

PRESSURE SENSITIVE ADHESIVES - INNOVATION AND INDUSTRY TRENDS: PATENT LANDSCAPE ANALYSIS AS COMPETITIVE INTELLIGENCE

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Introduction:

In 2016 there were approximately 3.1 million patent applications filed in worldwide patent offices (an 8% increase over 2015 statistics)¹. That equates to over 8000 patents filed every single day. Although some of the patent applications counted are duplicates (foreign counter-parts or continuation applications), the sheer number of monthly worldwide patent filings suggests that innovation rates are occurring on an unprecedented scale.

It is common for organizations and inventors to file patents on their most innovative ideas as a means to protect these innovations from copycats. Although imperfect, patent protection in the United States provides the innovator with, at a minimum, an obstacle, and at most, a right to stop others from making, using, or selling copycat technologies or products. In addition to providing value as a barrier to entry, patents contain important competitive intelligence relating to the who, what, where, when, how, and the why of technology and product innovations.

It has been hypothesized that 80% of published science and technology information contained in patents is not published anywhere else.² Therefore, patent information offers a one-of-a-kind window into the innovations, technical and product development, and business development activities of corporations, academic, government, and research institutions as well as individual inventors from around the world.

Currently, worldwide patent authorities maintain tens of millions of granted patents and pending patent applications. Worldwide patent offices, academic websites, and other free and paid commercial software providers offer searchable access to patent databases enabling internet connected people across the globe access to this massive data repository. Patent data offers an overwhelming treasure trove of searchable technical information accessible for free to anyone that has access to the internet and a computer. One challenge for modern corporations that are developing innovative products is finding the critical and relevant patent information in a given technology area and then analyzing that information in a manner that permits actionable decision making.

Patent Analytics:

Prior to the birth of the internet, patent information was primarily available in paper format, and it was extremely expensive and difficult for organizations to analyze the patent landscape around a single invention or a portfolio of inventions in the context of other related inventions. Patent attorneys and

¹ Brachman, Steve (2017), "[WIPO Stats on Patent Application Filings Shows China Continuing to Lead the World](#)" *IPwatchdog blog*. Dec. 12.

² Trippe, Tony (2016), "[Revisiting an Old Standard – 80% of Technical Information is Found Only in Patents](#)" *Patentinformatics Blog*

patent search experts had to either manually review paper copies of the documents at the U.S. Patent and Trademark Office or have paper copies mailed to them through patent copy services. Attempting to compare a group of patents in a certain technical field to other patents in that field using data from paper copies would have been next to impossible.

Paired with increased computer processing power, the explosion of electronic information in the early 1990s enabled easy access to worldwide patent data. Powerful search engines and text analysis tools provided a platform for just about anyone with a computer and an internet connection to search for and review patent information. Starting in the early-to-mid 1990s, this new form of information technology led to the establishment of specialty patent analytics firms and (at the world's largest companies) sophisticated in-house patent analysis departments.

The primary focus of patent analytics is to help organizations make more informed (*i.e.* data-driven) business decisions. Understanding the patent landscape in a particular technology area allows companies to effectively allocate resources for new and ongoing R&D initiatives, and to spend money wisely when filing new patents (instead of patenting everything that comes out of the lab, regardless of its strategic value). This information also helps companies understand the potential value of their patent portfolios—and their competitors' patent portfolios—and it can provide insight into when and if it might be useful to buy or sell intellectual property assets. Finally, patent analytics help to put new and existing technologies in context, elucidating the competitive landscape around that technology (including major players, new developments, and potential areas of conflict) and providing concrete intelligence regarding where companies stand, and where they can and might go.

Recently, patent analytics has experienced an extended period of accelerated growth and interest from a diverse group of private- and public-sector interests. This can likely be attributed to increased awareness of intellectual property issues on the part of companies and investors, who are realizing that intellectual property--and patents in particular--can provide significant monetization opportunities beyond product sales.³

Patent Landscape Analysis

Patent landscape analysis, often referred to as “patent mapping” is a proven multistep process, employing computer software and human intelligence, to parse through, organize and extract value from this vast amount of information. In a nutshell, patent landscape analysis provides insight into the innovations that underlie technology and products. Patent landscape analysis, is critical for making informed business decisions because it provides a basis for understanding how a particular patent or portfolio of patents is contextually related to the larger technology innovation landscape. A completed patent landscape analysis project consists of a set of technical references and accompanying analytics from which important technical, legal, and business information can be extracted. This information enables large corporations, startups, universities, research institutions, and investors to understand and make informed decisions prior to investing time and money into new technology and product development opportunities.⁴

³ Rappaport, Matthew (2013), “A Patent Landscape Analysis of Vascular Grafts, The Patent Monetizers’ Next Frontier” [The 2013 Midwest Intellectual Property Institute](#). September 27.

