Sample Patent Landscape Study

Rubber Based Adhesives

Feb, 2020

IIPRD

Table of Contents

1. Introduction

1.1 Rubber Based Adhesives

Rubber based adhesives are adhesives made using rubber (both natural and synthetic, high molecular weight rubbers or elastomers) as the base material. Rubber based adhesives are generally used as solvent-based solutions, latex, cements and pressure-sensitive tapes.

Rubber based adhesives score over the acrylic and silicone based adhesive products as they are more cost effective. They have more tackiness and stickiness as compared to acrylic and silicone adhesives. The soft nature of these adhesives allows them to have the ability to wet out and flow into a substrate much better especially when textured. The hydrophobic property of rubber based adhesives are at an advantage in humid atmosphere. Rubber based adhesives are ideal for indoor applications as they can adapt to a wide variety of substrates and provide strong adhesion to materials with high and low-surface energy.

Rubber based adhesives can be divided into two classes, namely

- Synthetic rubber based adhesive
- Natural rubber based adhesive

Natural rubber (NR), also known as Indian rubber, latex and Amazonian.This form of rubber is composed of polymers of isoprene, along with water and some other organic compounds. NR has many uses in adhesive tape applications owing to its outstanding peel adhesion and grab for both polar and low surface tension surfaces. Moreover, adhesive tape with natural rubber can be removed quite easily without leaving a trace.

Finally, NR based adhesives possesses high tack or stickiness which is highly beneficial for adhesive tapes requiring minimal pressure and time.

Synthetic rubber has an artificial elastomer which is made from various petroleum based monomers In compared to the natural rubber, the synthetic rubbers have more thermal stability and has better compatibility with petroleum products.

1.2 Market Potential

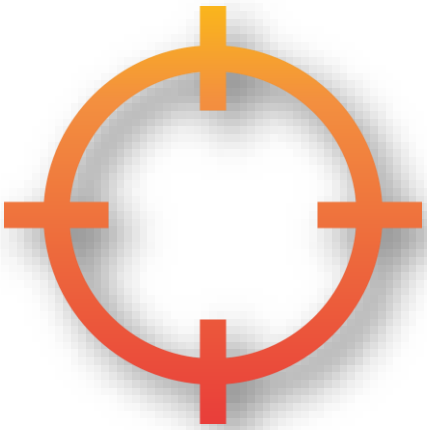
Rubber based adhesive market was estimated to be USD 56.59 billion in 2018 and is now projected to reach USD 71.99 billion by 2023, at a CAGR of 4.93% between 2018 and 2023. The market for the rubber based adhesives is driven by the growth of the automobile and the electronic industry.

In the Asia-Pacific region, China has taken the lead in the demand for adhesive tapes whereas in Europe, the demand of building and construction industry is fuelling the demand for adhesive tapes. Some of the key players operating in the global rubber based adhesive market include Swabs Tapes India Private Limited, MBK Tape Solutions, PPM Industries SpA, Godson Tapes Pvt. Limited, 3A Associates Incorporated, 3M Company, Tesa SE and Intertape Polymer Group, Inc

"Patent data shows 46% of total publication is pending applications. Higher percentages of applications point to a new or growing market"

2.Objective

- To perform detailed analysis of patenting activity pertaining to rubber based adhesives and to understand underlying technologies.
- To generate useful insights pertaining to rubber based adhesive technological field of study for the researchers at industry .
- Graphical representation of trends (Filing, Publication, etc.) from the mined data of relevant patents/applications.



3.Search Methodology

The first step is to create and define a patent set, whichthen serves as the basis of this study. Patent databases like Derwent Innovation have been used as our data sources. Search has been carried out in Abstract, Title and Claims fields of patent specifications by incorporation of Keywords and International Patent Classes.

4.Summary

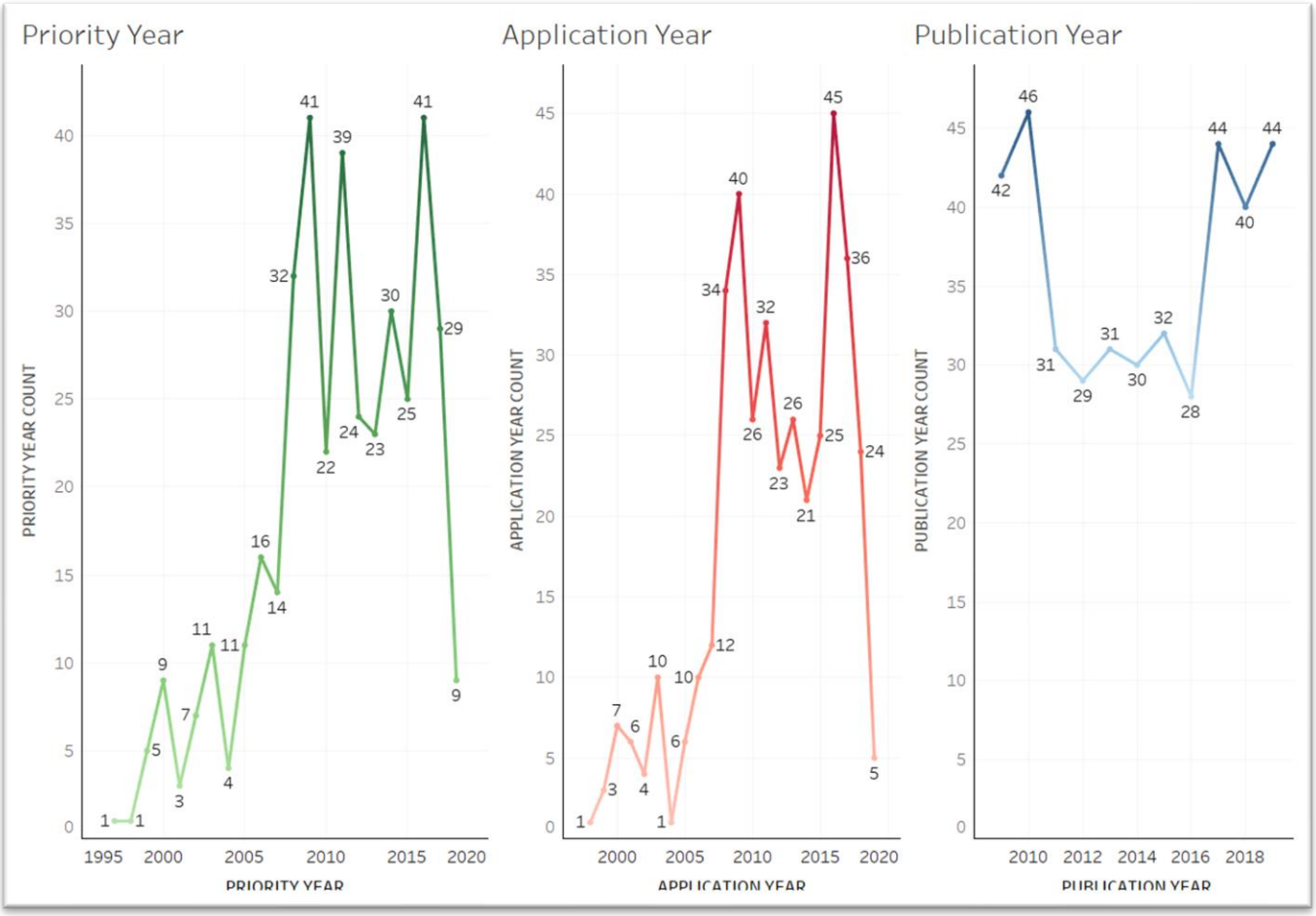
Overview	Global Patent Data	Technology Distribution
This report explores the global landscape of patents/ patent applications pertaining to rubber based adhesives.	A set of 397 patent families (that bifurcates to a total of 2587 individual patents/applications) filed in the rubber based adhesive domain were analyzed.	Patent publications particularly have focus on pressure sensitive adhesives (28%), liquid compositions (83%), solvent based adhesives (89%), ethyl acetate (47%) as solvent, synthetic rubber (53%), neoprene (93%) as type of synthetic rubber and electronic industry (15%) as major application area.

Volgograd State Technical University is the top global innovator in this domain with 35 patent families followed by BRIDGESTONE having 32 patent families.

Japan with 190 patent applicationsis the larget filing destination.

