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Consultants in Advanced Materials

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Selection of Projects focusing on New Product Development

Identifying system and materials for medical device in order to circumvent patent

A client wanted to develop a medical device for an emerging therapeutic application, but faced an established company with a patent portfolio that prevented developing a competing device that operated using the most obvious and simple physical principle. In this study we determined if there were any materials or systems that could obviously circumvent the patent. In the process we showed that some special materials that the incumbent company use are unnecessary. The key process associated with the device was heat transfer, so we examined the parameters and limitations of alternate approaches and materials. In the end we proposed a specific system where a supplier had developed a product that met the basic functional criteria for another industry. We also determined that the system should in theory work as well if not better than the established product. The client engaged us on a second stage to further investigate this technology and develop a theoretical working system based on this analysis, and to investigate more detailed potential road blocks.

Search for a time indicator technology

Our client who is a market leader in a consumer goods area was interested in incorporating a time indicating device in their high volume product. Our mission was to explore all potential technologies that could be used for this purpose while meeting some criteria laid out by the client including ease of use and target cost. We explored both electronic and chemical time indicators and evaluated each solution for relative merits vs. drawbacks. We also identified partners that are willing to work with our client in an exclusive manner for their market.

Orthopedic joint replacement

In a continuation of an initial technology assessment on emerging orthopedic joint replacement trends, we pursued our investigations with the specific request from our client to drive the process to a selective interviewing process in order to select two to three partners for new product development. This has allowed our client to acquire strategic patent rights at a very competitive price and enter a development phase that will enable them to keep a technology driven leading market position.

Search for novel surface modification technology

We assisted a client's R&D group in the automotive industry concerning surface engineering and surface modification for fuel cells. There are many conventional approaches in this field, which already had been tested and deemed inadequate. We identified some novel approaches to modifying the surface properties and identified

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partners and suppliers for future development. We also provided some theoretical insights regarding some of the fundamental scientific principles behind one approach.

Search for thermal insulation material

Our client is a market leader in the consumer packaged goods area. They are interested in developing temperature-controlled packaging to improve portability of their goods. They assigned us the task of identifying and assessing various insulation materials that could be used in their packaging while satisfying stiff performance criteria. We identified several potential candidate materials and new technologies that can be used for their application and evaluated them in terms of insulation capability, processability and cost.

Search for alternative welding methods

A client that manufactures products for flat roofs was looking for alternative and competitive welding methods for their insulating membranes program to better meet environmental requirements. We targeted specific welding methods and developed a comprehensive list of 10 different techniques that were evaluated in terms of power requirements, security issues, handling complexity and costs. We subsequently recommended the most suitable approach, which also could be protected by intellectual property positions.

Third party management for R&D polishing test trials

Following a preliminary assessment study, we managed key partners with innovative polishing know-how to conduct R&D trials for our client. This strategy to work on a blind basis with third parties enabled a qualification procedure while conducting in parallel, an analysis of advantageous alternatives or complementary options. This enabled the client to maintain confidentiality towards their strategic plans and technology. They have also benefited from experimental results and an independent analysis to support corporate management's strategic decision-making process.

Search for adhesive with highly specific properties

A client that manufactures products used in home construction was looking to gain a competitive advantage by specifying an adhesive that had very specific products. We did not expect to find this product off-the-shelf as the client had spent some time searching for a potential supplier. We provided an assessment of feasible adhesive systems that could potentially be developed for the application. In the process we eliminated a number of concepts. We identified adhesive suppliers (and other companies) that had the potential technology and keen interest in working with our client.

Advanced thin films for inertness and diffusion barrier layer

A leading company in micro-mechanical sensing devices faced instability phenomena for a newly developed product that they could neither eliminate nor control. A comprehensive survey of their challenge – networking with surface chemists and

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physicist – identified possible model systems for the observed phenomena. The study allowed for rapidly conducting successful preliminary tests with identified partners by applying innovative advanced ultra thin film inert barrier layers.

Advanced materials solution extending lifetime of component

A company in the plastics industry faced very short lifetime for a key component in a new manufacturing process. Based on microscopy and corrosion data we postulated materials based solutions to extend the lifetime of the component. We researched the feasibility, associated cost and probability of success of the ideas that we developed. We also identified vendors and initiated the process of obtaining prototype samples based on the most promising ideas during the course of the project.

