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Proprietary CTI

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In the July 2011 issue of the Carmagen eNews, George Swan introduced the use of Competitive Technology Intelligence (CTI) as an important element in developing a good business plan. That article focused on patent searching and systematic (computerized) evaluation of technical threats to a commercial position. Consideration of patent timing, intensity, and focus can lead to a "map" of competitor Intellectual Property (IP) strategies. This article continues to examine CTI tools focusing on the use of non-patent sources to determine how IP fits into competitor strategies.

Every company operates differently using equipment, process conditions, and practices that allow it to successfully participate in a market economy. Collectively, the underlying concepts represent a company's IP that can be protected in three ways: patents, published papers, or proprietary practices. An IP strategy combines these tools with the objective of maximizing a company's competitive advantage as part of an overall strategy.

Evaluation of competitive IP strategies begins with recognizing the role of each type of IP:

- Patents provide a maximum potential benefit because they offer both a potential source of licensing fees and freedom of action. However, the process of obtaining a patent is not only slow and expensive but also may reveal technology early (applications are published at 18 months). In addition, patent litigation hanging on technical details can be expensive and drawn out. Nevertheless, patent application is a form of publication that can serve at least to provide freedom of action.
- Publications provide freedom of action somewhat more rapidly. Publications that include new science and technology must be considered in context. If new technology is published, rather than patented, it may indicate that the authors are concerned with competition. Alternatively, it may indicate that they have developed a technology that is good science but not economically feasible (yet). Finally, publication may be the final act of terminating a line of development.
- Proprietary IP allows a company to maintain a competitive advantage only until its concepts are revealed. IP that is held proprietary is vulnerable. If the IP is published by others, that benefit vanishes as competitors can adopt it without penalty. If a competitor files a patent on the proprietary IP, the concept will be revealed upon publication of the application and, if issued, use could be blocked by a competitor.

A company strategy incorporates not only technical concepts but also business needs. In the petroleum industry, IP concepts are applied to meet specific goals that are driven by factors such

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- Course 1302, *Relief System Design*, November 8-10, 2011
- Course 1613A, *Turnaround Best Practices – Planning, Scheduling, and Management of Shutdowns*, November 15-17, 2011

Work Highlights

Process, Operations, & Safety

- *Provided technical expert litigation support on a case involving an engineering company, licensor, and personnel connected in a safety-related incident at a refinery.*
- *Completed revamp process design of MHO modifications on FCCU flue gas system based on a domestic client's new operating parameters, including some mechanical assessment details. Package was accepted by owner, and work included involvement with vendor of new slide valve.*
- *Provided full-time process design support at licensor's technical center.*
- *Participated in independent project review of overseas client's hydrogen plant systems.*

as cost and availability of feedstocks, market-determined product slate, refinery complexity, and governmental regulations. Typically, a company will develop different IP strategies for several technology areas contributing to its business success.

Competitive IP strategies can be discerned when information databases covering technical and business practices are evaluated in concert. This begins with the development of the taxonomy of the technology, i.e., a framework that can put technical concepts in business context. With this taxonomy as a guide, scientific, engineering, and business databases can be searched. Statistical and filtering algorithms may be applied to make sense of a vast and apparently chaotic body of information that this generates. Sub-searches of references in each area of the taxonomy can identify active competitors, key personnel, intensity of effort, and history of involvement. If the taxonomy is well constructed, it will include "enabling technologies" and areas with potential as "game changers." A taxonomy is created that included technology and business factors.

CTI assigns a strategy on the basis of taxonomy information for each competitor. This requires experienced industry experts who can apply their deep knowledge of petroleum technology and business worlds. Superimposed on the individual portions of the taxonomy is the overarching arena of research where the IP strategy comes into play. Protection of the technology that can give a competitor an advantage should be included in an overall strategy.

As an example, consider CTI for refinery naphthenic acid corrosion in the 1990s. New acidic low sulfur crudes from the North Sea, West Africa, and China were being introduced. Since these crudes were corrosive in pipestills and caused unusual product qualities, these "high TAN" crudes were being offered at deep discounts. IP strategies for practices related to refining high TAN crudes appeared to include proprietary activities for all competitors. Published reports by individual competitors, joint industry programs, vendors, and suppliers revealed a few specific areas of emphasis among competitors. Consequently, CTI was sought to determine how IP fit into the overall strategies among various domestic and European refiners.

Basically, there were four contributing areas affecting competitor strategy: the crude market, refinery alloys, flexibility in crude blending, and options for TAN processing (Figure 1).