5.Non-Technical Analysis

5.1. Priority, Filing, Publication Year Based Trend Analysis

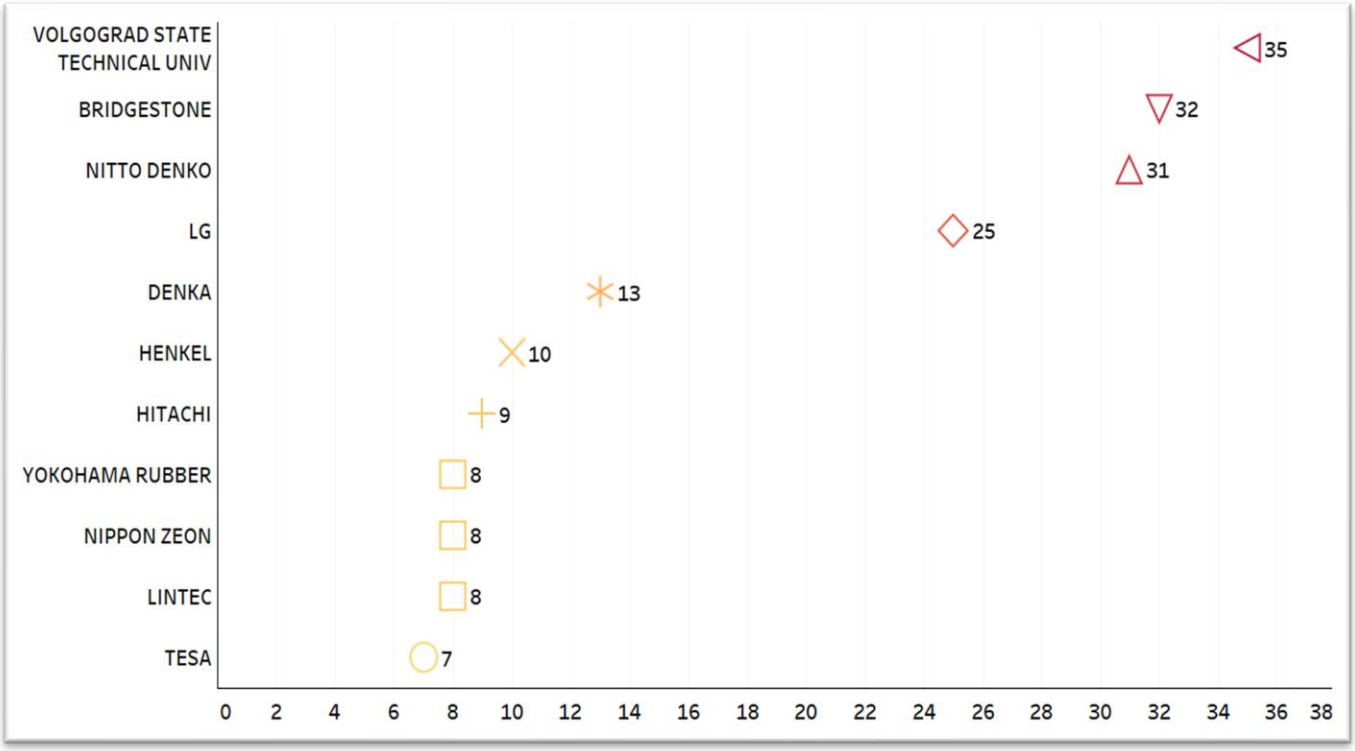


Note: Attributed to non-published patent applications, there may be a higher count in the years 2019-2020

Filing trend indicate a sudden spike of about 300% in the year 2008 which could be attributed to prolific filings by Volgograd State Technical Univ (16 patents/applications) and Bridgestone (14 patents/applications) during this period, predominantly in RU (16 patents/applications) & JP (12 patents/applications) jurisdictions in the field of pressure sensitive rubber based adhesives (7 patents/applications) and neoprene synthetic rubber based adhesive (12 patents/applications).

5.2. Assignee Based Trend Analysis

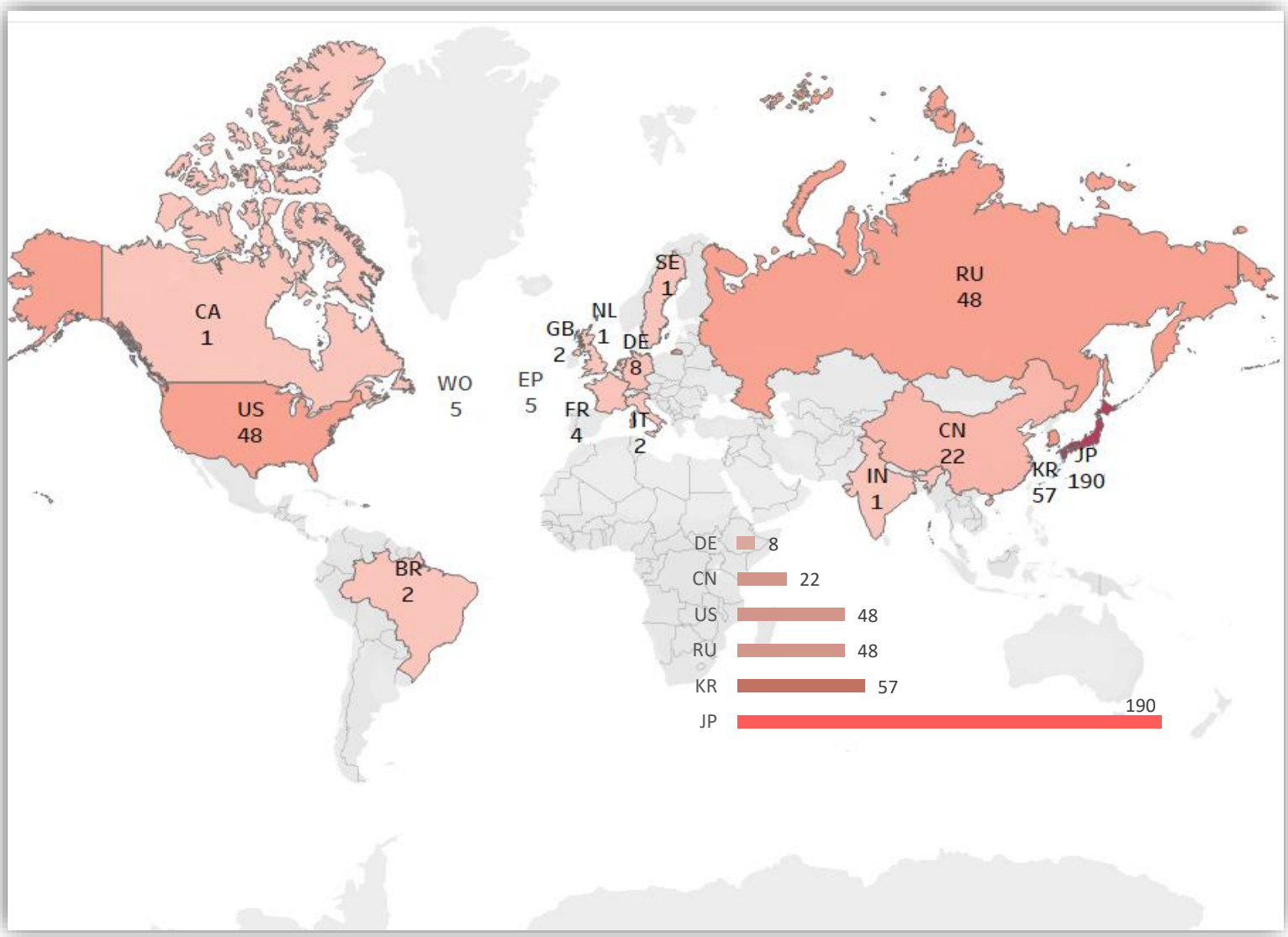
The below graph represents major assignees in the domain.



Volgograd State Technical University (35 patents/applications) is the top applicant/assignee. Allll other key applicants/assignees are companies Asia based. Volgograd State Technical University has all its filings originating in Russian jurisdiction with majority of the patents/applications belonging to the domain of neoprene synthetic rubber based adhesive (26 patents/applications).

