R90087 **Cotton** [*natural polymer*]
BT Cellulose
BT Cellulosics

R01186 **Coumarone** [*polymer former*]
BT Non-vinyl aromatics monoolefinic
BT Monoolefinic
UF Benzofuran

{Coupling agent} [*additive*]
USE Adhesion improver D033

N4853 **Cracking** [*property*]
NT Environmental stress cracking
NT Stress cracking
BT Stress-strain properties
BT Mechanical properties
UF Crazing
UF Fracture surfaces

N8899 **Crates** [*application*]
BT Containers
BT Packaging

{Crazing} [*property*]
USE Cracking N4853

Figure 3. Thesaurus sample.

generic code and aspects). These smallest boxes can be linked at the second level to their function. In the example the monomers are linked to each other and to the concept ternary copolymer at this level. Also calcium stearate is linked to lubricant at this level; if there were other lubricants they too would be linked to "lubricant" in the same way. At the third level (the largest box), these classes of chemicals are linked together and linked to the concepts for injection molding, ground vehicles, and composition.

THESAURUS

To aid searching, a Thesaurus will be produced containing all main terms and synonyms in alphabetical order and will be fully cross-referenced.

The relationships between concepts within a hierarchy are indicated by the labels BROADER TERM (BT) and NARROWER TERM (NT). Synonyms are indicated by USED FOR (UF) and USE terms. Some terms are followed by SEE ALSO (SA) references to suggest other areas of related or similar technology. Scope notes have been incorporated where appropriate to indicate the extent or limitations of the concept. All of these features will be displayed within the Thesaurus (see Figure 3). In addition to the Thesaurus, there will be a hierarchical listing of all the concepts. This will display the relationships between concepts within a facet.

ACKNOWLEDGMENT

We thank all members of the Plasdoc Advisory Group for their assistance and support in the design of the new system and look forward to working with them during the β-testing. We also thank Joe Aggarwal and all members of the Derwent Plasdoc Coding Department, who have been continually involved in the enhancements, making suggestions, compiling statistics, and testing. At present, they are involved in in-house testing of all elements of the new system.

The IFI Polymer Indexing System: Its Past, Present, and Future[†]

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IFI/Plenum, producer of the CLAIMS online U.S. patents files, uses a unique system for indexing polymers based on their identification in terms of logical starting materials, broad classes defining the repeating units, and very often, descriptive concepts and polymer names. In addition, the Comprehensive Database (CDB), available by subscription, makes use of a special set of roles applied to the monomers to indicate that the material being indexed is polymeric in nature. These codes are linked to the monomers to indicate their claimed function and whether postmodification, such as crosslinking, has occurred. The system thus allows for polymer retrieval at both specific and generic levels. Examples of this indexing system are illustrated and some possible future linking enhancements for improving the precision and selectivity of polymer retrieval are discussed.

INTRODUCTION

Just the mention of the word "polymer" has been known to strike fear into the hearts of mere mortals and certainly, at the least, a sense of apprehension, if not foreboding, to an information searcher. The word itself sounds innocuous enough. After all, a polymer appears to be nothing more than a compound of very high molecular weight. What can be so menacing about such highly regarded materials as polyethylene or nylon or even, for that matter, the much maligned polystyrene? A searcher undoubtedly has nothing against polymers personally, except when it is time to search the literature for a specific one. Then these polymers seem to develop almost human-like "attitude problems". They either become very timid, not wishing to be found at all (i.e., no retrieval) or they run in large "gangs" and hope for anonymity in the crowd (i.e., many false drops). The key to finding the best way of tracking down these sometimes elusive quarries is to know their habitat (the system used to index them) and become familiar with their upbringing (the historical continuity of that index system).

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Then, maybe, one can put these "beasts" into perspective and deal with them in a rational, pragmatic, and above all, realistic way.

This paper will examine the polymer indexing–retrieval system used by IFI/Plenum Data Corporation, available online and via in-house computer tapes as the CLAIMS Comprehensive and Uniterm databases of U.S. patents. It is intended to be an overview of IFI's basic polymer indexing policies, touching on the most important aspects. Complete rules and details have been published.[1]

THE BEGINNINGS

The original Uniterm product created in the mid-1950's by IFI, then known as Information for Industry, was a dual dictionary of index terms for chemical patents used as a desktop reference tool. This was concept coordination in its infancy and adequate, perhaps, for the "good old days". Manual correlation of such indexed keywords may have been feasible when an entire month's chemical patent issue was considerably less than one week's worth today. Even the advent of in-house batch computer searching from magnetic tape in 1962 was not a total remedy.

