

# VINYLOOP®



**A new Process to Regenerate  
PVC Compounds from  
Composite Residues**

**A new Product  
The Precipitated PVC Compound**



# Origin of the Vinyloop® Venture

In November 1997, Ferrari (France) invited Solvay to help them solving a problem of recycling PVC coated textile for light mobile structures, especially the ones used for short term application (advertising)



# VINYLOOP® - Key dates

- ◆ Nov. 97 : Research Start-up
- ◆ Mar. 98 : First Patent



- ◆ Dec. 98 : Technological Pilot Plant (Brussels - Reactor 250 l)
- ◆ Aug. 99 and Mar 00 : Complementary Patents

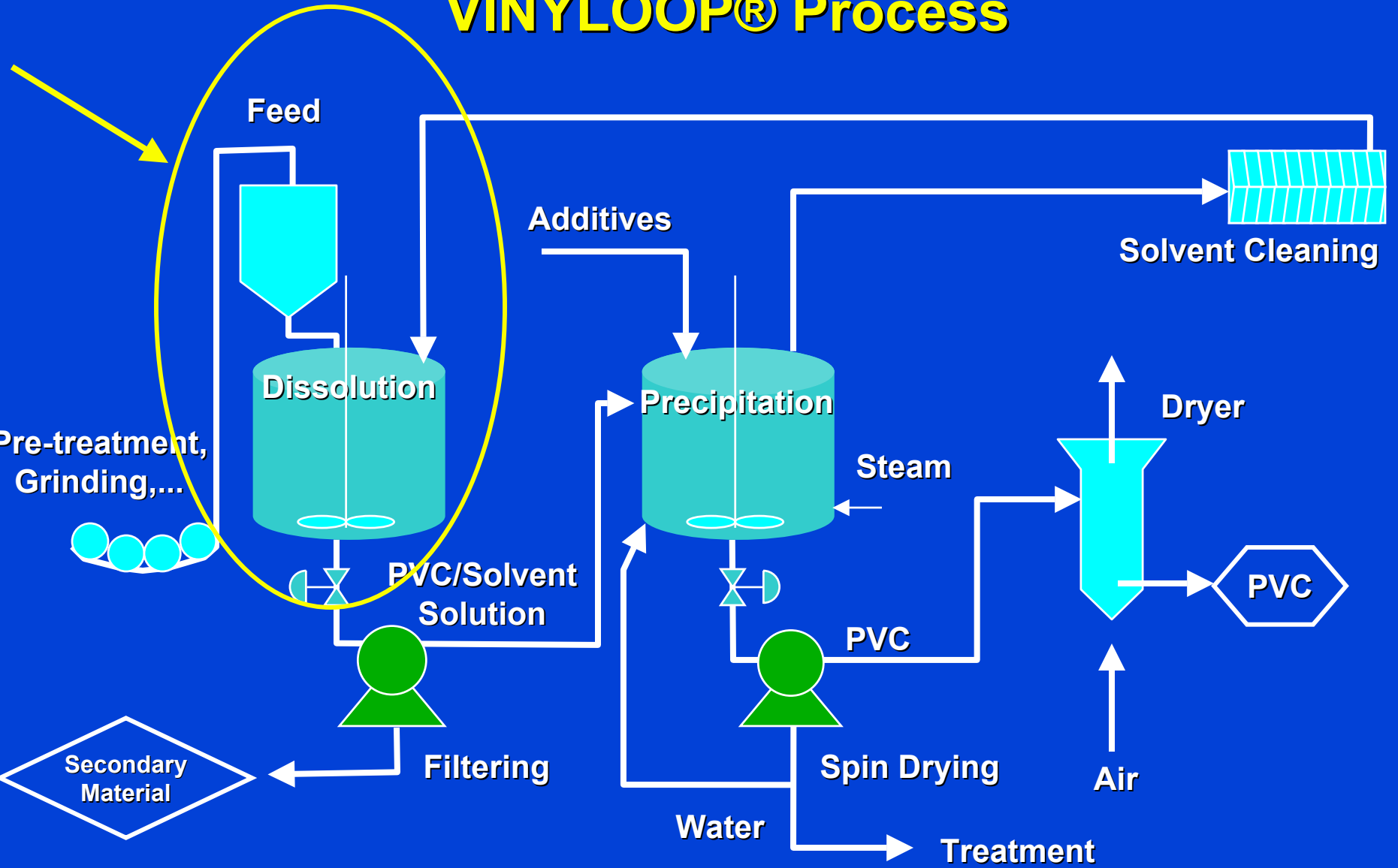
- ◆ Jul. 00 : Vinyloop Ferrara SpA (first industrial Plant)
- ◆ Jan. 01 : Industrial Pilot Plant (Brussels - Reactor 400 l)