⁴ Rappaport, Matthew (2017), “Patent Landscape Analysis – An Overview” [The IP Checkups Blog](#). March 20.

Patent landscape analysis provides a basis for understanding innovation activity within industries. By looking closely at patents related to any technical area, one can gain invaluable insight and intelligence into a variety of factors including:

- which organizations (companies, research institutions, others) are working in the area,
- what specific technologies and industries are being targeted,
- how the technical problems are being solved,
- where geographically patents are being filed,
- who the key inventors are,
- which patents are most highly cited by others' later filed patents,
- how long it is taking for innovations to evolve into products,
- which product features are disclosed in which patents, and
- how much time is occurring between a patent filing and its granting or abandonment,

Among other factors, the information derived from a patent landscape analysis can be applied within an organization to:

- generate novel technology,
- monitor competitor activity,
- identify possible companies or technologies to license or acquire,
- design around others' technology to side-step litigation,
- establish a comprehensive and well informed intellectual property strategy,
- avoid spending time and money on duplicating technology that has been developed previously and may already be on the market,
- optimize internal processes to get the most bang-for-the-buck with regards to innovation and product development.

More specifically, the results of a patent landscape analysis can help an organization:

- Determine how crowded a technology area is before investing in new R&D initiatives.
- Identify what product features have been patented to allocate resources to novel technology features that provide the most differentiation from competitors.
- Assess the strengths and weaknesses of a company's own portfolio to determine where engineers and scientists should focus on new product/feature development and patent filings.
- Identify non-core patents in a company's portfolio that can be licensed, sold, or monetized.
- Review and analyze the technologies being developed by competitors to understand where the competition is focused.
- Identify patents that might be acquired to countersue a plaintiff in a patent litigation suit.
- Understand what areas have been heavily patented to assist engineers and scientists to focus on 'white space', or areas where there are openings for new technology development within a particular technology space.
- Make informed decisions regarding the value of a company's patent portfolio, including identifying opportunities and risks associated with investing in a start-up or acquiring a company.

A thoughtful patent landscape analysis managed by a knowledgeable technical/patent expert who understands the underlying technology and the principles of intellectual asset management provides the end-users with valuable, actionable information. The value of the patent landscape analysis is further enhanced if thought leaders from R&D, marketing, legal and business development groups are engaged during the process.

Patent landscape is a critical process for corporations to implement on an ongoing basis. Doing so will establish and support a larger Intellectual Asset Management (IAM) program including an integrated approach to innovation capture and management. The goal of any high technology focused organization should be to implement a repeatable patent landscape analysis and IAM process that engages key thought leaders across R&D, marketing, legal and business development groups to:

- continuously assess the current state of innovation in a variety of technology areas,
- rank and rate each innovation in light of product and market opportunities,
- capture any new ideas developed internally,
- acquire or license relevant and complementary innovations from 3rd parties
- test the uniqueness of all innovations against competitor ideas and prior art,
- protect innovations to limit copycats and theft,
- develop products in areas that show the most potential while assuming the least amount of risk.

Once established, a sound IAM process that uses patent landscape analysis to support an integrated innovation capture and management system will result in long-term corporate success by aligning the intellectual property strategy with its larger research and business objectives. Specific organizational benefits include:

- reducing costs (R&D - time to commercialization, defensive patent litigation)
- increasing revenue (offensive litigation/licensing)
- eliminating redundant research

Patent Landscape Analysis in Pressure Sensitive Adhesives

The data used in the following section does not provide a comprehensive view of the pressure sensitive adhesives patent landscape. It is provided to exemplify some of the processes, techniques, and potential outcomes involved with creating a patent landscape. The data presented is used for exemplary purposes only and the exhaustiveness of the data, proposed process, and conclusions, should only be considered as a high-level example of how patent landscape analysis can enhance competitive intelligence. And, how the resulting information could be used to better understand the technology area and make more strategically informed R&D and business decisions.

Patent Landscape Analysis Process:

- 1) Determine what the purpose is for the Landscape Study
 - a. The purpose of this exemplary patent landscape analysis is to provide insight into competitor patent activity in pressure sensitive adhesives as applied to various application areas such as electronics, healthcare, building/construction materials, food labeling, automotive and others.