The indexing done by IFI was, and still is, derived from the entire patent specification. In the earlier years, it was based primarily on the natural language of a patent. Polymeric materials were often particularly troublesome to deal with since they often masqueraded themselves in any number of disguises. A polymer could be "unpretentious" and be referred to by its given name, such as polypropylene. However, inventors often feel obligated to be somewhat evasive and identify them in more cryptic terms such as by their starting materials, by repeating units with no mention of monomers, or even by vague, if not sometimes incomprehensible, generic formulas. This wide variety of possibilities makes searching that much more frustrating when patentability, not just state-of-the-art, is the motivating force.

In these early days phrasing determined to a great extent what was indexed. With the ever increasing size of patent literature during the 1960's and 1970's and a parallel growth in polymer patents,[2] it became quite clear that a need existed to handle them and certain other technologies in a more systematic fashion. Simply adding more terms to a vocabulary was not the way to deal with these potential migraines. In 1971 we found our "aspirin": IFI acquired the rights to a Du Pont patent index and merged it with the existing Uniterm system. The products of this union are the polymer system used since 1972, as well as the fragmentation and role systems also currently applied to patents indexed by IFI.

Controlled but open-ended vocabularies (General, Compound, and Fragment Term Lists) were established through a lengthy consolidation process and, concurrently, the use of some older terms was discontinued. The postings to these terms had increased so much during the 1950–1971 time period that their value for search purposes had consequently declined. In an effort to reduce false drops, they were designated as "search terms only" (STO's) for the historical file, and the indexing of terms with greater specificity was initiated. It is worth noting that a significant amount of backposting and index upgrading has been, and is continually being, made to the back file with every reload. This is particularly valuable for polymer patents since the current indexing is generally much more precise than indexing done with STO's.

THE POLYMER INDEXING SYSTEM

The IFI polymer indexing system was designed to eliminate much of the guesswork involved in determining the alternate ways polymers are cited in patents. By incorporating redundant indexing and postup procedures, we allow for searching at several levels of specificity. Retrieval can be based on very broad descriptive terms such as THERMOSETTING RESINS and ION EXCHANGE RESINS when features other than the exact chemical structure are of primary importance. The indexing system also permits retrieval at more focused levels since it is highly unlikely that such broad descriptors alone would suffice for most searches. For example, terms that define just the inherent substructure or repeating functional groups of a polymer can be selected (such as POLYETHERS), or more specific terms which denote the actual composition of a polymer (e.g., the combination of monomers in a polymer, such as ETHYLENE OXIDE–PROPYLENE OXIDE COPOLYMER) can be selected. In this way, a searcher can easily handle a wide range of queries, ranging from the very broad to the more narrowly defined.

Definition. For our purposes, IFI defines a polymer simply as a molecular structure derived from the continuous linkage of "small", generally simple compounds. These structures, however, do need to have a minimum number of repeating units to be considered polymers. For polyethers and polyamines, more than 10 repeating units are required; all other polymer classes must have at least four repeating units. If the degree of polymerization is lower than this, the structures are considered to be distinct compounds and are treated somewhat differently, usually by way of fragmentation or with entries from our Compound Term List. In addition, we also classify polymers into two basic groups: addition and condensation polymers. Addition polymers have hydrocarbon backbones formed by chain reactions involving compounds containing active double or triple carbon bonds. By our rules, condensation polymers include those produced from any other kind of bifunctional monomer(s), usually, as the term implies, through the loss (condensation) of small compounds such as H_2O or HCl. These characterizations certainly are not novel.

Prescribed Monomers. One of the special features of IFI's polymer system, however, is its handling of starting materials, i.e., the compounds from which polymers are made. Retrospective to 1972, polymers are coded based on what we refer to as "prescribed" monomers. The use of such arbitrary starting materials eliminates much of the ambiguity at search by assuring retrieval of similar polymeric structures, regardless of how they were actually made. This helps in removing at least some of those aforementioned disguises.