Technology search and assessment of health related testing procedures

Our client wanted to extend their product performance and functionality range into the feminine hygiene and self-testing area. We provided an overview of the various mechanisms and indicators currently in use to detect a medical condition and the potential tests that could be incorporated into their product. This included the bodily functions, responses and changes and the measurable outputs generated by them. We also explored patent literature to identify similar products and mechanisms available to the medical community in diagnosing different medical conditions. We recommended procedures that could be adopted or modified for use within the current framework of our client's products.

Search for "spring-like" materials

A client required a material with outstanding spring-like properties for the mechanical function of a special device. Armed with basic technical criteria for the application, we identified existing emerging materials developed for other applications and industries that were already being tested to replace the material currently being used by our client. This project also allowed our client to become aware of critical medium and long-term future trends in this field. This enabled appropriate strategic initiatives to protect their market position.

Feasibility of fluid delivery system for novel application

We analyzed the technical feasibility of applying a family of fluid delivery technologies that met certain criteria to our client's process. We searched suppliers of the components as well as system integrators and middlemen who could modify the technology for our client's application. We evaluated the likelihood of success for the various types of technologies and provided associated cost estimates. We also provided recommendations regarding both systems and component suppliers. In the process we also uncovered a completely new technology that was very promising but did not fall within the original scope of the search.

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Search and assessment of a polymer system

A client was developing a novel technology application in a high volume consumer oriented sector that required a polymer with very demanding physical properties. We were asked to find a suitable polymer for the application that could meet all of the physical properties and be suitable for their processing. We evaluated commercially available polymers, polymers in development and benchmarked each candidate system for the application. We also researched new processes that could lead to the development of a suitable polymer and estimated the timeframe for development.

Search for sealing technology

Our client supplied a product that was subject to failure due to leakage resulting in a short lifetime. We were asked to investigate new sealing technologies that could result in a lifetime increase of about 10 times within a desired price level. The project initially aimed at finding commercially available seals but we quickly identified that these would not give the desired performance at a reasonable cost. We researched other sealing technologies outside our client's industry that could be modified or developed to meet their requirements. We identified two new viable sealing technologies that are not currently used in our client's applications but can be modified and put our client in touch with suppliers who were willing to develop the seal to fit their needs.

Search and assessment of a novel surface decoration technology

Our client, a global manufacturer of high-value injection molded products, is familiar with all existing surface decoration technologies for injection-molded products. We investigated the current state of a surface decoration technology, which currently is used for totally different applications and materials. After interviewing a large number of experts and technology leaders we found that a “new” technology could be used for our client’s products in the near future. We identified several potential partners that could modify the “new” technology to meet our client’s specific needs.

Technology search and assessment for global personal equipment manufacturer

This project was focused on identifying new technologies that could improve the surface properties of our client’s high-value metal-based products. We performed a global search and identified several technologies that were unknown to our client and that they decided to pursue. We also identified several cooperation partners that are willing to produce test-samples for our client.

Status of MMC (Metal Matrix Composite) Technology for Power Silicon modules

A company that manufactures Power Silicon modules was looking for materials that offer lower cost and better performance than conventional AlSiC offerings. They asked us to search for and evaluate alternatives to their existing knowledge base. The search covered

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companies in North America, Europe and Japan, and included materials under development as well as commercial products. We also identified alternate materials technologies are not classified as MMCs. The analysis also enabled our client to evaluate the technical prospects and merits of a start-up company's technology, which our client had originally identified.

Advanced materials for heat-spreaders

A leading company in thermal management for electronics asked us to evaluate materials technologies that can be used as high in-plane thermal conductivity heat spreaders. We benchmarked this technology versus base materials (Al and Cu) as well as "non-solid-state" heat-spreader technologies. A large component of the study involved analyzing carbon based materials and predicting the probability of developing cost effective materials. We evaluated the price/performance tradeoff that the end-users are making for existing and upcoming applications.

New material solutions for a manufacturer of mechanical gears

Our client was a leading manufacturer of various types of gears and the study was focused on worm gears used in food processing applications. The objective was to achieve lubrication free gears. This was considered possible to achieve given the relatively mild performance requirements in the application. We researched a number of materials that could be used in the worm and the gear, and also would work well in combination with each other. We delivered a listing of suggestions of material solutions ranging from polymer composites to various surface treatments. The client subsequently embarked on a testing and evaluation program.