# VINYLOOP<sup>®</sup> Process

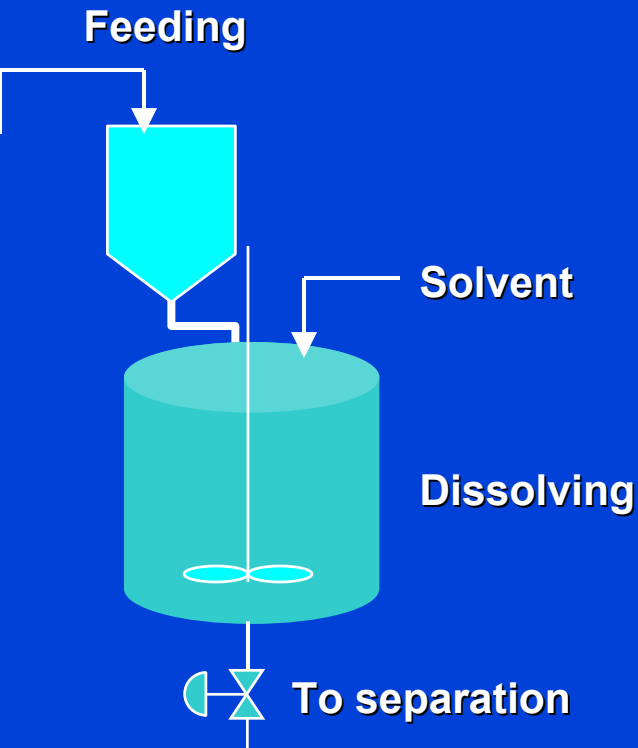
- ❖ A mechanical recycling process using an organic solvent to separate the PVC compound from the other materials in a PVC composite
- ❖ A closed loop process : the solvent is completely recycled
- ❖ A batch process in three main steps :
  - dissolving the PVC compound in the composite
  - separation of the secondary material
  - precipitation of the regenerated compound while recovering the solvent
- ❖ The regenerated PVC compound is ready for new use