These prescribed monomers are, above all, logical starting materials for their designated polymer classes. Some, such as those for the addition polymers, are, in fact, the actual monomers used in the industry to prepare the polymers. Otherwise, prescribed monomers are closely related derivatives of the actual starting materials. For example, a dicarboxylic acid compound would be the prescribed monomer indexed for a polyamide that was made from the corresponding diacyl chloride. Such conversions are most often applied to the condensation polymers since many different combinations of compounds can produce the same type of repeating unit. This policy, then, obviates the need to generate all the reaction routes by which the same basic polymeric structure can be derived. This means that a polymer with the name:

polyethylene terephthalate or PET

or one designated by the structural repeating unit:

-(-CO-(*p*-phenylene)-COO-CH_2CH_2-O-)$_x$-

or yet another described as:

the polymeric reaction product of ethylene oxide and terephthalic acid or its lower alkyl esters

would all be retrieved using the same search strategy.

If the actual starting materials are important, such as when a method of preparation is claimed instead of a composition of matter, these materials will be indexed also. For claims of this type, we would further include process terms to describe

Table I. Common IFI Polymer Classes

class	arbitrary monomer(s)
polycarbons	C=C or C≡C compound
polyethers	HO–R–OH
polyesters	HO–R–OH and HOOC–R′–COOH
polycarbonates	HO–R–OH
polyamides	H_2N–R–NH_2 and HOOC–R′–COOH
polyurethanes	HO–R–OH and OCN–R′–NCO
polysiloxanes	HO–Si(–R)$_2$–OH

the fundamental reactions involved, like addition polymerization or homopolymerization, as well as terms that detail other special aspects of the process, such as emulsion, graft, or irradiation polymerization. Any references to catalysts in claimed processes are always covered.

Arbitrary starting materials have been designated for a great many polymers. Most notable are the seven classes that IFI considers "common" because of their frequent occurrence. This group includes all the addition polymers, or "polycarbons", as well as six condensation polymer classes—polyethers, polyesters, polycarbonates, polyamides, polyurethanes, and polysiloxanes. The arbitrary starting materials for these are outlined in Table I. According to this table, it becomes apparent that the above mentioned PET examples, despite the rather diverse ways they were cited, would all be indexed similarly. Since the prescribed starting materials for a polyester are a diol and a dicarboxy acid, the monomers used to describe this particular polymer are ETHYLENE GLYCOL and TEREPHTHALIC ACID.

Because there is such a large variety of unsaturated compounds from which addition polymers can be produced, the "polycarbons" category is further broken down into numerous subdivisions (44 to be exact) to better characterize the monomers. The subdivisions are based on the heteroatom functional groups, if any, that the monomers contain; the relation of these groups to the site of unsaturation; the total number of double or triple bonds the monomer has; and whether the monomer is present in a homo- or co- (or higher) polymer. The subdivisions, or classes, are hierarchical in nature and are outlined in Table II. Each monomer is described by only one class term, that which appears highest on the list, and every monomer which becomes part of a polymer will have its appropriate class indexed. For example, a homopolymer of vinyl acetate would be posted to the class VINYL HOMOPOLYMERS/ESTER/, and a terpolymer of butadiene, styrene, and acrylonitrile would have the three classes COPOLYENES/CONJUGATED/, OLEFIN COPOLYMERS/AROMATIC/, and ACRYLIC COPOLYMERS/NITRILE/ indexed.

Roles. The members of this same list of "common" polymers have another significant indexing feature that provides for additional specificity at search. This powerful tool is available on the Comprehensive Database, or CDB, an enhanced subscription version of Uniterm.

In the CDB a system of roles is used to represent the function of a material in a patent. These roles are two-digit numeric codes which are applied to all chemical substances or concepts indexed by any of the IFI controlled vocabularies. They are mode indicators and define a substance as being either (1) present (i.e., a passive substance), (2) a reactant, or (3) a product, by the designations 10, 20, or 30, respectively. As many roles as are applicable are indexed for each substance. In this way, a searcher can require that a material be the *product* of a claimed process (role 30) or that it be a *reactant* in a claimed process (role 20). All polymer names, classes, and descriptors will be assigned one or more of these three basic roles.

A unique series of roles is assigned to compound terms to distinguish the indexing of polymer components, such as ethylene used as the arbitrary starting material for polyethylene, from the indexing of monomeric substances, such as a gaseous ethylene reactant. Each of the seven "common" polymer classes uses a different set of roles for the prescribed starting materials to identify the type of polymer repeating unit. These polymer roles are listed in Table III.