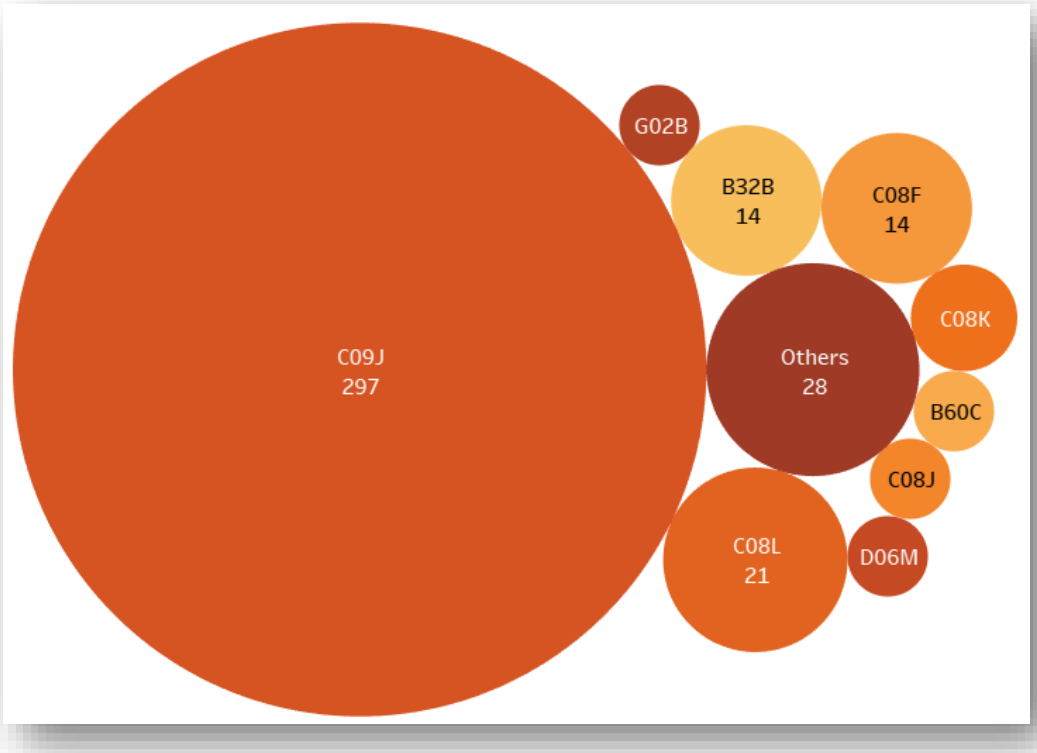
5.3. Geography Based Trend Analysis

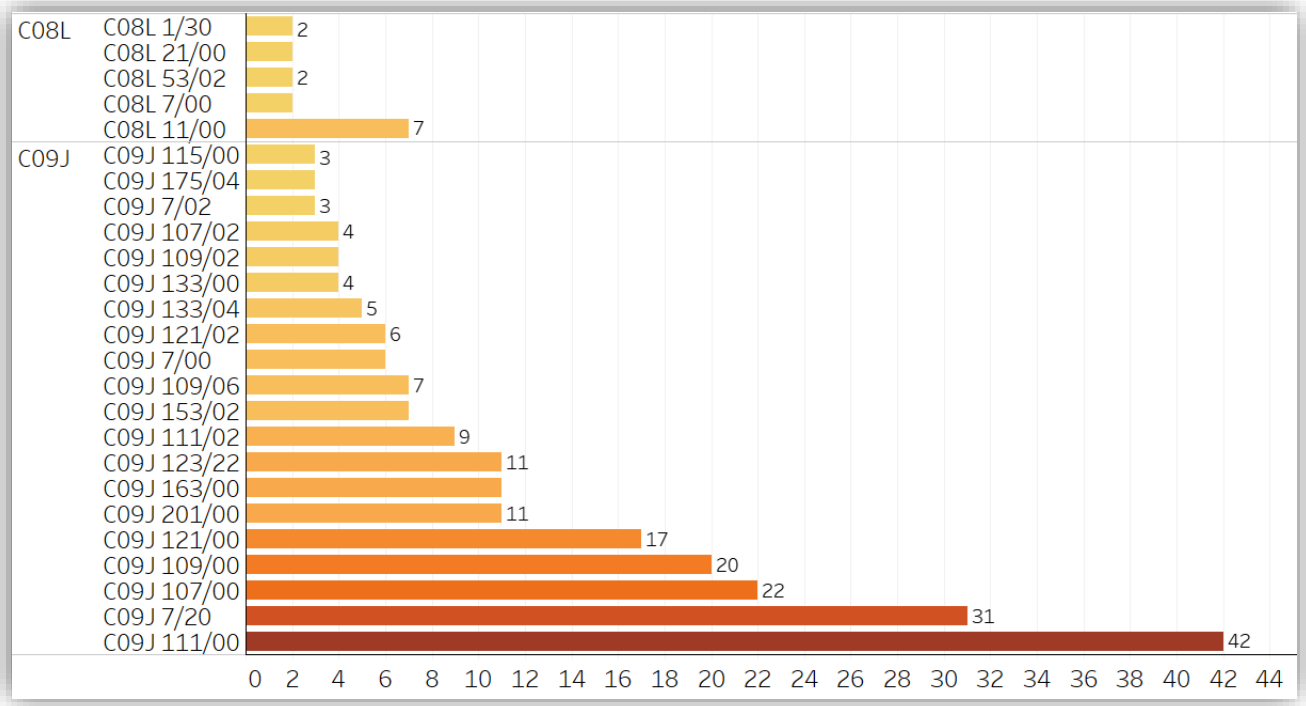
5.3.1. Geographical Distribution Of Patent Application Filings



Trend related to geographical filings demonstrate that the maximum number of filings had their origin in Asia, with Japan, emerging as the top jurisdiction. Nitto Denko (31 patents/applications) is the top assignee in JP jurisdiction primarily focusing in the domain of pressure sensitive rubber based adhesives (29 patents/applications).