- 2) Review subject matter
 - a. Meet with key stakeholders i.e. legal, marketing, R&D, and business development.
 - i) Review market intelligence and other corporate intelligence.
 - b. Review exemplary patents, non-patent literature, and patent class codes.
 - i) Search patent data related to “pressure sensitive adhesives” and other relevant synonyms to identify some relevant examples.
 - ii) Search non-patent literature databases.
 - iii) Review the International Patent Class (IPC) code hierarchy
 - c. Determine which international jurisdictions are relevant.
 - i) Where will the products be sold, where are competitors filing patents?
 - d. Determine the date range to be searched,
 - i) Do you want to look at patents filed during the past 5 years, past 20 years, longer?
- 3) Develop and run patent searches across worldwide data
 - a. Test a variety of search strategies.
 - i) Full Specification searches.
 - ii) Title Abstract Claim Searches.
 - iii) Patent Class Code Searches.
- 4) Cleanup Data
 - a. Remove unwanted data.
 - i) Duplicate kind codes.
 - ii) U.S. Published patent applications that have granted.
 - iii) Corresponding foreign applications.
 - iv) Remove irrelevant results.
 - b. Normalize Inventor data.
 - c. Normalize Assignee data.
 - i) For U.S. published patent applications without assignee data, by inventor/year.
 - ii) By original assignee, current assignee, reassignment chain.
 - iii) By organization, licensee, business unit.
 - iv) By organization type, large, small, university, monetizer etc.
- 5) Manually Review data and create categories; populate categories.
 - a. Categories created from reviewing the data.
 - i) Manually Review data and populate the categories (more accurate-more time) or,
 - ii) Sub-search and create search strings to populate the categories (less accurate – less time).
 - b. Categories created in other ways.
 - i) From published literature review (catch emerging categories).
 - ii) Experts ‘Skilled in the Art’ (watch out for blinders).
 - iii) Automated algorithm-based systems (can be effective – quick and dirty).
 - c. Categorize data
 - i) Technology.
 - ii) Markets.
 - iii) Product.
 - iv) End user benefits.
 - v) Rankings.

- 6) Create relevant charts/tables
 - a. Geography.
 - b. Inventors.
 - c. Assignees.
 - d. Citations.
 - e. Company/Product.
 - f. Family Connections.
 - g. Others.

- 7) Generate Visualizations
 - a. Heat Maps.
 - b. Citation trees.
 - c. Product/Patent Matrices.
 - d. Others.

- 8) Review with department thought leaders and take action
 - a. R&D.
 - b. Business Development.
 - c. Intellectual Property.
 - d. Competitive Intelligence/Commercial Strategy.
 - e. HR.
 - f. C-Suite.

The Search:

Searching is one of the most critical aspects of developing a valuable patent landscape analysis. All of the remaining steps of the analysis are dependent on the quality and accuracy of the results found in the search. A successful search strategy will find the relevant results, not miss any “counterintuitive” relevant results, and remove irrelevant results.

The following search strings are exemplary of the type of searching that could be done to develop a patent landscape related to pressure sensitive adhesives. In the context of an actual study, many more searches would be used for experimentation. These additional searches would include strategies such as applying keywords found from the full specifications of some of the exemplary patents and non-patent literature, applying “Not” statements in order to exclude relevant results, and further research of international patent class codes to identify potentially relevant patents that use alternative keywords.

The sample search strings below were directed at key terms and a patent class code related to adhesives and tapes, that are pressure sensitive, that contain specific chemistries, and are directed to specific application areas:

Table 1. Exemplary Search Strings

Search	Section Searched	Time Period	Authorities	Query	Number of Results
1	Titles, Abstracts, or Claims AND International Patent Class Codes	Filed between 2-1-1998 – Present	US, EP, WO	(tape* or adhesiv* or PSA or PSAs or (pressure ADJ sensitive) or (contact ADJ adhesive*) AND (polyacrylate* OR polyacrylic OR PMMA OR acrylic OR *methacrylate* OR *acrylate*1 OR (vinyl NEAR10 ester*1) AND (Patent IPC or CPC code is C09J)	~20,000 records, ~16,000 unique applications
2	Sub-search or Search 1 above for Full Specification	Filed between 2-1-1998 – Present	US, EP, WO	(automobile or automotive or car or cement or concrete or construction or building or electronics or display* or (liquid ADJ crystal) or (light adj emitting adj diode) or LED or OLED or (optical ADJ film) or pharma* or food or fruit or vegetables or polarizer or semiconduct* or (touch ADJ screen) or (touch ADJ panel) or label or medical or wound or solar or perspiration or sweat or aerospace or battery or LCD or plasma or AMOLED or TOLED or (mobile ADJ phone) or (Cell Phone) or electrochromic or PCB or (printed ADJ circuit ADJ board) or television or (virtual ADJ reality) or (Quantum ADJ dot*))	~11,000 records, ~9,000 unique applications

Data Cleanup:

Data clean-up is critical to the patent landscape analysis process. It is not uncommon for searches to return thousands of potentially relevant patents and patent applications. Successful patent landscape studies evolve over time from a technical and product perspective and eventually become highly

targeted. An example of this would be a project that begins looking at pressure sensitive adhesives, and then further narrows to “hot melt adhesives”, and then further narrows to “acrylic polymers”, and then finally narrows to “acrylic polymer formulations” that can be applied to the “building and construction industry”. Applying an iterative process reduces the number of irrelevant results that need to be reviewed. Once the initial searches have been identified, the data will need to be reviewed and cleaned up to ensure the analysis is applied across only relevant results. Communication between the patent analyst and the technical/business team is critical during this period to ensure that documents disclosing relevant technologies and products are added to the landscape while those that are less relevant are set aside for future analysis.