Although these polymer roles may seem a bit complicated to the uninitiated, they disclose a considerable amount of information. The first digit of the code indicates the function of the monomer within the polymer, i.e., if it is in a passive substance, in a reactant, or in a product, analogous to the 10, 20, and 30 concepts. In addition, this first digit also serves to differentiate between the indexing of a homo- or copolymer. Thus, monomer role designations with a leading 6, for example, VINYL CHLORIDE in role 61, indicate that a *homo*polymer *product* is being indexed. A leading 8, such as VINYL CHLORIDE in role 81, would indicate this monomer is part

Table II. Polycarbon Subdivisions (in Hierarchical Order)

acetylenic homopolymers acetylenic copolymers	acrylic homopolymers/acid/ acrylic copolymers/acid/
conjugated homopolymers conjugated copolymers	acrylic homopolymers/ester/ acrylic copolymers/ester/
homopolyenes/conjugated/ copolyenes/conjugated/	acrylic homopolymers/other/ acrylic copolymers/other/
homopolyenes/nonconjugated/ copolyenes/nonconjugated/	acrylic polymers/not specific/
allyl homopolymers allyl copolymers	vinyl homopolymers/amide/ vinyl copolymers/amide/
olefin homopolymers/cyclic/nonaromatic/ olefin copolymers/cyclic/nonaromatic/	vinyl homopolymers/ether/ vinyl copolymers/ether/
olefin homopolymers/aromatic/ olefin copolymers/aromatic/	vinyl homopolymers/alcohol/ vinyl copolymers/alcohol/
olefin homopolymers/acyclic/ olefin copolymers/acyclic/	vinyl homopolymers/ester/ vinyl copolymers/ester/
acrylic homopolymers/nitrile/ acrylic copolymers/nitrile/	vinyl homopolymers/halide/ vinyl copolymers/halide/
acrylic homopolymers/amide/ acrylic copolymers/amide/	vinyl homopolymers/other/ vinyl copolymers/other/
acrylic homopolymers/anhydride/ acrylic copolymers/anhydride/	vinyl polymers/not specific/
	homopolycarbons/other/ copolycarbons/other/

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Table III. IFI Polymer Roles (Common Classes)

	starting material roles					
	homopolymer			copolymer		
polymer class terms	PS[a]	RT[b]	PD[c]	PS[a]	RT[b]	PD[c]
polycarbons	41	51	61	71	81	91
polyethers	42	52	62	72	82	92
polyesters	43	53	63	73	83	93
polycarbonates	44	54	64	74	84	94
polyamides	45	55	65	75	85	95
polyurethanes	46	56	66	76	86	96
polysiloxanes	47	57	67	77	87	97

[a] PS = present. [b] RT = reactant. [c] PD = product.

of a *co-* (or higher) polymer *reactant.*

The second digit signifies to which of the seven "common" polymer classes the monomer belongs: a "1" is used for all polycarbons, a "2" for polyethers, a "3" for polyesters, and so forth.

With this in mind, maleic acid as part of a copolymer with styrene could easily be distinguished from maleic acid in a homopolyester with propylene glycol. In the former case, maleic acid would be assigned role 71, a "polycarbon" (or addition) monomer in a passive copolymer; in the latter it would be indexed in role 43, a polyester monomer in a passive homopolymer. By linking the appropriate roles to the desired substances

MALEIC ACID (link) role 71 or
MALEIC ACID (link) role 43

A searcher can increase precision tremendously over just searching for an arbitrary monomer alone. For a large number of polymers, the "ultimate" in precision is possible since they are indexed not only in terms of their monomers in the appropriate roles but also by specific bound polymer terms. Two such terms are MALEIC ACID–STYRENE COPOLYMER and POLYPROPYLENE MALEATE, which could be searched for the above-mentioned examples. Such polymer names are being added to the general term vocabulary on a regular basis.

Whenever indexing is done at the monomer level or by a specific bound polymer term, there is always a reference included to the class to which the polymer belongs. So, one will find an indexing term for POLYAMIDES in role 10 when HEXAMETHYLENEDIAMINE and ADIPIC ACID are indexed in role 45 or when POLYHEXAMETHYLENE ADIPAMIDE is indexed in role 10. This permits searching at the broader class level, if such is desired, and assures retrieval even when indexing includes more specific terms.