5.4. International Patent Classification Based Trend



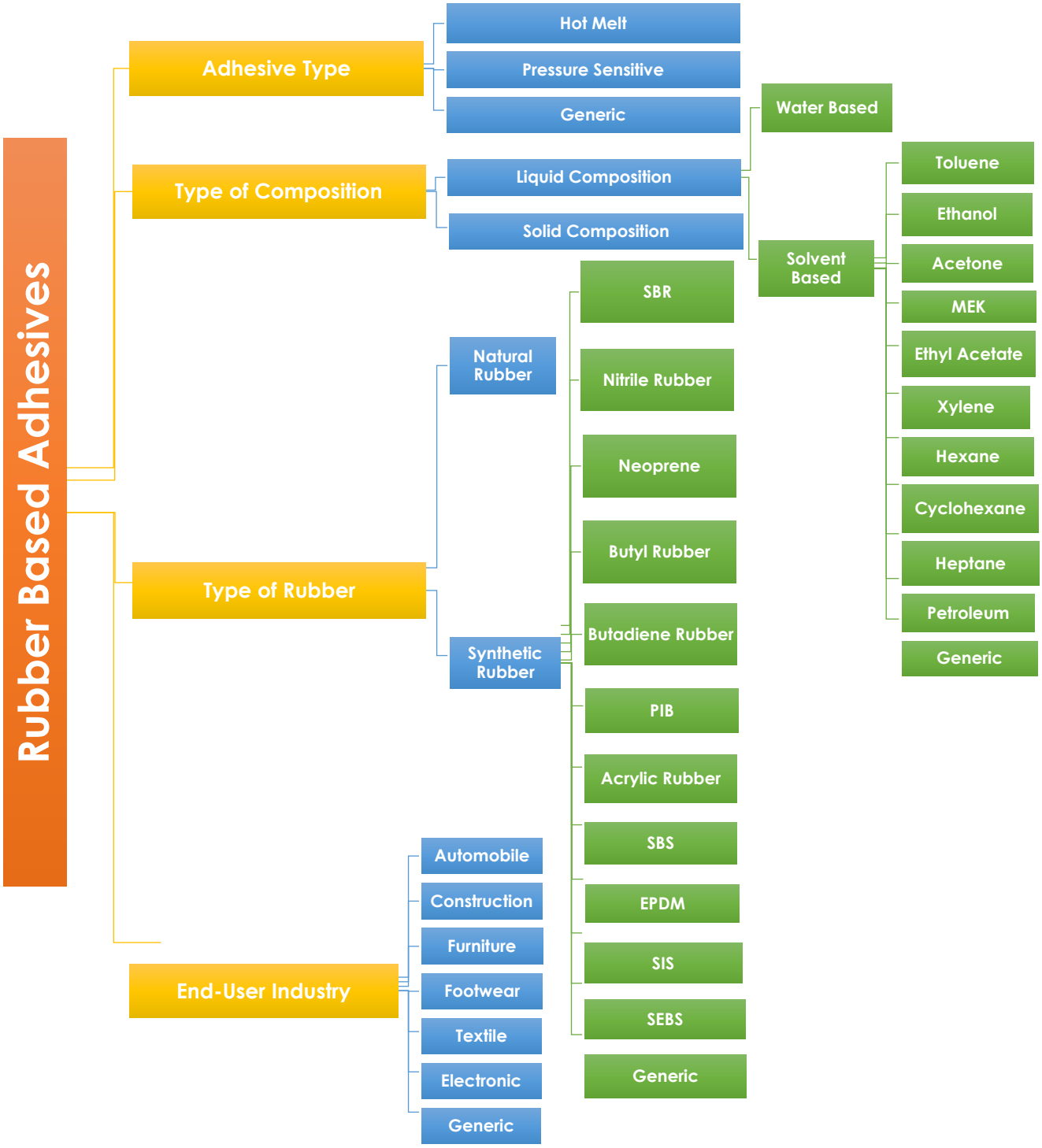


The IPC sub-class definitions are provided in Appendix B

6.Technical Analysis

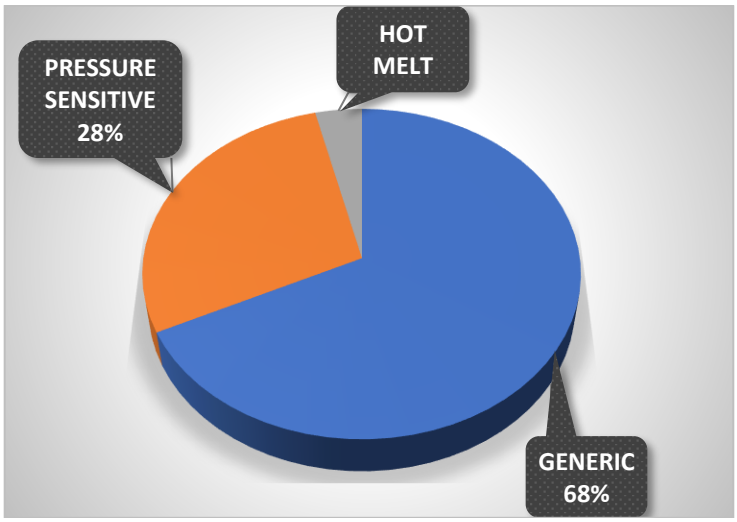
6.1. Taxonomy Developed For Bucketing Of Relevant Patent Documents

A set of 397 patent families were analyzed in depth to identify the focus areas of the patents related to Rubber Based Adhesives.

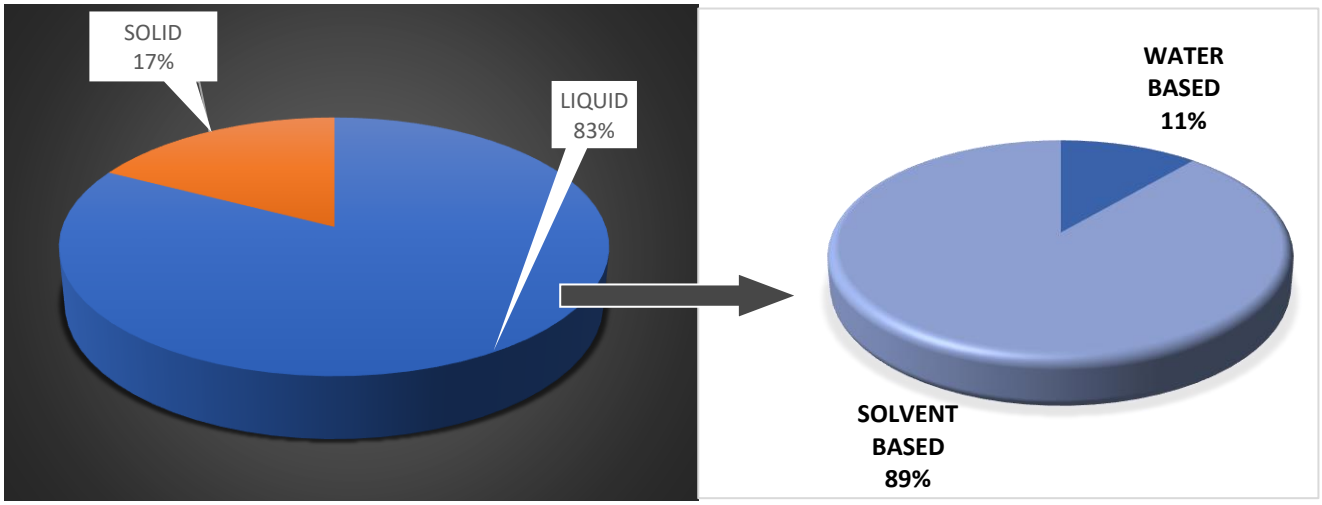


6.2. Distribution Of Patents/Applications Pertaining To Rubber Based Adhesives

Amongst the specific adhesive types, maximum number of patents/applications disclose pressure senstive rubber based adhesives mostly derived from natural rubber (58%).

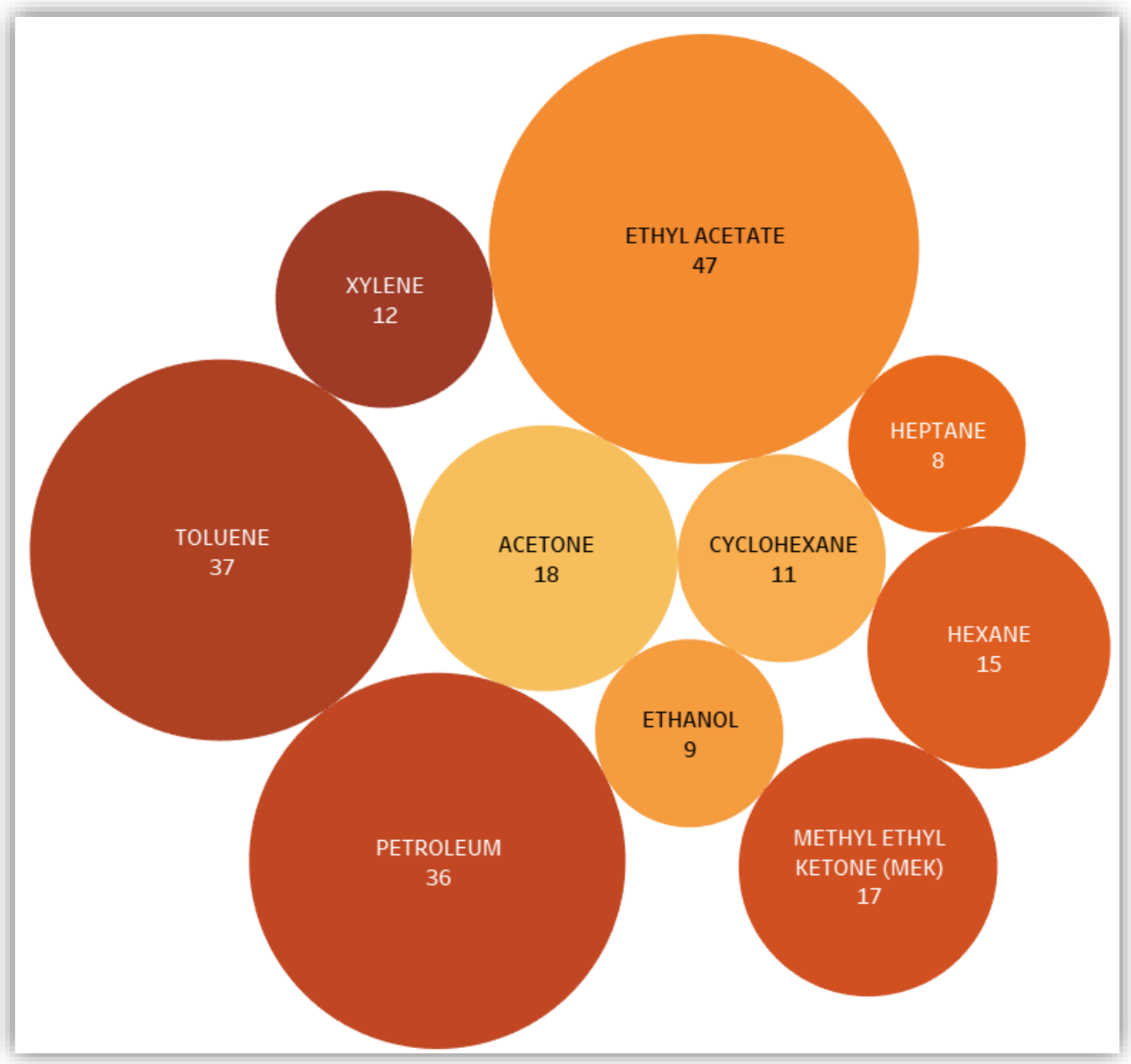


6.2.1. Dissection Of Patents/Applications Pertaining To 'Type Of Composition'



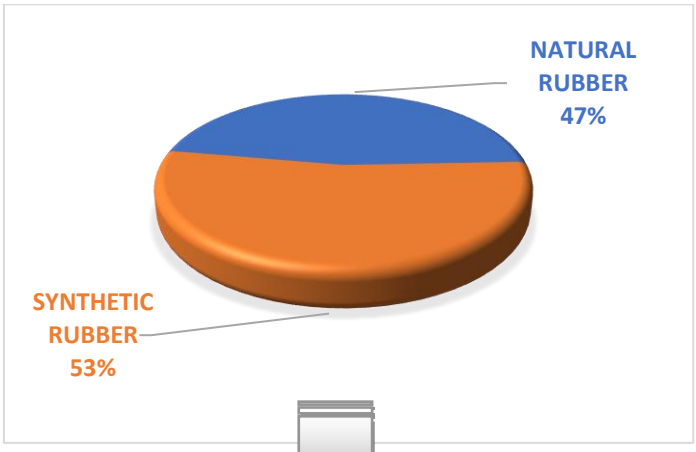
Maximum number of patents/applications are disclosing solvent based liquid adhesive compositions.