# VINYLOOP® Process





# VINYLOOP<sup>®</sup> Process



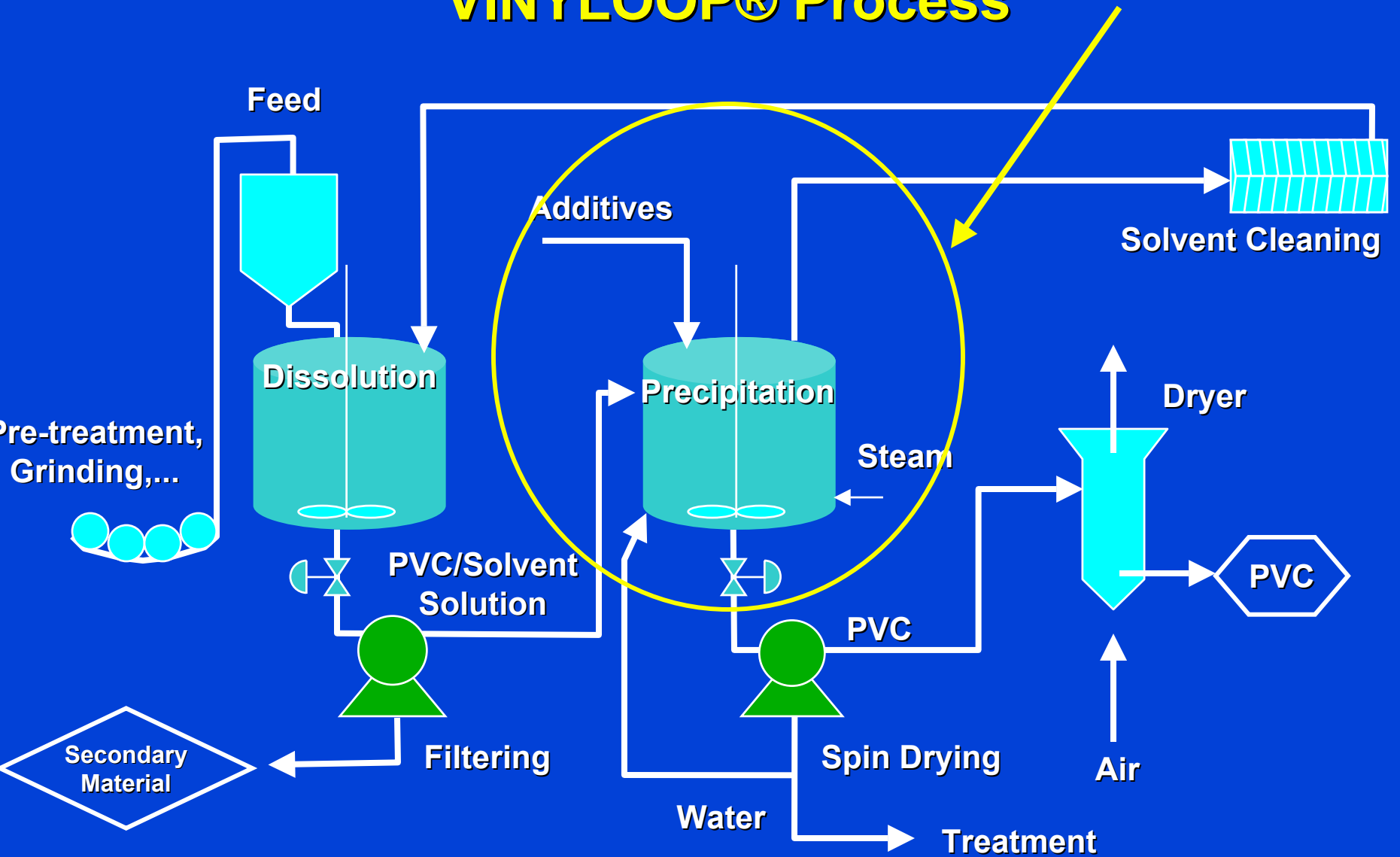
## Feeding

- ❖ Transport by a special device designed to introduce the composite in the dissolver without loss of solvent to atmosphere
- ❖ Adapted to the composite treated