The system can further indicate that a polymer has been aftertreated or modified in some manner, such as by crosslinking or end-capping, by still another set of roles. By very much the same reasoning that produced our arbitrary starting materials, we also have a series of designated, or arbitrary, modifiers. Again, this is for ease of search. Compounds which become part of a polymeric structure as the result of an aftertreatment will be assigned the roles of that same polymer.

Collection Terms. Despite this postup procedure, a few years ago it was requested that we go even one step further to facilitate the search of certain concepts at yet a broader level. Since IFI generally indexes at the level of specificity of a patent, retrieval of "all condensation polymers" or "all hydrocarbon-only polymers" proved to be a tedious undertaking. Search strategy required using an extensive list of synonyms from the vocabulary to ensure thoroughness. Worse still was the request for information on *any* polymer (hopefully in conjunction with some other limiting concept group!) IFI consequently established a series of "collection" groups. All patents indexed by any term belonging to a particular collection category will automatically have its collection term also posted. So, for example, if the term POLYISOBUTYLENE were indexed for a record, the collection term HYDROCARBON POLYMERS/CT/ would be autoposted to that same record. These collection terms have been added back to 1950 for all indexed patents.

PROSPECTS FOR THE FUTURE

The IFI polymer indexing system is innovative in its design. It incorporates numerous outstanding features that offer searchers a course of action that has been proven to work. Many techniques are available for dealing with the diversity of polymer information needs. However, issues concerning relevancy are inevitably raised by our users. A sense of continuity in this paper would not be achieved, therefore, without a look forward, a little time devoted to outlining the hopes that IFI has for the future of its products.

As the human commodity—a searcher's time—becomes more and more valuable as well as increasingly scarce, it is becoming evident that we must once again address the issues of precision and recall. Because, as we were solving yesterday's problems, those old monomers were scrambling to develop a profusion of new alliances with one another.

As has been pointed out by Kaback,[3] it is vital to be able to eliminate documents from a search that "include the right bits of information but in the wrong context". The ultimate desire of every producer is to provide a database where false correlation would be a thing of the past, particularly in the polymer technologies. But, alas, such an ambition would require that every single polymer, new and old, theoretical or exemplified, replete with any post-processing substances or modifiers, be indexed as a separate item. Such precision, at a reasonable cost, is still, undoubtedly, many years off. What solutions, then, can be implemented today?

Many of the challenges posed by the indexing of polymer patents are peculiar only to patents. An inventor, often in verbose legalese, will usually describe a composition in very generic terms to obtain the broadest possible protection. His exemplary claim for a new pharmaceutical, for example, is customarily represented by an all-encompassing Markush structure that, ultimately, comprises an extensive list of permutations of optional and mandatory elements. While not every one of the combinations may have actually been synthesized, they should all be legally valid entities. Such is also true of, say, a novel terpolymer that could include numerous alternates for each of the three monomer groups, perhaps even a Markush for one of *them.* So, again, he is actually claiming not just one polymer but an extended family. IFI feels that every member of this family, even the so-called "paper compounds" are important and should be taken into account.

To index the Markush indicated above, IFI uses a rather sophisticated fragmentation system in which substructural pieces—functional groups and rings—are linked together in sets with their appropriate role indicators. A series of "must" and "possible" elements is utilized to permit searching positively for things that are required and negating out those that are not. This logic works quite well.

To cover the polymer family, we currently index all the monomers by their corresponding prescribed starting materials in all pertinent function roles. As mentioned before, the class to which the polymer belongs is also indicated as are any bound polymer names currently in our vocabulary. This policy guarantees that all the combinations of the claims, exemplified or not, are retrievable. A sample of polymer indexing with roles is detailed in Figure 1.

Here, a terpolymer is exemplified with three monomer groups, each of which has several alternates as members. By our current indexing procedure each monomer is indexed by its proper prescribed starting material with the appropriate role(s) for its class. Since these compounds form addition

TERPOLYMER OF (1) ETHYLENE OR PROPYLENE,
(2) (METH)ACRYLIC ACID, and
(3) VINYL ESTER OF C_2-C_4 ALKANOIC ACID

ROLES	MONOMERS	CLASS TERMS
(1) 71	ETHYLENE	OLEFIN COPOLYMERS/ACYCLIC/ 10
71	PROPYLENE	
(2) 71	ACRYLIC ACID	ACRYLIC COPOLYMERS/ACID/ 10
71	METHACRYLIC ACID	
(3) 71	VINYL ACETATE	VINYL COPOLYMERS/ESTER/ 10
71	VINYL PROPIONATE	
71	VINYL BUTYRATE	
71	VINYL ISOBUTYRATE	

