

“Peering thru the Fog”; a
personal review of some patent
issues related to SAP

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Why Ian on IP?

Why not discuss supply?

At INDEX14 in Geneva a major SAP producer, when asked by potential customers for details of a much trumpeted new improvement said “why not look at the patent literature?”

Why this approach can be misleading as well as helpful...with a historic review of some patents and their application to SAP & diaper production.

Consider

1. SAP patents

2. Milestone patents

3. What big improvement?

- **SAP is heavily patented**

Process

Product

Application

Who should own what IP?

| <u>SAP Producer</u> | <u>Diaper Maker</u> |
|-------------------------------|-----------------------|
| SAP production process | |
| <i>SAP properties</i> | <i>SAP properties</i> |
| | Diaper design |

This assumes that in a collaboration, the majority of SAP property & process development is done by the SAP producer and vice versa for hygiene articles

Quick overview

Process

Product

Application

1) PROCESS

Reactor type

Reaction conditions

Surface treating

Addition of additives

Reduction of residual monomer

2) PRODUCT PROPERTIES

PSD = Small or Large

Speed of Absorption = Fast or Slow

Odor reducing

AUL

Absorbency Index

Permeability

SFC

3) APPLICATION

Baby Diaper

Adult Inco

Femcare

all categorized as ‘absorbent articles’

Far too numerous to mention

QUICK SEARCHES:

USPO only since 1976 - keywords

| KEYWORDS | HITS |
|---|-------------|
| SUPERABSORBENT | 6012 |
| SUPERABSORBENT + PROCESS | 4892 |
| SUPERABSORBENT + ACRYLIC + PROCESS | 2688 |
| SUPERABSORBENT + POLYMER | 4788 |
| SUPERABSORBENT + ACRYLIC + POLYMER | 2818 |

IT'S NOT VERY SCIENTIFIC:

I had expected more!

There are many false hits

There is duplication

But a trend is clear

And there is a fit; at one point in late 80's we were monitoring 30+ filings a month at Dow

| KEYWORDS | HITS |
|---|-------------|
| SUPERABSORBENT | 6012 |
| SUPERABSORBENT + ACRYLIC + APPLICATION | 2838 |
| SUPERABSORBENT + ACRYLIC + ARTICLE | 1898 |
| SUPERABSORBENT + ACRYLIC + DIAPER | 1525 |

| ASSIGNEES | HITS |
|--------------------|-------------|
| P&G | 612 |
| K-C | 856 |
| SCA HYGIENE | 239 |
| UNICHARM | 29 |

| ASSIGNEES | HITS |
|--------------------|-------------|
| DOW | 992 |
| STOCKHAUSEN | 765 |
| BASF | 629 |
| EVONIK | 100 |
| SHOKUBAI | 133 |

| ASSIGNEES | HITS |
|-----------------------------------|-------------|
| CHEMDAL | 88 |
| SUMITOMO | 75 |
| LG CHEM | 16 |
| KOLON | 9 |
| SANYO (mostly application) | 137 |

WHY PATENT?

(a) Use technology to gain commercial advantage

- **Improved product**
- **Lower cost**

(b) Block or restrict competitors

(c) Gain leverage

- **Future cross license**

PATENTS THAT CAUSE(D) PAIN IN THE INDUSTRY

Merely a selection; not exhaustive, and no opinion is presented on validity or otherwise...

Selected Influential Patents

| DATE | AUTHOR | ASSIGNED | PATENT | TOPIC |
|--|--------------|----------|-----------|---|
| 1966 (filed May 31 st) | Harper et al | Dow | 3,669,103 | Absorbent product containing a hydrocolloidal composition |
| 1966 (filed May 20 th) | Harmon et al | J&J | 3,670,731 | Absorbent product containing a hydrocolloidal composition |

Selected Influential Patents

| DATE | AUTHOR | ASSIGNED | PATENT | TOPIC |
|------|--------------------|----------|-----------|--|
| 1985 | Brandt et al | P&G | 4,654,039 | Improved gel volume & gel strength polymers |
| 1988 | Kellenberger et al | K-C | 5,147,343 | Absorbent products containing hydrogels with ability to swell against pressure |

Selected Influential Patents(2)

| DATE | AUTHOR | ASSIGNED | PATENT | TOPIC |
|-------------|----------------------|-----------------|------------------|---|
| 1990 | Goldman et al | P&G | 5,061,259 | 400-700 micron preferred PSD |
| 1993 | Melius et al | K-C | 5,601,542 | Pressure Absorbency Index |
| 1994 | Goldman et al | P&G | 5,599,335 | SFC > 30 & Performance Under Pressure |

**AND NOW BACK TO THE
ORIGINAL QUESTION
THAT PROMPTED THIS
PAPER...**

**OR, WHAT COMES
NEXT?**

PRODUCER 'A' IP STRATEGY

- Patent everything possible

'A' SAP PROCESSES

| PROCESS | SOURCE | LOCATIONS | STATUS |
|--------------------------------------|---------------------------------|---------------------------------|---|
| Batch Kneader reactor | In house (1980's) | Germany | Closed |
| Kneader Reactor | In License | Germany | Special products only |
| Bulk Batch | Acquisition | USA | Now Closed |
| Continuous Belt | Acquisition | USA UK Thailand | Closed Burned down Running |
| Continuous Kneader | In house (late 90's) | Europe USA China | Running |

What patents might be linked to these different processes?

'A' SAP PROCESS PATENTS(1)

| PROCESS | SOURCE | YEA R | AUTHOR | US # |
|---------------------------------------|--------------------|------------------|-----------------------------|----------------------------|
| Kneader reactor | In house | 1988 | Hennig et al | 4729877 |
| Single Kneader Reactor | In house | 1988 | Nowakowsky et al | 4769427 |
| Bulk Batch | Acquisition | 1989 | Alexander et al | 4820742 |
| Double Kneader | In house | 2001 | Heide et al | WO/2001/038 402 |
| Continuous Kneader | In house | 2008 | Steuven et al | 2008/0004408 |

**Those are probably all too old to
be the references for the recent
announcement...**

**So let us examine more recent
literature...**

'A' SAP PROCESS PATENTS(2)

| SAP PROCESS | YEAR | AUTHOR | US # |
|---|-------------|--|--------------------------------|
| Droplet Polymer | 2007 | Loesch et al | 8,529,805 |
| Radiation Initiated Conti Belt | 2007 | Weismantel et al | 8,546,461 |
| Novel forced air drying | 2005 | Weismantel et al Funk et al | 8,592,516 8,541,528 |
| Use of conveying screw for solid additives | 2007 | Funk et al | 8,633,285 |

CONCLUSION ON 'A':

- **Future possible switch from dual kneader to belt reactor with novel drying process**
- **Probable lower unit capital**
- **Potential for improved SAP properties**

If 'A' goes ahead:

- Reinvention for improvement is brave but...how can they get acceptable ROI on existing global production units which are relatively new?**
- Will new technology be limited to niche new SAP products?**

Finally, what of SAP supply?

- Expansions continue!**
- Demand growth globally around 6%**
- Plenty of SAP**
- Watch this space for details**

THANK YOU – ANY QUESTIONS?

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Note:

These are the personal views of the presenter. We thank all who contribute information and invite others to participate by contacting Ian Davenport at any time.

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