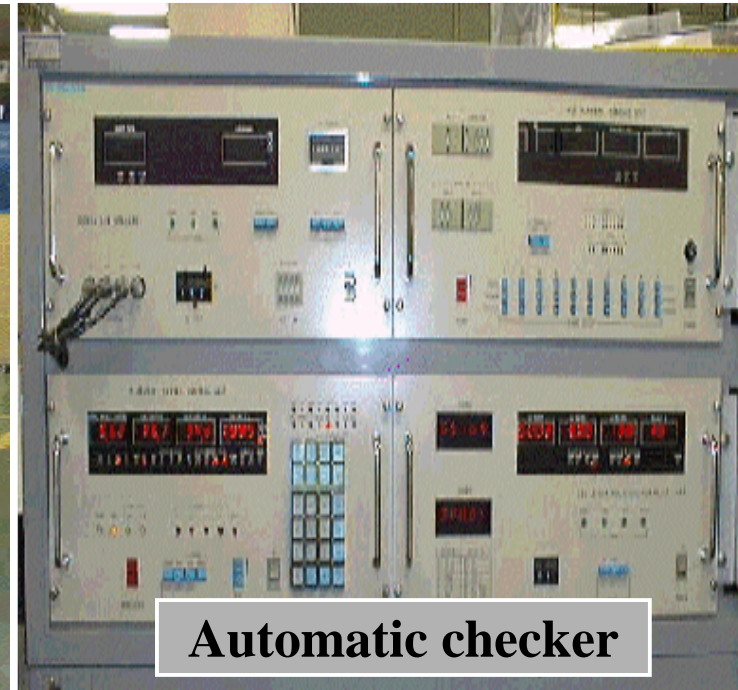
Process to print the product name,
item code and lot number on the cover.



Piece by piece inspection 逐一检测



Outlook of checker



Automatic checker

Electrical characteristic and appearances are examined piece by piece.
电器特性和外观逐一检测

Packaging 包装

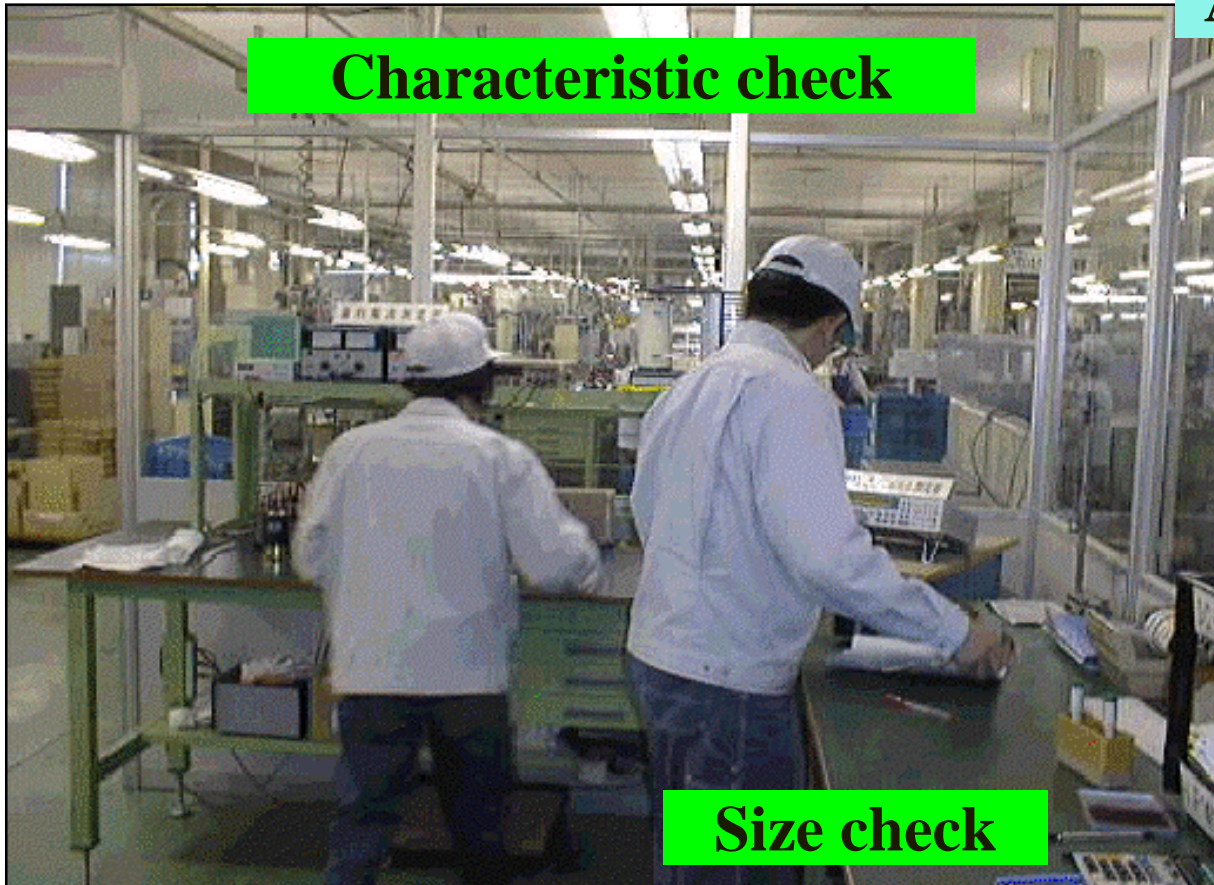
- The products are packaged. 产品包装
- Appearances are examined. 外观检查



Automatic packaging machine

Final inspection 最后检查

Sampling inspection before shipment 出货前抽样检查



Appearance check



Shipment 出货



Finished products ready for shipment.