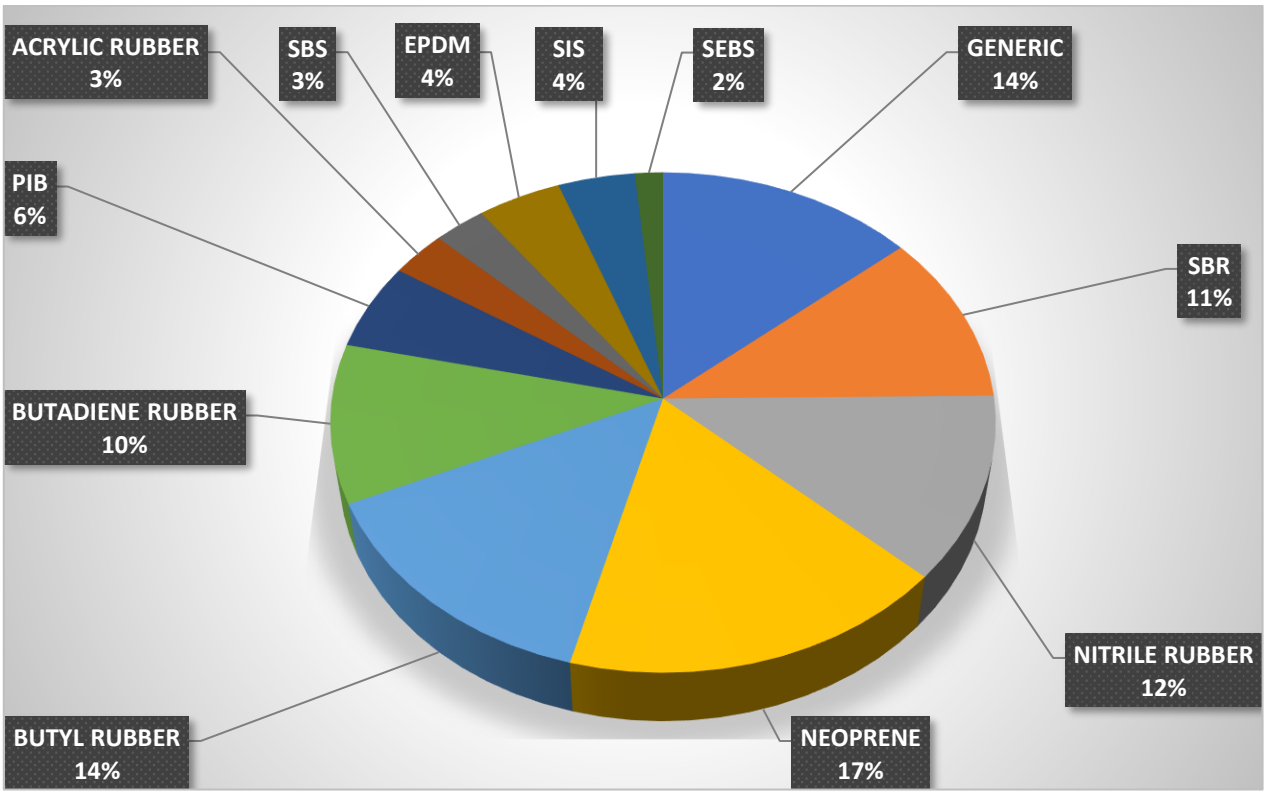
6.2.2. Dissection Of Patents/Applications Pertaining To 'Solvent'



Maximum number of patents/applications are disclosing use of non polar solvents such as toluene (37), petroleum (36), hexane (15), xylene (12), cyclohexane (11) and heptanes (8) for the preparation of liquid rubber based adhesive compositions.

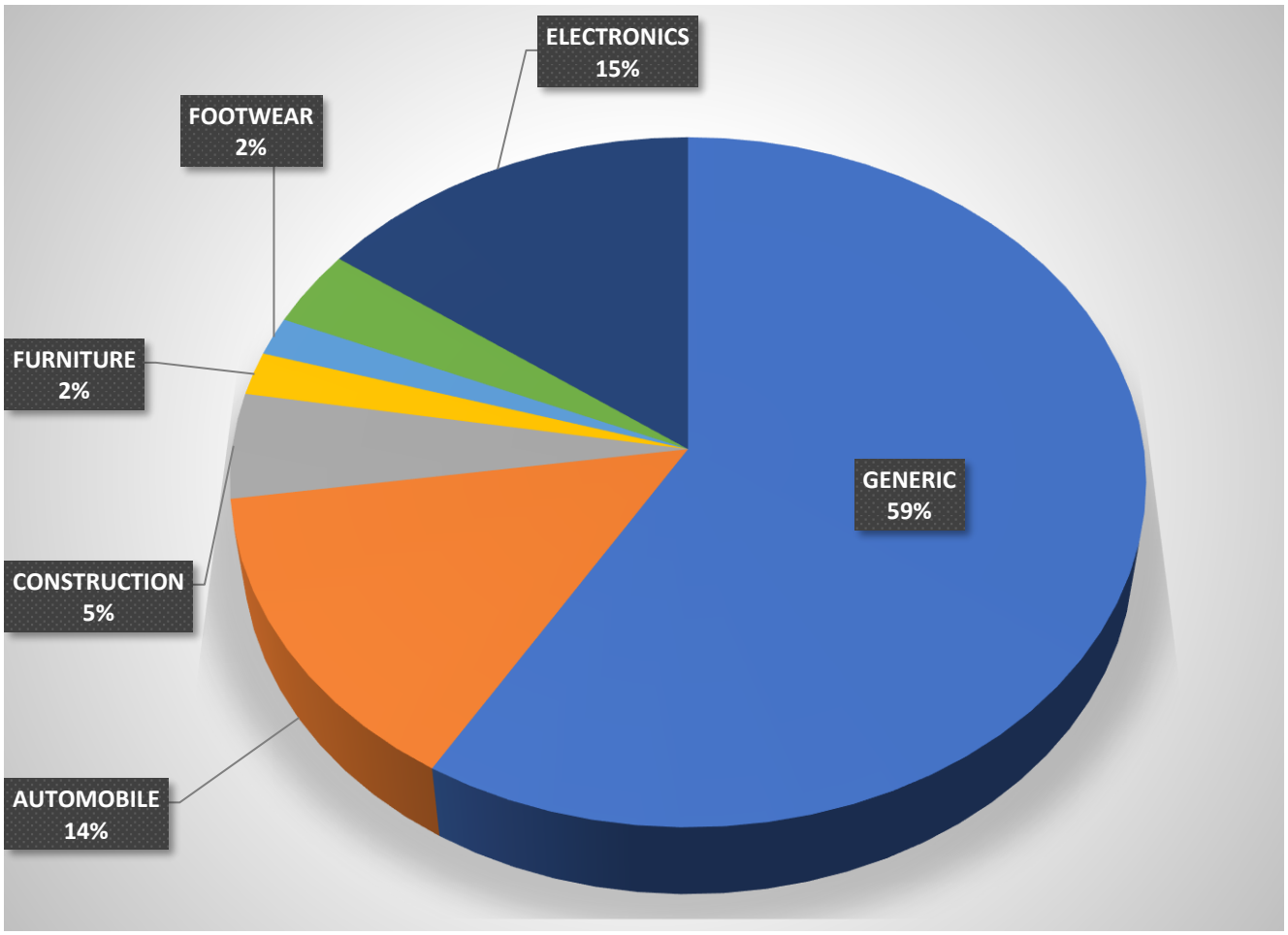
6.2.3. Dissection Of Patents/Applications Pertaining To 'Type Of Rubber





As evident from the chart, maximum number of patents/applications are disclosing use of Neoprene (17%), Butyl Rubber (14%), Nitrile rubber (12%) and SBR (11%) as the type of synthetic rubber for the preparation of rubber based adhesives.