In our case study, an initial manual review was performed in which the patent analyst manually reviewed the Titles, Abstracts, and Claims of each patent document to remove results that are not primarily directed to pressure sensitive adhesives. Often, a second review would be performed to further eliminate documents which don’t meet the specific criteria of the search – for example, those documents in which the word “Construction” was applied to disclose the make-up of the adhesive rather than being directed to the “Construction” industry.

In addition, during data clean up additional decisions can be made such as whether to select a single representative family member for each innovation or select any patent that the search query returns. If choosing the former, then if there was a patent application filed in the United States Patent Office and the Patent Cooperation Treaty (PCT) to eventually file for rights in multiple jurisdictions, only the earliest patent family member would be selected. If choosing the latter, then all results that matched the search query would be analyzed.

Other decisions include how to proceed with U.S. published applications that have since granted or situations in which an initial U.S. patent application spawned a continuation, continuation-in-part, or divisional patent application. These decisions on whether to keep or remove such results depends on whether or not the user wants to preserve the geographic filing strategies of the different patent owners, wants to review all of the different versions of claims as well as additional claim sets that might exist between a published patent application and its corresponding grant and the future iterations of a particular invention. Ultimately, decisions on whether to keep those documents in the corpus or remove them are dependent on the desired outcome and purpose of the patent landscape analysis.

Data Normalization:

Normalization is another very important step when creating a patent landscape analysis. Normalization provides a means for more accurately understanding which organizations are working in an area, which inventors work for each organization, how large or small each organizations portfolio is relative to others in the area, and which organizations are working together. The purpose of this step is to further cleanse the data to ensure that consistent comparisons are being made when later stages of the analysis are performed. Below is an example of normalization applied to a fictitious top assignee (those with the most patents assigned) and a fictitious first inventor in the exemplary pressure sensitive adhesives patent landscape. Notice the variations on names as well as the order of names and the use of punctuations such as commas and periods. Often, the only way to be certain that an assignee or inventor name is the same organization/person as other names is to compare multiple criteria (i.e. assignee name, inventor name, publication year, patent subject matter). Also, for assignee names, the internet and corporate records

from secretary of state offices or other sources can be used to ensure that the various corporate names are actually related to the same corporation.

Table 2. Combined assignee information to establish an accurate naming convention of patents assigned to fictitious Company A with fictitious 1st inventor, Jane B. Doe

1st Assignee	Normalized 1st Assignee	1st Inventor	Normalized 1st Inventor	Type of Organization
COMPANY A	COMPANY A	DOE, JANE B.	DOE, JANE B.	Large
COMPANY A, INC.	COMPANY A	DOE, JANE BARABARA	DOE, JANE B.	Large
COMPANY A LLC	COMPANY A	DOE JANE B	DOE, JANE B.	Large
COMPANY A INNOVATION CORP	COMPANY A	JANE B.DOE	DOE, JANE B.	Large
COMPANY A INTELLECTUAL PROPERTY, LLC	COMPANY A	JANE DOE	DOE, JANE B.	Large
COMPANY A INTELLECTUAL PROPERTY INC.	COMPANY A	JANET B. DOE	DOE, JANE B.	Large
COMPANY A CORPORATION	COMPANY A	JANE, BARBARA DOE.	DOE, JANE B.	Large
COMPANY A, A LIMITED LIABILITY CORPORATION	COMPANY A	JANE, B. DOE	DOE, JANE B.	Large

Categorization:

Determining how to categorize data for a patent landscape analysis in large part depends on the underlying goals of performing a competitive patent landscape analysis. Whether trying to determine where the “White Space” is (areas that appear unpatented), where competitors are spending money and what jurisdictions they are filing in, or how active one particular technology area is relative to another, categorization is a critical step to organizing the data in order to maximize the value of the information and support strategic business decisions. Due to the overlapping nature of some of the categories it is likely that some patents will fall into multiple categories. For example, a patent disclosing an acrylate based adhesive chemistry may be used in the construction market as well the medical market.