- Crude marketing affected both the sale and purchase of high TAN crudes. Producers and refiners attempted to maximize profitability by manipulating posted TAN discounts. This was influenced by upstream/ downstream integration. Crude purchase information from public shipping and import records identified refineries processing high TAN crudes. Refinery configurations (available tankage and product slates) revealed blending flexibility. Perceived long term availability of discounts and the introduction of additional high TAN crudes influenced strategies.
- Refineries with equipment fabricated using high alloys or acid resistant cladding were identified, but other negative properties of the high TAN crudes limited the % of high TAN in runs. Vendor reports indicated refinery alloy upgrades were limited to specific areas.
- Blending at low concentrations was widely used to capture the value of high TAN discounts. To minimize the risk, blending strategies relied on proprietary engineering models, increased monitoring, and corrosion inhibitors. These were backed by field tests. Research on models, instruments, inhibitors, and corrosion testing was sponsored in a number of joint industry projects. Reported results provided insights into competitor activity.
- TAN conversion processes were described in both patents and open publications. Few of these published techniques appear to be practiced in refineries.

The result of the information taxonomy allowed identification of companies with interest in running corrosive crudes.

Strategies for fully integrated oil companies differed from refining companies. With upstream interest in marketing high TAN crudes, integrated companies were active in researching new options in blending or TAN conversion. On the other hand, independent refining companies limited their activities to field testing inhibitors and instrumentation that facilitated blending. By combining the business and technical activities, it was possible to construct an IP "intensity profile" for competitors (Figure 2).

It was clear from this analysis that refiner strategies were largely based on blending with vendor support in inhibitor and instrumentation application. A very limited number of independent refiners used alloy equipment to handle high TAN crudes, while a number were capable of blending the crudes at high dilution. On the other hand, integrated company strategies differed.

- Integrated A: To maximize return on high TAN equity production and refining by capturing much of the spot market. It was the largest buyer and a major producer. Its patent and publications indicated active fundamental research in both ancillary blending techniques (inhibitor, acid characterization, and monitoring equipment), but little was revealed on refinery practices that appeared to remain proprietary.
- Integrated B: Profit by selling engineering support and gathering field data on other refiner's equipment. It was neither a producer nor refiner of high TAN crudes. It offered its engineering services based on a proprietary model.
- Integrated C: To utilize alloyed refinery equipment to capture its equity, lower volumes of high TAN crude. Field research focused on monitoring techniques. This competitor did not appear to use IP in its strategy.
- Integrated D: To maximize return on equity production in existing refineries while evaluating monitoring and inhibitor applications with little IP input.
- Integrated E: To maximize its return on high TAN production and refining. Similar to Competitor A but with emphasis on upstream and refining (relying on inhibitor vendor IP). Less intensive research in conversion and instrumentation suggested low IP involvement in its strategy.

As noted earlier, applying CTI to determine the role of IP in a competitor's business plan requires experienced industry experts. Literature searches and taxonomies can be generated from keywords, but a deep knowledge of petroleum technology and the commercial world is needed to distinguish between "breakthroughs" (game-changing technology) and "breakdowns" (revelation of "good science" rejected as technologically impractical). This expertise often resides in consultants with years of experience in related research.

About the Author

Win Robbins has extensive analytical expertise in the areas of reactive sulfur/naphthenic acids characterization, HPLC-2 ring type definition technology, and polynuclear aromatic hydrocarbons (PNA) characterization.

Please contact Jerry Lacatena (jlacatena@carmagen.com) if you'd like more information on Carmagen's expertise in this area.

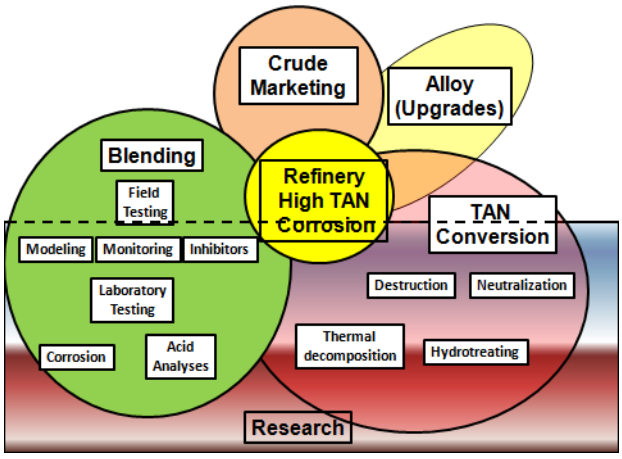

Figure 1 – Factors Influencing High TAN Crude Strategies

Integrated	Discoveries	Production	Refining (Blending)	Engineering Services	Alloys	Field Studies	TAN Conversion
A							
B							
C							
D							
E							
Independent							
A							
B							
C							
D							
E							

Intensity	
High	
Moderate	
Mid-level	
Marginal	
Low	
None	

Figure 2 – High TAN Crude Corrosion Activity Intensity Profile