6.2.4. Dissection Of Patents/Applications Pertaining To 'End-User Industry'

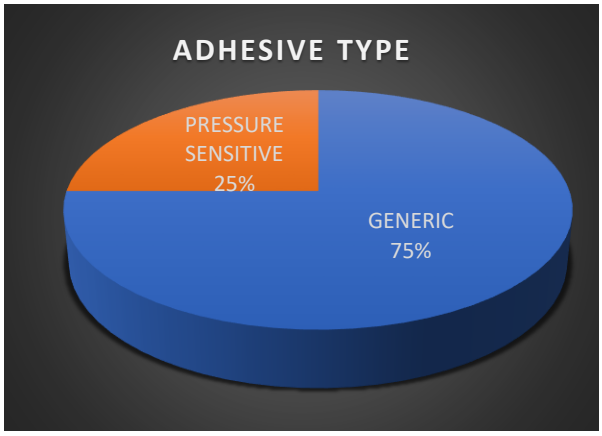


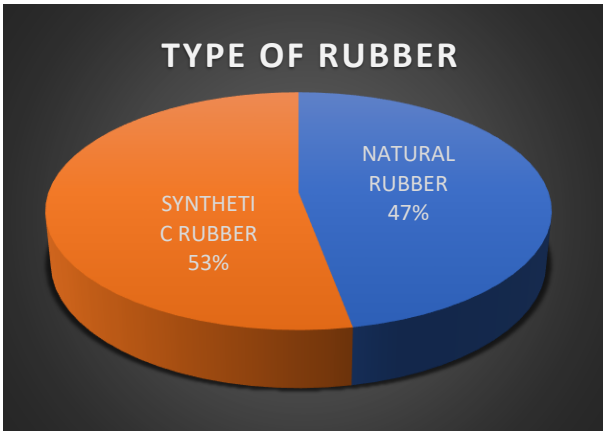
A significant number of patents/applications are disclosing use of rubber based adhesives in Electronics (15%) and Automobile (14%) sector.

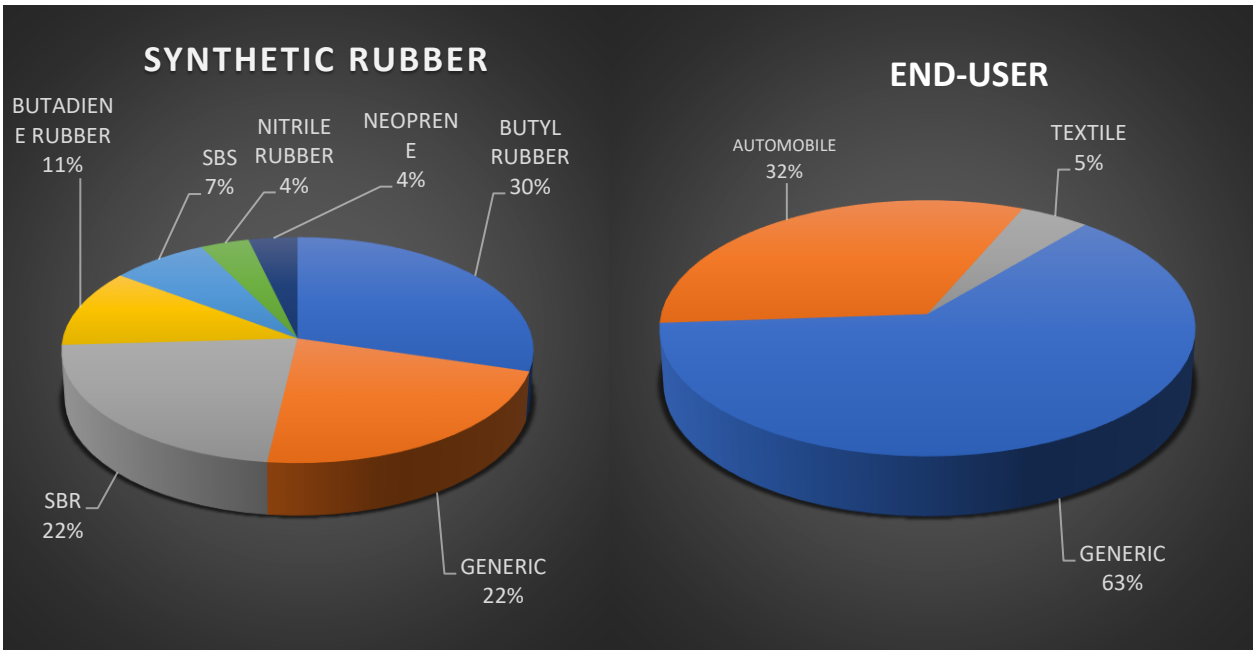
7. Patent Portfolio Analysis

7.1 BRIDGESTONE

Bridgestone is a Japanese multinational auto and truck parts manufacturer and is one of the largest manufacturer of tyres in the world.