Ideally, a web-based patent landscape software is deployed to categorize, archive, and monitor the competitive patent information identified in the patent landscape analysis. Below is an exemplary customized categorization hierarchy for pressure sensitive adhesives:

1) Adhesive Composition

- a. Acrylate

- b. Fluorinated Polymer
- c. Polyamide
- d. Polyepoxy
- e. Polyester
- f. Reactive monomers
- g. Rubber
- h. Silicone or siloxane
- i. Styrene Co-Polymers

2. Uses

- a. Automotive
- b. Construction or building
- c. Electronics
- d. Displays
 - (1) Liquid Crystal
 - (2) Optical Film
 - (3) Polarizer
 - (4) Semiconductor
 - (5) Touch Screen
- e. Food
- f. Medical/Pharma
- g. Solar

3. Competitors

- a. Company A
- b. Company B
- c. Company C
- d. Company D
- e. Company E
- f. Company F

Charts & Tables:

Once the data is categorized, customized charts, graphs and tables can be generated depending on what information is important for the outcome of the patent landscape study. Typical charts and tables include top assignee, top inventor, geographic distribution, and patent filing/publication. Velocity charts are also quite valuable as they show how much activity (i.e. spending) is happening in each category over time. More valuable and informative charts can be developed if the original data set has been properly cleaned and sorted into relevant categories. A few exemplary charts can be found below (**The data in the charts below is purely for example purposes and not to be considered as an accurate reflection of the pressure sensitive adhesives patent landscape**).

Below is a graph depicting the top 10 assignees (the actual company names have been redacted) by the number of documents related to hot-melt adhesives filed on an annual basis between 1982-2014. These patents were found through applying a combination of keywords, patent class codes, and other techniques across worldwide patent data and then manually reviewed by a PhD chemist for relevance.

The patent filings depicted in this chart include a representative patent document (most recent granted patent or published patent application) for each patent family filed in the United States Patent Office, the European Patent Office, or the Patent Cooperation Treaty from the World Intellectual Property Office.