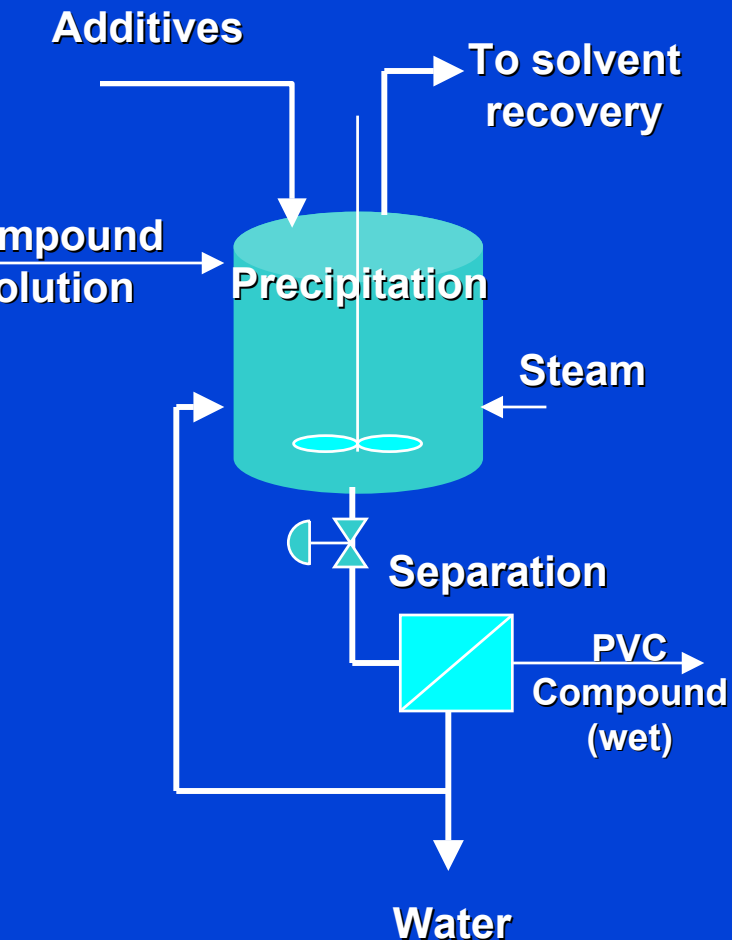
## Dissolving

- ❖ Solvent selected to selectively dissolve the PVC compound and not the secondary material
- ❖ Temperature 100 - 140 °C adapted to the material and the type of composite
- ❖ Closed process under pressure and without air
- ❖ Some additives can be introduced