SPECIFIC (BOUND) POLYMER NAMES

10 ACRYLIC ACID-ETHYLENE-VINYL ACETATE TERPOLYMER

10 ETHYLENE-METHACRYLIC ACID-VINYL ACETATE TERPOLYMER

Figure 1. Polymer indexing example.

polymers, the roles that will be assigned to them must be "polycarbon" roles, specifically those for copolymers or higher polymers. For illustrative purposes, it is assumed that the terpolymer is a passive substance (i.e., just present) so that all monomers would be given role 71 (see Table III). The individual members of group 3, noted generically as the vinyl ester of a C_2–C_4 alkanoic acid, are generated, and each is indexed as a separate compound. Next, each prescribed monomer will have its associated "polycarbon" subdivision indexed in role 10 (see Table II). If the same class applies to more than one monomer, such as OLEFIN COPOLYMERS/ACYCLIC/ for both the monomers ethylene and propylene, it is indexed only once. Finally, any bound polymer names which are in the current vocabulary for the combination of the three monomers is also included in role 10. Of the 16 possible permutations, two were valid index terms.

This indexing allows a searcher many access points for retrieval, from polymer name to class terms to specific monomer or any combination thereof.

Polymer Linking. Even using this monomer–role combination a searcher may run into some difficulties since monomers, unlike fragments, cannot at present be linked together. It is possible, then, that the individual monomers selected to exist simultaneously in a copolymer may, in fact, be alternates to one another. This can be seen in the above indexing example. If the searcher wanted references to a terpolymer of ethylene, vinyl acetate, and vinyl butyrate, said record would be retrieved because the indexing allows only the linking of roles to the monomers and not also the linking of monomers to one another.

Such false correlation stems from the inherent limitations of the system itself and cannot simply be remedied by a few cosmetic changes. If such were the case IFI, as well as several other producers, would have rectified the situation years ago.

Our programming staff has devoted many hours to the development of a new linking system that could be merged into the existing polymer system. The indexing procedures that we apply to patents necessitates some major revisions. It has been proposed that the additional use of letter codes be implemented to designate the alternates of a monomer group in any copolymer or higher polymer or when a polymer has been modified by the incorporation of another non-monomeric substance. Our intention was to provide the data to our online hosts and have them store the information in a series of linkable subfields (as templates). This would minimize the actual storage space needed since each component of a subfield would be listed and stored only once, in its appropriate group. This, however, proved to be a processing nightmare, and because of current host software restrictions, search logic for retrieving one of the unique combinations possible from these subfields would be, apparently, convoluted at best.

The other recourse is to generate all those individual family members. This may be relatively easy when dealing with the straightforward associations of most addition polymers. We are familiar with other files where such database structure is currently in use. It becomes more laborious, both in the indexing and subsequent data manipulation aspects, when one reckons with the likes of a polyurethane made from a partially blocked isocyanate and a chain-extended epoxy resin, cross-linked with a polyamine. We would seriously want to cover this scenario as well. Add to this the desire to link in uses, properties, and additives, and it becomes obvious that this is no minor undertaking.

So, this paper may be more of a status report on the progress of our endeavors than on the disclosure of a "cure-all". IFI is actively engaged in finding the best vehicle for these linking enhancements and is investigating other alternatives for data storage including the possibility of CD-ROM's. The product may be a stand-alone one and perhaps not tied in with other current CLAIMS files. The indexing programs are in place in a few of our input terminals and will be subject to much fine-tuning, scrutiny, and trouble-shooting in the months to come. We hope to generate test data soon and be better able to evaluate the feasibility and cost effectiveness of this linking proposal.

CONCLUSION

IFI has always been a customer-oriented organization, from its simple beginnings when it provided products in book format to the present-day of supplying a series of online files. We continually strive to improve whenever possible. Keyword indexing has always been a valuable retrieval tool. We feel that our approach, especially the sophisticated role system, is one that can prove very beneficial to a searcher, particularly when applied to polymer patents where it can serve to hone that retrieval tool. The incorporation of more enhanced linking capabilities can only serve to put an even finer edge on it.

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