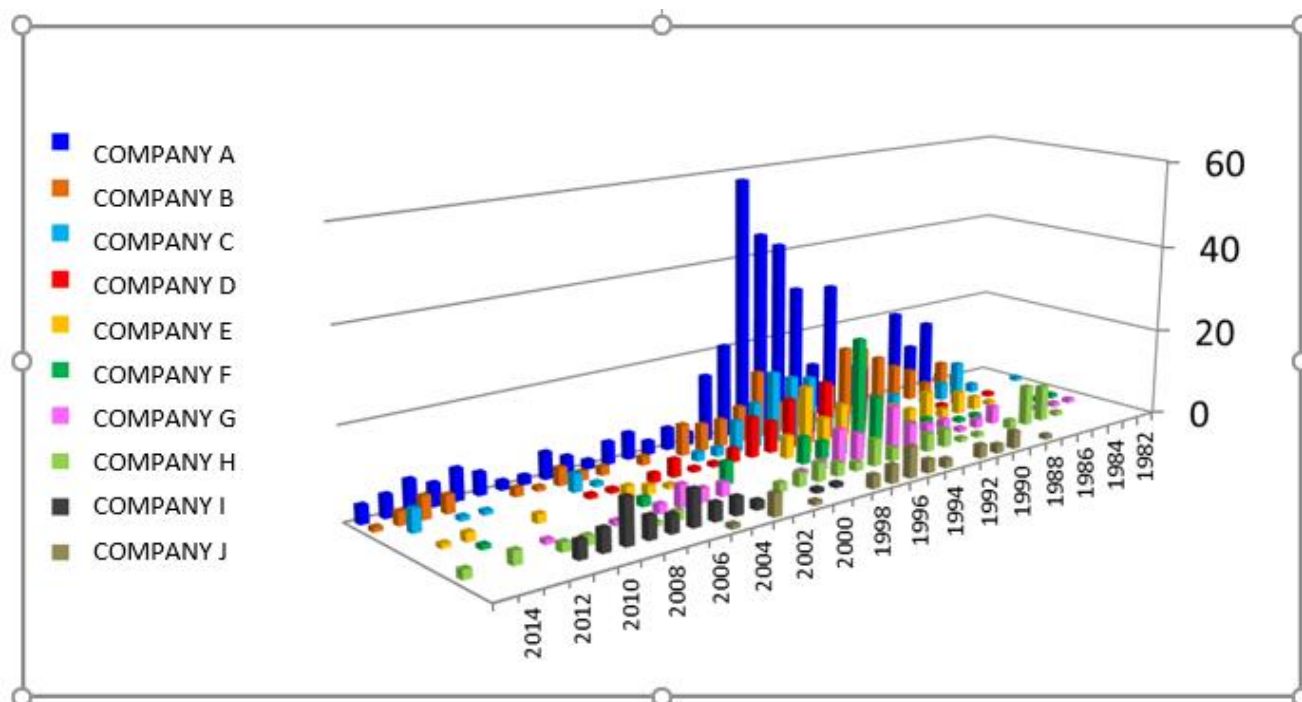


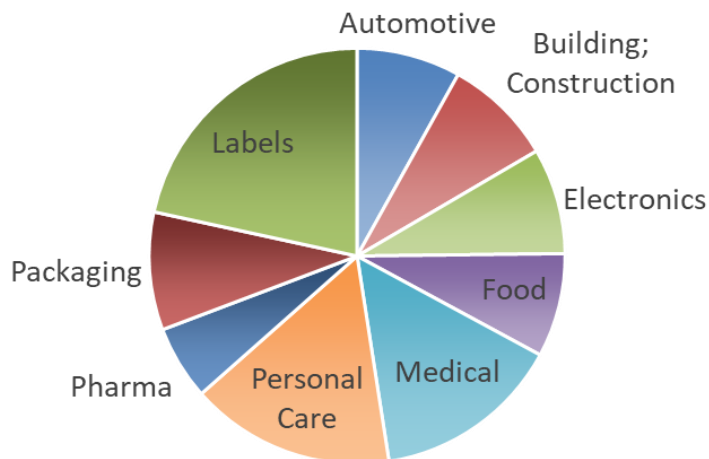
Figure 1. Top assignees from 1982-2014 in hot melt adhesives.

The chart provides insight into the patent filing activity and by extension the R&D activity of the top patent filing companies in the hot melt adhesives area over more than 30 years. The chart exemplifies how COMPANY A, COMPANY B, and COMPANY C have been fairly consistent over the years with their patent filings in this area. While other companies such as COMPANY F and COMPANY J were more focused on filing patents related to hot melt adhesives in the 1980s and 90s but have filed less in recent years. There are several possible conclusions from looking at this data. A few possibilities are listed below.

1. COMPANY F and COMPANY J may have changed focus on their internal research programs and are no longer developing hot melt adhesives. A marketing review of their product portfolio may provide additional insight.
2. COMPANY F and COMPANY J may be licensing in patents from third parties, buying off-patent materials directly from suppliers, or employing a trade secrets strategy and not filing patents in this area to keep their ideas secret.
3. COMPANY F and COMPANY J may have identified and begun developing new adhesive materials to replace older hot melt adhesive technology.

In order to further assess the actual reality of the state of the hot melt adhesives market and R&D activity, this data would be integrated with data found from marketing studies, additional R&D analysis, business development insights and other competitive intelligence. This list of possible conclusions presented above reinforces the importance of using patent landscape analysis as a competitive intelligence tool which has a direct impact on R&D and business development decision making.

The chart below provides insight into various end-use applications in which the top assignees are directing hot melt adhesive patent filings. The pie-chart displays the distribution of all hot melt adhesive patent filings across various application areas while the table below it lists the top assignees for each application area.



	Labels	Packaging	Pharma	Personal Care	Medical	Food	Electronics	Building & Construction	Automotive
Top 3 Players (% IP Owned)	CO. A (15%)	CO. B (13%)	CO. E (40%)	CO. A (15%)	CO. A (36%)	CO. D (14%)	CO. A (38%)	CO. A (20%)	CO. A (37%)
	CO. C (10%)	CO. C (12%)	CO. A (10%)	CO. B (15%)	CO. B (6%)	CO. B (9%)	CO. I (6%)	CO. D (5%)	CO. K (6%)
	CO. B (9%)	CO. D (9%)	CO. F (7%)	CO. G (13%)	CO. H (4%)	CO. C (7%)	CO. J (5%)	CO. C (5%)	CO. L (5%)

Figure 2. Top application areas for hot melt adhesive patent filings and percentage of filings assigned to the top fictitious companies.

This information is useful to see the application area focus of the top patent filing organizations in hot melt adhesives as well as the larger distribution of all hot melt adhesive patent filings by application area. Although there is some overlap as some patents, in the full specification, may disclose several application areas, the data is helpful to understand one company’s application area focus with respect to other application areas.

According to the chart, CO. A’s patent filings appear to be proportionally distributed across all application areas (compared to all of the top companies’ patent filings in these application areas) as follows:

- Electronics – 38%
- Medical – 36%
- Automotive – 37%

Building and Construction – 20%

Labels – 15%

Personal Care – 15%

Pharma – 10%

Some possible conclusions from looking at this data include:

1. CO. A's hot melt adhesive patent filings and the products they have developed or plan to develop (this could be further confirmed by analyzing the time period during which the CO. A hot melt adhesive patents related to each application area have been filed), are mostly geared toward electronics, medical and automotive markets.
2. CO. A doesn't appear to be focused on applications related to packaging or food.
3. Even though with respect to CO. A's patent filings, it appears less focused on labels, personal care, and building/construction, proportional to all hot melt adhesive related patent filings, CO. A has a higher percentage in those application areas than its competitors.