Creative technical problem solving in a battery related application

We researched adhesives and sealants for a difficult and long-standing battery application problem. Candidate materials that had proven themselves in similar environmental conditions were identified and summarized, complete with supporting data and references. Novel seal designs were offered to take better advantage of the unique properties of some of the candidate materials. The client used these results to re-establish research efforts that had dead-ended without fresh ideas toward the problem.

Technology search and assessment for global flooring manufacturer

We identified new approaches for increasing the scratch resistance of polymer surfaces and presented a range of alternatives. The performance characteristics achieved in other end use industries and their different products were analyzed and benchmarked against the product currently offered by our client. The client decided to pursue several of our suggested approaches.

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Technology search and assessment for global personal equipment manufacturer

The project focused on reducing light reflection, without decreasing the scratch resistance of a special glass surface. Our client had exhausted its own creative resources and ideas. Our global approach to technology search was a major factor to our client in their decision to work with us. Drawing on our inherent knowledge of material science and engineering we were able to quickly develop approaches that had merit to our client. We are currently continuing work for this client. Of course, we also made use of extensive literature reviews, database searches and interviews with industrial and academic experts.

New technological approaches for a major dental component supplier

Our client had a long term desire to move away from the current materials and technological approaches used in dentures. Our task was to outline novel and promising new technologies that could potentially be used in the various denture applications. It was recognized that any one technology would have to be modified before being directly applicable. Our services were used as means towards preliminary screening and search for new creative ideas.

Technology search for a US supplier of reflective materials and crystals

Our client manufacturers reflective materials delivered in strips, which is fixed to cloths, street signs or other structures that require a reflector. The reflective crystals had to be protected via a transparent polymeric layer in outdoor applications. The current polymeric film did not perform adequately and specific properties needed to be enhanced. We undertook a comprehensive search within the chemicals and downstream processing of polymers. We were able to recommend two new polymers that separately responded to the various necessary performance enhancements.

Hard, high bond strength coating for tool application

A client in the tool industry had observed the proliferation of PVD (physical vapor deposition) coatings, but it is questionable if there is any real improvement in performance for this particular type of tool. Our client commissioned us to leapfrog the conventional wisdom and search for coating technologies that offered improved bonding to the substrate. In our search we considered the deposition rates; the cost of the processes; and viability of integrating them with our client's processing. We uncovered a novel, patented technology that appears to fit our client's needs. We are currently helping our client by managing a development program with the company that owns the patented technology.

Coating technology for commodity product

A client that manufactures commodity products wanted to improve its performance by applying an internal coating to the product. The criteria for these coatings included low cost, very high throughput and a specific type of chemical resistance. Despite these exacting criteria we generated a number of potential alternatives. Our client is currently

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pursuing a development program in one of these areas with a company that we identified and introduced them to.

Separator materials for electrochemical device

Our client is currently developing next generation devices using new cathode materials for higher energy densities. The biggest hurdle in the utilization of these materials is the migration of large ions across the porous separators. We searched for a material that could serve as an appropriate separator and also act selectively. We searched different industries as well as research institutions and universities for materials and ideas that could lead to the development of membranes with the desired properties. We have provided a list of possible candidates and are currently assisting our client in testing these options.

In a follow-up study, we further evaluated the research of some key university research groups and set up partnerships with our client to help develop suitable separator materials at a low cost.

Problem solving – SiC coatings

Our client sells components to the semiconductor industry. The parts are coated with SiC, which usually deteriorates via a pinholing mechanism. We first delineated steps taken by our client's competitors as well as any theories they had about the mechanism. We then drew upon scientific knowledge and research in fields that are not directly related to this subject matter in order to formulate a novel explanation of the pinholing mechanism. This enabled our client to take steps to improve the lifetime of their product.

Voltage activated materials

We carried out a study where we identified potential materials technologies that operate at low voltage and minimal current consumption. These materials can be used to fabricate actuators that function in conjunction with battery powered devices. We identified a range of potential materials systems that included emerging concepts as well as technologies that are being seriously developed.

Evaluating commercial status of electrochemical device

A client asked us to analyze the commercial production status of an electrochemical device with specific geometrical dimensions. We performed a global search and investigated well-known producers/ developers and also identified a number of new players in Europe and Asia. We were able to collect samples from a number of companies.