# VINYLOOP® Process



# VINYLOOP<sup>®</sup> Process

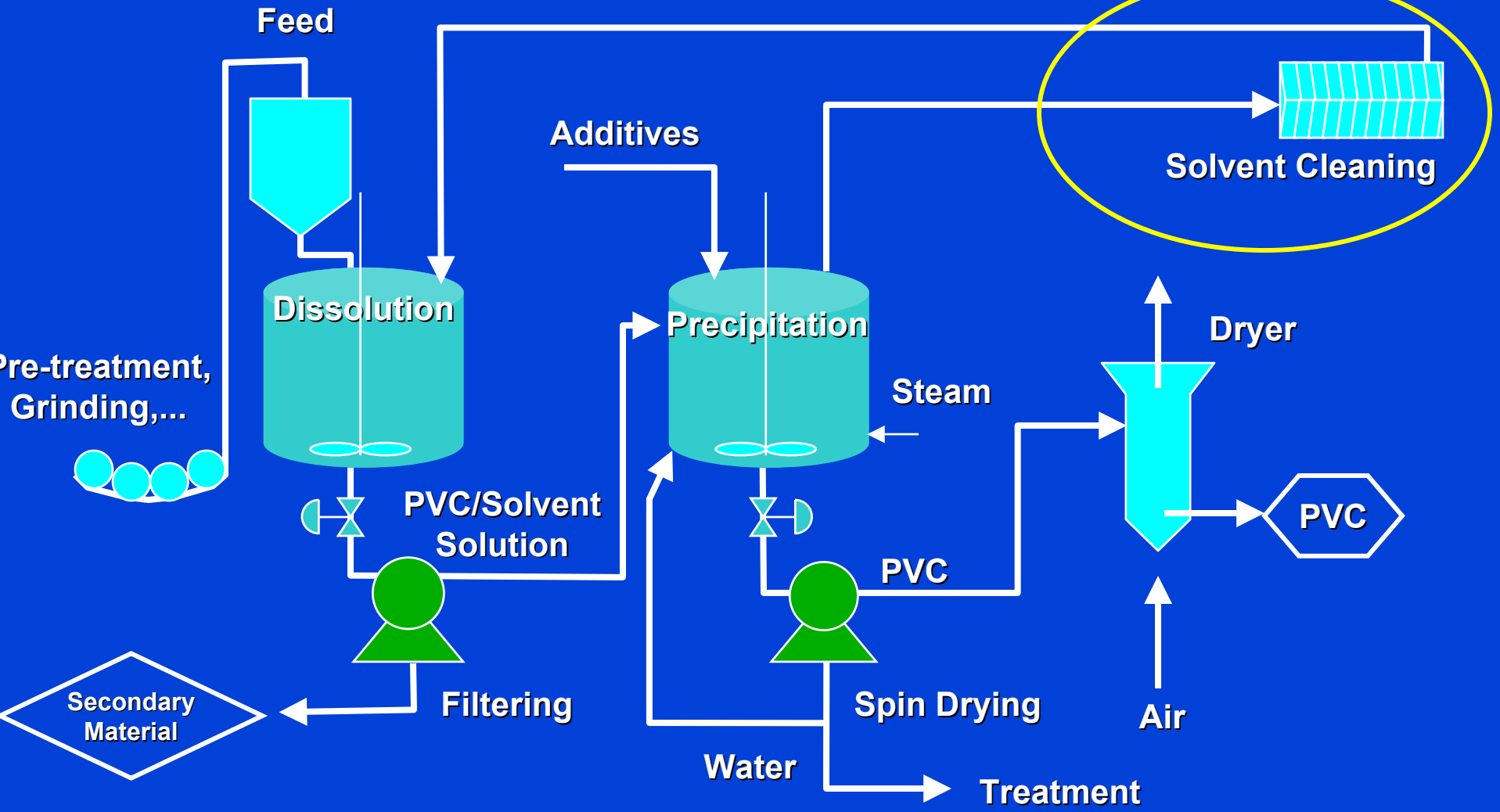


## Precipitation

- ❖ Controlled specified conditions are used to get the desired characteristics of the regenerated PVC compound
- ❖ Additives may be introduced for control
- ❖ Steam is injected to completely evaporate the solvent
- ❖ The PVC compound is recovered as an aqueous slurry
- ❖ All the components of the original PVC formulation are recovered in the regenerated compound, not PVC only (except in very special cases or voluntarily designed separation)



# VINYLOOP® Process



# VINYLOOP® - Process Advantages

- ◆ Valid for all types of PVC residues, but especially efficient for the composites where PVC is intimately linked with other materials
- ◆ Valid for all types of Composites
- ◆ Pure PVC Compound Production with a new form - a PRECIPITATED PVC COMPOUND
- ◆ Very Homogenous Grain Size Distribution
- ◆ Possibility to introduce Additives
- ◆ Closed Loop Recycling - re-use in the same applications is possible
- ◆ PVC content of Secondary Material < 2%

# VINYLOOP® - PVC Composites

- ◆ Wire and Cables
- ◆ Membranes, Tarpaulins, Textiles and other Coated Fabrics,...
- ◆ Flooring
- ◆ Multi-layers Films and Sheets (Blister, ...)
- ◆ Vinyl Wallpaper
- ◆ Flexible hoses
- ◆ Automotive applications

# VINYLOOP® - Wire and Cable

- ◆ Tested: PVC(60% to 85%) + metals+ other polymers and elastomers + ....
- ◆ Recycled PVC has all the characteristics of the original compound
- ◆ Pre-treatment = increase the PVC content up to 85% to reduce the filter size. Economical analysis (Filter sizing and pre-treatment)
- ◆ With the adequate formulation in Vinyloop®, the R-PVC compound will have the right resistivity to be used as primary insulator.