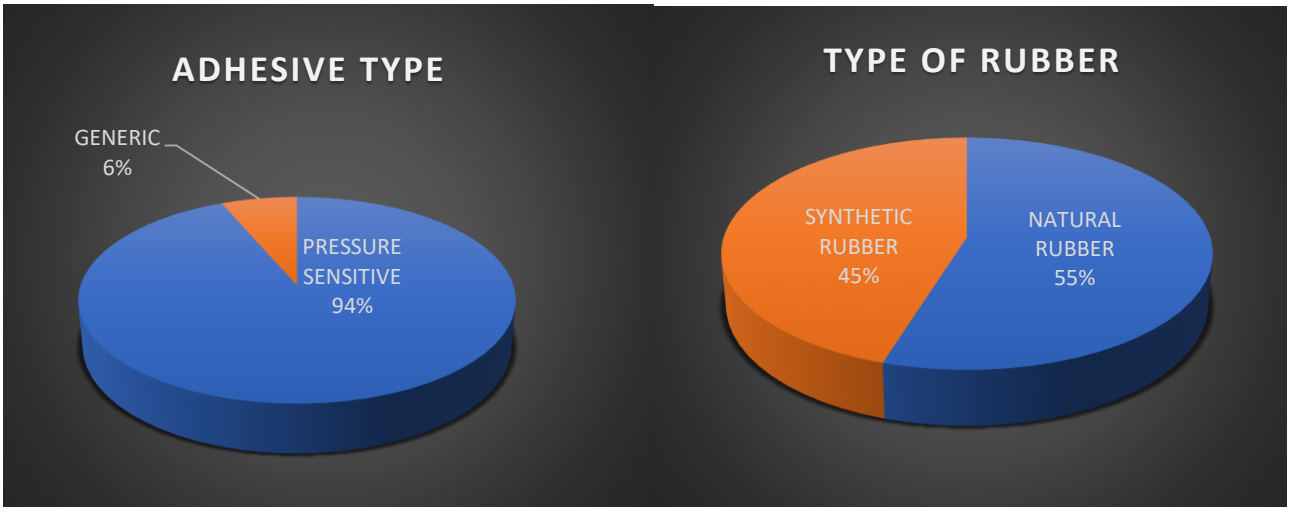


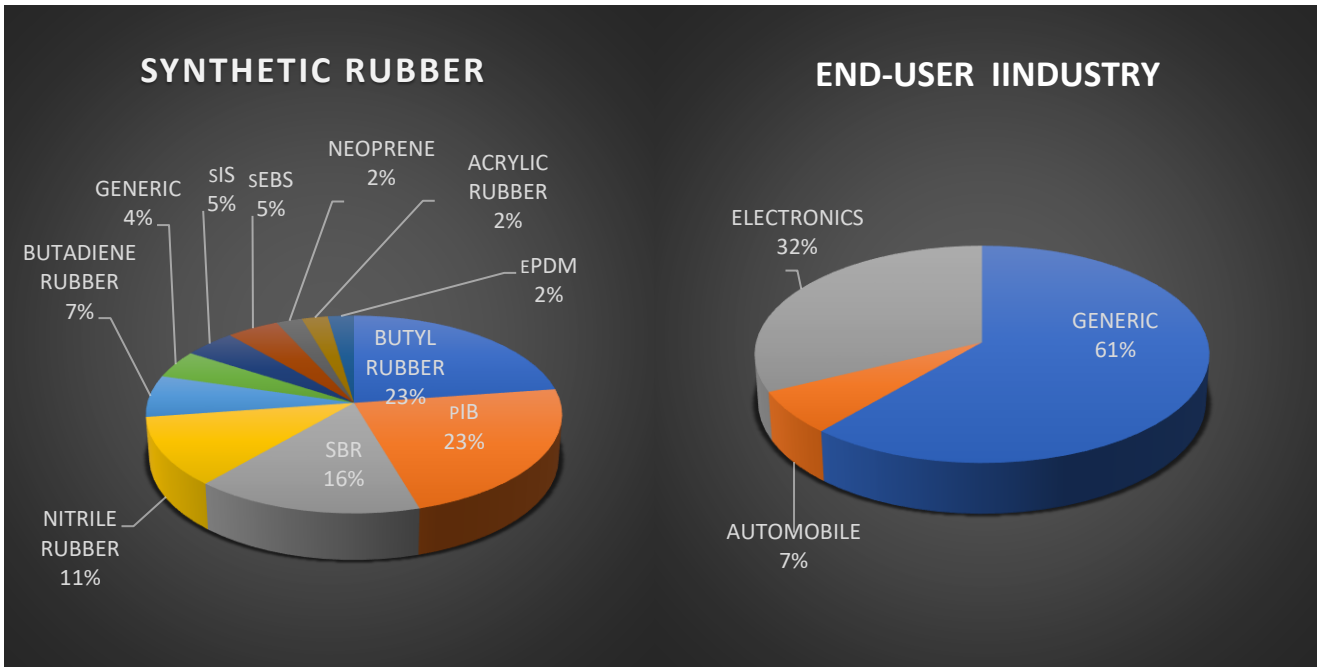




7.2 NITTO DENKO

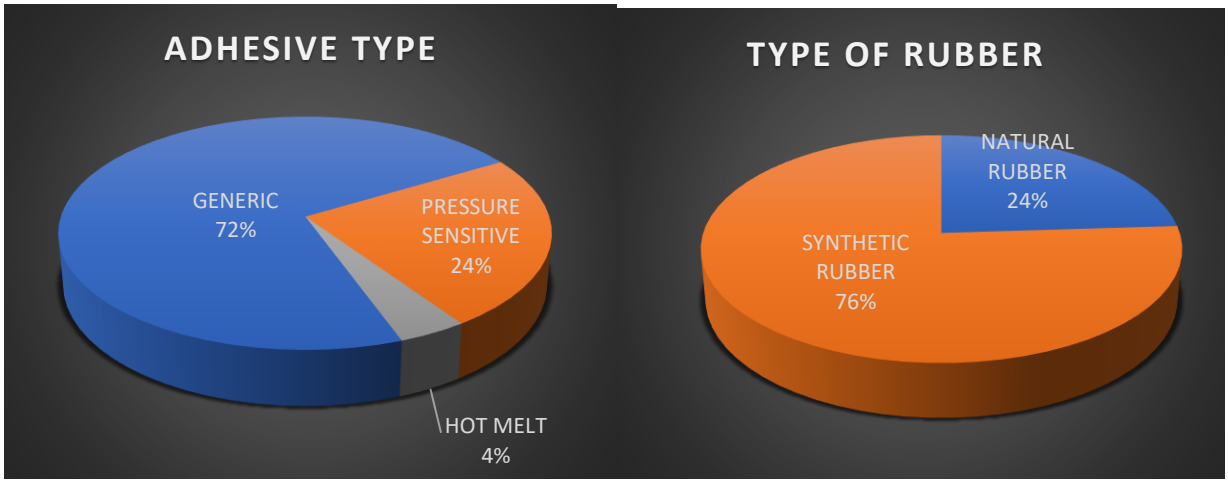
NITTO DENKO is a Japanese company which produces tapes, vinyl, LCDs, insulation and several other products. Adhesion technology is one of the core technologies onto which Nitto Denko is working, and the said tecnologiesincludes Adhesive Design, Adhesion Property Evaluation, Layering, Release, Substrate Design and Adhesive Synthesis.

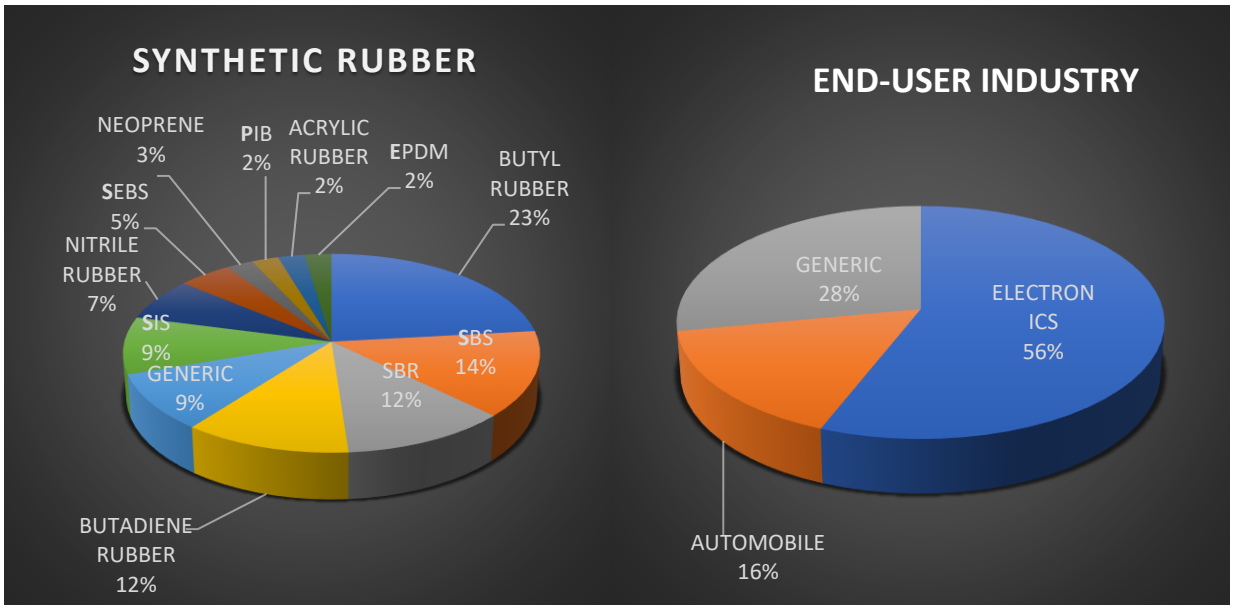




7.3 LG

LG formerly Lucky-Goldstar is a South Korean multinational conglomerate corporation. LG Chem is involved in manufacturing of Pressure Sensitive Adhesive, Butadiene Rubber, NBR LATEX, Styrene Butadiene Rubber, SBS, SB LATEX, etc.





8. Key Patents Assigned To Educational Institutes

Patent No.	Field of Invention
KR20190091865A KONGJU NATIONAL UNIV	The patent application relates to an adhesive composition used in temperature insensitive-type adhesive tape, comprises first rubber containing un-vulcanized natural rubber, second rubber made of synthetic rubbers, tackifying resin, anti-aging agent,and chloroprene rubber
RU2448997C2 VOLGOGRAD STATE TECHNICAL UNIV	The patent document relates to an adhesive composition based on chloroprene rubber, which can be used in the rubber industry when gluing together vulcanised rubber based on different rubber.
RU2374286C1 VOLGOGRAD STATE TECHNICAL UNIV	The patent document relates to an adhesive composition contains polychloropene rubber, nairit, butylphenolformaldehyde resin, zinc oxide, magnesium oxide, water and organic solvent.
CN108165205A BEIJING RUBBER INDUSTRY RES DESIGNING INSTITUTE	The patent document relates to a hot melt adhesive composition comprises high diene monomer content rubber, maleic anhydride-modified thermoplastic elastomer, tackifying resin, processing oil, filler, vulcanizing agent, and vulcanization auxiliary agent.
RU2527223C1 MOSCOW STATE UNIVERSITY	The patent document relates to an adhesive composition based on butadiene-nitrile rubber with content of acrylic acid nitrile 18% or 28%.

9. Appendix A - References & Credits

1. Adhesive Technology Handbook, 2nd Edition, Page 1, William Andrew
2. https://www.nationalgeographic.com/news/2010/6/100628-science-ancient-maya-aztec-rubber-balls-beheaded/
3. http://www.madehow.com/Volume-6/Rubber-Cement.html
4. Handbook of Adhesive Technology, 2nd Edition, Page 4, Pizzi and Mittal.
5. https://www.specbond.com/
6. https://www.tesa.com/en
7. https://www.researchgate.net/figure/Chemical-structure-of-styrene-ethylene-butylene-styrene-SEBS_fig1_276384350
8. Imran Khan (2011). Natural Rubber-Based Pressure-Sensitive Adhesives: A Review. Journal of Polymers and the Environment. Journal of Polymers and the Environment.
9. https://adhesives.specialchem.com/product/p-arlanxeo-therban-xt-vp-ka-8889
10. https://www.sciencedirect.com/topics/engineering/polyisobutylene
11. Hand Book of Adhesives and Sealants, Page 300, Edward. W. Petrei
12. https://www.adhesives.org/adhesives-sealants/adhesives-sealants-overview/adhesive-technologies/physically-hardening/water-based-adhesives/water-based-dispersion-adhesives
13. Adhesives & Sealants Market by Adhesive Formulating Technology (Water-Based, Solvent-Based, Hot-Melt, Reactive), Sealant Resin Type (Silicone, Polyurethane, Plastisol, Emulsion, Butyl, Polysulfide), Application, Region - Global Forecast to 2024
14. Rubber Adhesive Tapes Market - Global Industry Analysis, Size, Share, Growth, Trends, and Forecast, 2019–2027.