Further analysis would be required to truly understand the focus of CO. A or any companies pressure sensitive adhesive patent filing strategy. However, by undertaking patent landscape analyses, collecting the data in a database, and keeping the information updated, the organization gains incredible insight into a competitor's patent filing and by extension R&D activity. The competitive intelligence gathered from this exercise, combined with data collected by other departments within the organization, along with a collaborative business process in place, will undoubtedly have a significant impact on the organizations legal, R&D, and business development decisions. Specifically, using this type of data can be used to inform the organizations patent filing and larger intellectual property strategy, its product development and new R&D initiatives strategies, and its activity with regards to partnerships, M&A, and licensing.

Below is an example chart that focuses on polymers disclosed in the patents filed in the medical application area for hot melt adhesives from 1985- 2015.

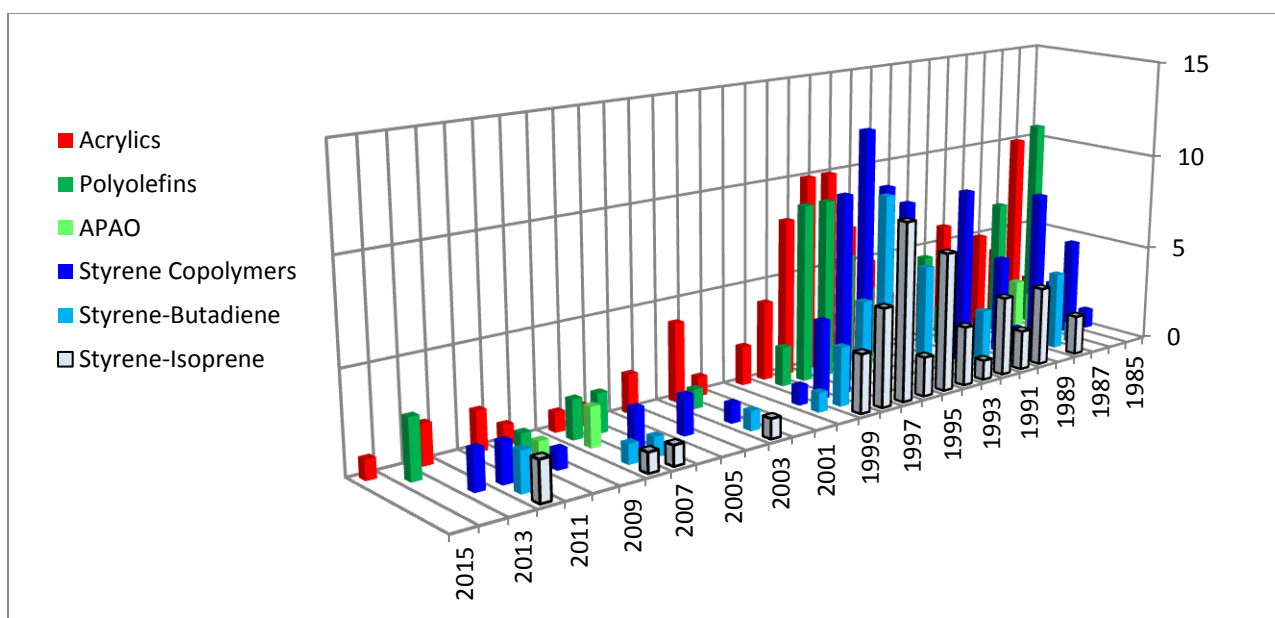


Figure 3. Hot melt adhesive polymers disclosed in patents from 1985-2015 for medical applications.

There is a clear advantage from a competitive intelligence perspective to understanding which polymer materials are disclosed in patents focused on particular application areas. Further insight into when these patents were filed, and which organizations filed them helps an organization to map out the competitive landscape and make informed strategic decisions related to its own patent filing, R&D, business development, and marketing programs.

Visualizations:

Visualizations can be helpful to gain a “high-Level” understanding of what is happening in a particular patent landscape. The heat map below displays the number of pressure sensitive adhesive patents that disclose certain “characteristics” * filed annually between 1997-2014 in several industry application areas.

The heat map colors, from white to red, help focus the eye on which years and which application areas are experiencing a high volume of activity as opposed to the application areas and years that are not active. In this instance it appears that high levels of activity occurred in certain electronics application areas as well as in tapes from about 2005-2014.

Ideally, various members of the patent analysis team with different backgrounds and expertise would review this map in a live setting in which clicking on a color and number reveals which patents are associated with which application area(s) and/or year. The visualization is powerful as it enables experts from a variety of departments to review the data at both a macro and micro level and derive conclusions such as which application areas might see an increase in new products and technologies from competitors and which application areas may be ripe for disruption.