# VINYLOOP® - Ferrara Project

- ◆ **Plant operated by a Joint Venture : Vinyloop Ferrara SpA**
  - Solvin 55% (JV between Solvay 75% and BASF 25%)
  - Tecnometal 15%, cable recycling business
  - Vulcaflex 15% and Adriaplast 15 %, PVC processing businesses
- ◆ **Supported by Vinyl 2010**
- ◆ **Capacity : 10,000 tonnes / year of residues**  
(8,500 tonnes of Re-generated PVC compound)
- ◆ **Plant designed for  $\geq$  85% PVC content and no fibres**
  - Essentially designed to treat Cable residues
- ◆ **Guaranteed quality - ISO Certification**
- ◆ **Stream factor 85%, 7days/wk, 16 people**

# VINYLOOP® - Ferrara Project (2)

## ◆ Progress Report

- Environmental and Building permits issued on March 13th
- Construction started Mid of March 2001
- End of November 2001  
Mechanical completion  
of the process sectors  
and beginning of the  
commissioning
- First trials in  
January/first batch on  
February 4th 2002







# VINYLOOP® - Ferrara Project Status 8 April (3)

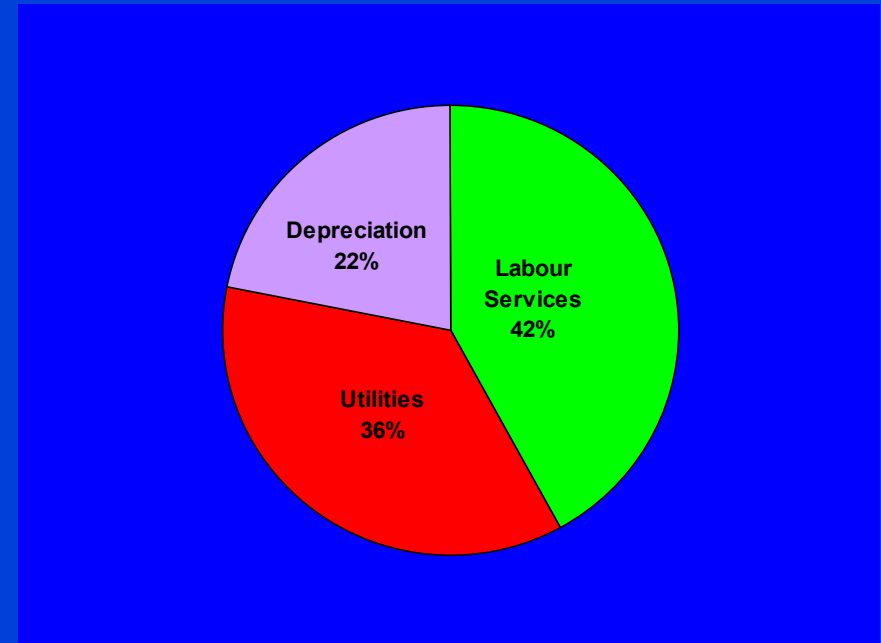
- ◆ Final investment: 10,6 M €
- ◆ Pretreatment for waste <85% PVC: end May 02
- ◆ Staff: total 16; maintenance, IT, accounting are outsourced
- ◆ Principles and all steps of the process have been validated and production rate is progressively increasing:
  - Current maximum daily production: 3 tons per day (work with one precipitator and no hidden time in the sequences)
  - Total current production: 42 tons
  - Product sold and invoiced: 5 tons
- ◆ Nominal production: 27 tons PVC per day expected in July

# VINYLOOP® - Economic Viability

Investment : 8.2 to 14 M Eur  
depending upon the existing facilities

Average Production cost :  
250 to 450 Eur / tonne  
depending upon local labor and utilities

Minimum Average Selling price for 15% ROI  
450 to 640 Eur / tonne of R-PVC



# VINYLOOP® in General Future Development

## ◆ Process Technology

- Process Improvements to reduce the Initial Investment and the Operating Costs
- Identify sources of high value raw material
- Find high value applications for the re-generated and precipitated PVC compounds
- Life Cycle Analysis for various products

## ◆ Business

- Find partners to study the feasibility and support this new business development



# Further projects

- ◆ France: Ferrari 2004
- ◆ Germany: flooring 2004
- ◆ Germany: cables 2003/4
- ◆ Spain: cables
- ◆ Italy: automotive
- ◆ Netherlands
- ◆ Canada
- ◆ Japan



a Passion for Progress®

and ... Innovation

**Thank You for the opportunity you gave us to  
present the Vinyloop® Process**