10. Appendix B – Definitions Of IPC Classes

IPC Subclass	Definition
B32B	LAYERED PRODUCTS, I.E. PRODUCTS BUILT-UP OF STRATA OF FLAT OR NON-FLAT, E.G. CELLULAR OR HONEYCOMB, FORM
B60C	VEHICLE TYRES
C08J	WORKING-UP; GENERAL PROCESSES OF COMPOUNDING
C08F	MACROMOLECULAR COMPOUNDS OBTAINED BY REACTIONS ONLY INVOLVING CARBON-TO-CARBON UNSATURATED BONDS
C08K	USE OF INORGANIC OR NON-MACROMOLECULAR ORGANIC SUBSTANCES AS COMPOUNDING INGREDIENTS
C09J	ADHESIVES; NON-MECHANICAL ASPECTS OF ADHESIVE PROCESSES IN GENERAL; ADHESIVE PROCESSES NOT PROVIDED FOR ELSEWHERE; USE OF MATERIAL AS ADHESIVES
C09J 7/20	ADHESIVES IN THE FORM OF FILMS OR FOILS; CHARACTERISED BY THEIR CARRIERS
C09J 111/00	ADHESIVES BASED ON HOMOPOLYMERS OR COPOLYMERS OF CHLOROPRENE
C09J 109/00	ADHESIVES BASED ON HOMOPOLYMERS OR COPOLYMERS OF CONJUGATED DIENE HYDROCARBONS
C09J 107/00	ADHESIVES BASED ON NATURAL RUBBER; LATEX
C09J 121/00	ADHESIVES BASED ON UNSPECIFIED RUBBERS
C09J 123/22	ADHESIVES BASED ON HOMOPOLYMERS OR COPOLYMERS OF UNSATURATED ALIPHATIC HYDROCARBONS HAVING ONLY ONE CARBON-TO-CARBON DOUBLE BOND; ADHESIVES BASED ON DERIVATIVES OF SUCH POLYMERS; NOT MODIFIED BY CHEMICAL AFTER-TREATMENT; HOMOPOLYMERS OR COPOLYMERS OF HYDROCARBONS HAVING FOUR OR MORE CARBON ATOMS; HAVING FOUR TO NINE CARBON ATOMS; COPOLYMERS OF ISOBUTENE; BUTYL RUBBER HOMO- OR COPOLYMERS OF OTHER ISO-OLEFINES
C09J 163/00	ADHESIVES BASED ON EPOXY RESINS; ADHESIVES BASED ON DERIVATIVES OF EPOXY RESINS
C09J 201/00	ADHESIVES BASED ON UNSPECIFIED MACROMOLECULAR COMPOUNDS
C09J 111/02	ADHESIVES BASED ON HOMOPOLYMERS OR COPOLYMERS OF CHLOROPRENE; LATEX
C09J 109/06	ADHESIVES BASED ON HOMOPOLYMERS OR COPOLYMERS OF CONJUGATED DIENE HYDROCARBONS; COPOLYMERS WITH STYRENE

C09J 153/02	ADHESIVES BASED ON BLOCK COPOLYMERS CONTAINING AT LEAST ONE SEQUENCE OF A POLYMER OBTAINED BY REACTIONS ONLY INVOLVING CARBON-TO-CARBON UNSATURATED BONDS; ADHESIVES BASED ON DERIVATIVES OF SUCH POLYMERS; VINYL AROMATIC MONOMERS AND CONJUGATED DIENES
C09J 7/00	ADHESIVES IN THE FORM OF FILMS OR FOILS
C09J 121/02	ADHESIVES BASED ON UNSPECIFIED RUBBERS; LATEX
C09J 7/20	ADHESIVES IN THE FORM OF FILMS OR FOILS; CHARACTERISED BY THEIR CARRIERS
C09J 133/04	ADHESIVES BASED ON HOMOPOLYMERS OR COPOLYMERS OF COMPOUNDS HAVING ONE OR MORE UNSATURATED ALIPHATIC RADICALS, EACH HAVING ONLY ONE CARBON-TO-CARBON DOUBLE BOND, AND AT LEAST ONE BEING TERMINATED BY ONLY ONE CARBOXYL RADICAL, OR OF SALTS, ANHYDRIDES, ESTERS, AMIDES, IMIDES, OR NITRILES THEREOF; ADHESIVES BASED ON DERIVATIVES OF SUCH POLYMERS; HOMOPOLYMERS OR COPOLYMERS OF ESTERS
C09J 107/00	ADHESIVES BASED ON NATURAL RUBBER
C09J 107/02	ADHESIVES BASED ON NATURAL RUBBER; LATEX
C09J 109/02	ADHESIVES BASED ON HOMOPOLYMERS OR COPOLYMERS OF CONJUGATED DIENE HYDROCARBONS; COPOLYMERS WITH ACRYLONITRILE
C09J 133/00	ADHESIVES BASED ON HOMOPOLYMERS OR COPOLYMERS OF COMPOUNDS HAVING ONE OR MORE UNSATURATED ALIPHATIC RADICALS, EACH HAVING ONLY ONE CARBON-TO-CARBON DOUBLE BOND, AND AT LEAST ONE BEING TERMINATED BY ONLY ONE CARBOXYL RADICAL, OR OF SALTS, ANHYDRIDES, ESTERS, AMIDES, IMIDES, OR NITRILES THEREOF; ADHESIVES BASED ON DERIVATIVES OF SUCH POLYMERS
C09J 115/00	ADHESIVES BASED ON RUBBER DERIVATIVES
C09J 175/04	ADHESIVES BASED ON POLYUREAS OR POLYURETHANES; ADHESIVES BASED ON DERIVATIVES OF SUCH POLYMERS
C08L	COMPOSITIONS OF MACROMOLECULAR COMPOUNDS
C08L 11/00	COMPOSITIONS OF HOMOPOLYMERS OR COPOLYMERS OF CHLOROPRENE; LATEX
C08L 7/00	COMPOSITIONS OF NATURAL RUBBER; LATEX
C08L 1/30	COMPOSITIONS OF CELLULOSE, MODIFIED CELLULOSE OR CELLULOSE DERIVATIVES; CELLULOSE DERIVATIVES; CELLULOSE ETHERS; ARYL ETHERS; ARALKYL ETHERS
C08L 21/00	COMPOSITIONS OF UNSPECIFIED RUBBERS; LATEX
C08L 53/02	COMPOSITIONS OF BLOCK COPOLYMERS CONTAINING AT LEAST ONE SEQUENCE OF A POLYMER OBTAINED BY REACTIONS ONLY INVOLVING CARBON-TO-CARBON UNSATURATED BONDS; COMPOSITIONS OF DERIVATIVES OF SUCH POLYMERS; OF VINYL-AROMATIC MONOMERS AND CONJUGATED DIENES
D06M	TREATMENT OF TEXTILES OR THE LIKE; LAUNDERING; FLEXIBLE MATERIALS NOT OTHERWISE PROVIDED FOR
G02B	OPTICAL ELEMENTS, SYSTEMS, OR APPARATUS

DISCLAIMER

IIPRD has prepared this sample report, wherein contentsof the report is based on internal evaluation of Patent Literature (Patents or Patent Applications) as retrieved from Patent Databases that are believed to be reliable by IIPRD. Being a sample report, complete list of patent documents retrieved/analyzed is not disclosed herein; however, it can be made available on request, subject to IIPRD terms and conditions though. IIPRD disclaims all warranties as to the accuracy, completeness or adequacy of the report. For preparing the report, patent literature searches (based on the keywords, IPC/CPC, etc.) were conducted and a dataset was retrieved, the dataset was then analyzed. The searching and analysis is subject to individual/researcher's discretion, neither IIPRD nor its affiliates, any of its proprietors, and employees (together, "personnel") are responsible for the authenticity of the data. The purpose of this report is not to formulate any sort of legal advice.

Delhi | Noida | Mumbai | Pune | Bengaluru | Hyderabad | Indore | Jalandhar |Chennai|
US | Bangladesh | Myanmar | Vietnam | Nepal | Malaysia | Sri Lanka

ABOUT IIPRD

IIPRD is a premier Intellectual Property Consulting and Commercialization/Licensing Firm with a diversified business practice providing services in the domain of Commercialization, Valuation, Licensing, Transfer of Technology and Due-Diligence of Intellectual Property Assets along with providing complete IP and Patent Analytics and Litigation Support Services to International Corporates and Global IP Law Firms.

Contact Person

Tarun Khurana

iiprd@iiprd.com, info@khuranaandkhurana.com

Contact No.: +91-120-4296878, 2399113, 2399010

Contact Details

Noida (NCR) Office – Head Office

E-13, UPSIDC Site – IV, Behind Grand Venice, Greater Noida, 201308

Visit us at

www.iiprd.com | www.khuranaandkhurana.com