* The “characteristics” are unimportant to describing the value of the heat map, though exemplary characteristics could be adhesive type, company name, or method of adhesion.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Automobiles	1	1		2	1		4	1	2	1	7	2	1	1	2	1	7	1
Cement or Concrete			1	1									1			1	2	1
Construction or building	5	3	1	5	2	3	7	2	4	3		1	4	2	2	2	12	5
Electronics	1						2	2	1			1	4		2		2	7
Electronics->Displays			1	2	1	2	3	3	7	5	9	15	10	7	14	14	9	12
Electronics->Liquid Crystal	1	2		1	1	3	5	4	16	15	19	20	14	12	25	25	21	21
Electronics->Optical film	1	1				2	4	3	12	7	11	17	10	7	12	16	12	11
Electronics->Polarizer	1	1	1	1	2	2	7	6	14	18	20	22	18	18	23	28	23	22
Electronics->Portable or Handheld		1	2						2	1	1				1		2	1
Electronics->Semiconductor Processing	1			1	1			2	1	1			4	1	2	4	3	4
Electronics->Touch panel				1	1			2	2	1			4	5	13	11	13	11
Labels		2		3	1	3	4	5	5	5	6	3	3	1	2	5	8	
Medical monitor or wound treatment	3	1	4	5	2	2	3	2	6	5	5	2	4	4	2	5	4	3
Solar panels													1					1
Sweat or Perspiration Protection	3	2	4	4	2	1	3	2	2	3	2	1	3	2	2	1	2	3
Tapes	6	9	3	8	5	5	16	8	15	12	11	14	16	16	24	21	23	14
Tapes->Double sided	3	1		3			4		7	3	1	4	3	7	8	5	10	8

Figure 4. Heat map displaying pressure sensitive adhesive annual patent filing activity by application area.

Conclusion:

Considering that:

1. There are millions of patent applications filed worldwide each year
2. A majority of the scientific and technology information published in these patents isn't available anywhere else
3. Patent information is disseminated across the globe via the internet in electronic format.
4. Advanced text analytic tools enable organizations to mine competitive patent information,

It is essential for hard-technology companies, particular those working with advanced materials to establish strong innovation capture and management programs including the deployment of patent landscape analysis to derive actionable conclusions from this rich data and to use patent information to make better informed data-driven R&D and business decisions.

Patent information provides a goldmine of insight related to several important factors:

- What companies are developing which technologies.
- The rate of technology development over time.
- The geographic regions in which companies are filing patents to protect their rights.

Competitive intelligence has historically played a key role in the research industry. And although large organizations are good at creating processes, for the most part intradepartmental collaboration remains elusive. Patent landscape analysis is an extremely valuable competitive intelligence solution useful to understand this complex data. Deploying a process and supporting database management software to

establish an integrated Intellectual Asset Management (IAM) program including a robust patent landscape analysis process significantly enhances the competitive intelligence function within an organization. If performed collaboratively and a repeatable process is established, patent landscape analysis provides key insights and drives actionable decision making around research and development initiatives, mergers and acquisitions, licensing, partnerships, and patent filing strategy. This patent-centric information paired with more traditional competitive intelligence including market research enables organizations to see a larger picture of the competitive activity occurring in a given field.

This paper provides a high-level case study of how to perform a patent landscape analysis and what information can be derived from performing a patent landscape analysis. Gaining insight into the patent filing activity of competitors in the pressure sensitive adhesives market is critical to understanding how those competitors are behaving and what products they might be working on, but also how to establish an organizations own R&D, business development and patent filing strategy.

Further analysis of each company's patents, when the patent filings are occurring and how frequently, which jurisdictions they are being filed in are useful to understand the patent filing and R&D activity of each competitor in this field. A deeper analysis by a trained patent analyst and technical expert is essential to identify the specific methods, formulations, combinations of materials, manufacturing techniques and other factors disclosed in the patents by each company. Ideally, a system would be established to categorize, archive, and monitor this information as it evolves. And finally, the information needs to be looked at holistically and in context with other research that comes out of the research lab, marketing studies, and business development discussions.

In the end, the proactive organization that undertakes this type of study paired with further analysis of the data by people working in business development, R&D, legal and marketing departments are in a stronger position to make more informed business decisions and answer questions such as:

- Where are our competitors investing?
- Where are the best opportunities within this area to spend our R&D dollars?
- Are we better off building new technology from scratch or paying a license to or buying it from others?
- Who owns and what are the most defensible patents in this area?
- What types of competitors and competitive threats might we encounter if we enter this area?
- How should we create our own patent filing strategy?
- Who are the top thought leaders in this area? Should we try to hire them?

A thoughtful intellectual asset management (IAM) program including a repeatable process for patent landscape analysis combined with traditional competitive intelligence and market research provides an organization with critical information to align its intellectual property strategy with its R&D and business development initiatives. Patent landscape analysis is an essential competitive intelligence activity to stay one step ahead of your competition.

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