



(19) **United States**

(12) **Patent Application Publication**

Stubiger et al.

(10) **Pub. No.: US 2002/0161600 A1**

(43) **Pub. Date: Oct. 31, 2002**

(54) **TECHNICAL SUPPORT PROGRAM**

Related U.S. Application Data

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(60) Provisional application No. 60/190,170, filed on Mar.
17, 2000.

Publication Classification

(51) **Int. Cl.⁷** **G06F 17/60**
(52) **U.S. Cl.** **705/1**

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(57) **ABSTRACT**

Technical services are offered to customers on an outsourced basis according to a menu of services available. A menu is provided for categories of equipment on with the technical services provider offers technical services and a menu is also provided identifying the technical services which are offered. The services are modular and are selected based upon the customer's needs. The modular services are offered at two levels, a basic level and a high end level.

(21) Appl. No.: **09/979,911**
(22) PCT Filed: **Mar. 15, 2001**
(86) PCT No.: **PCT/US01/08573**

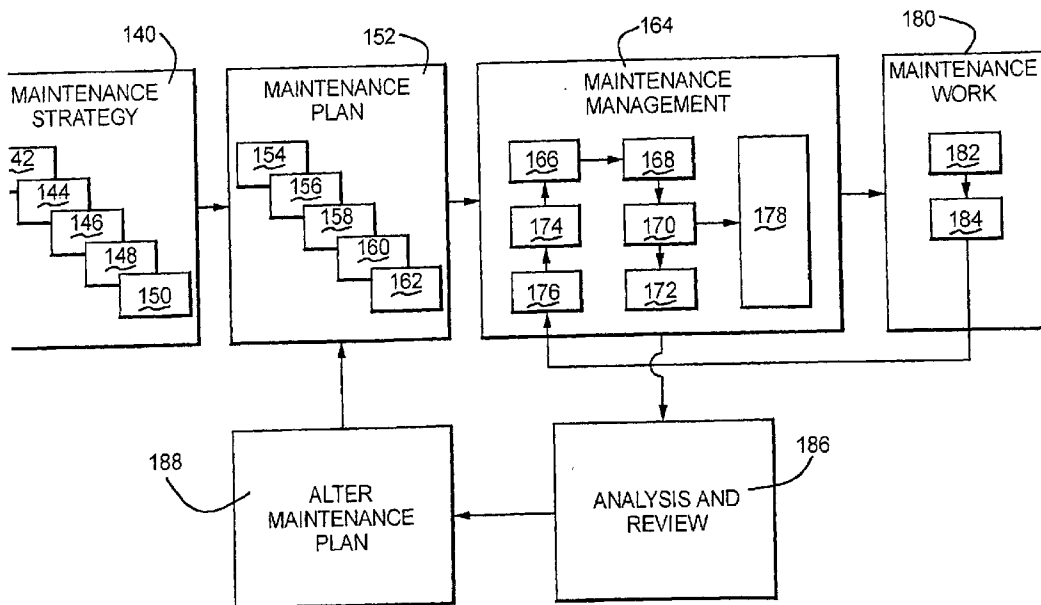


FIG. 1

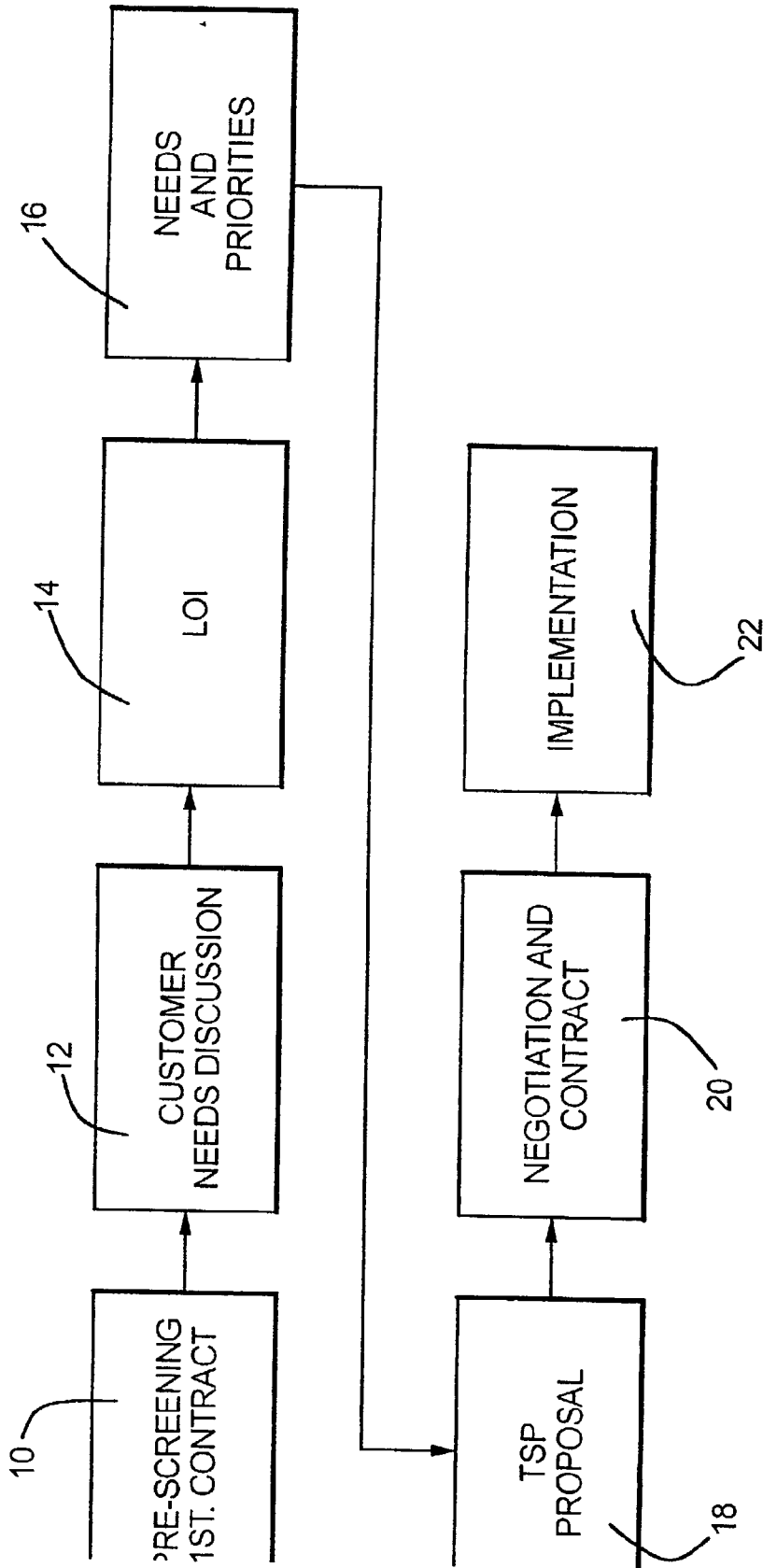


FIG. 2

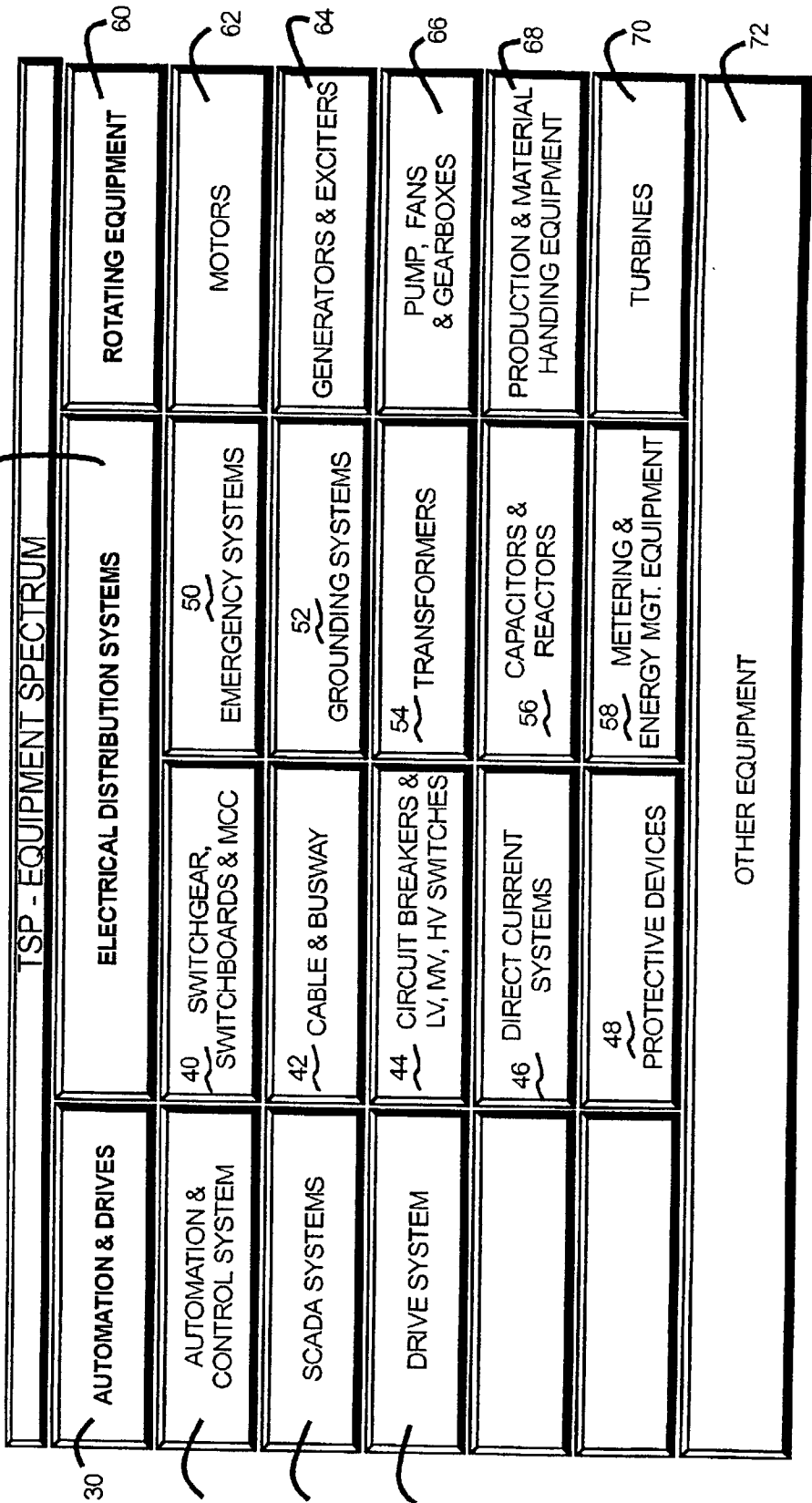
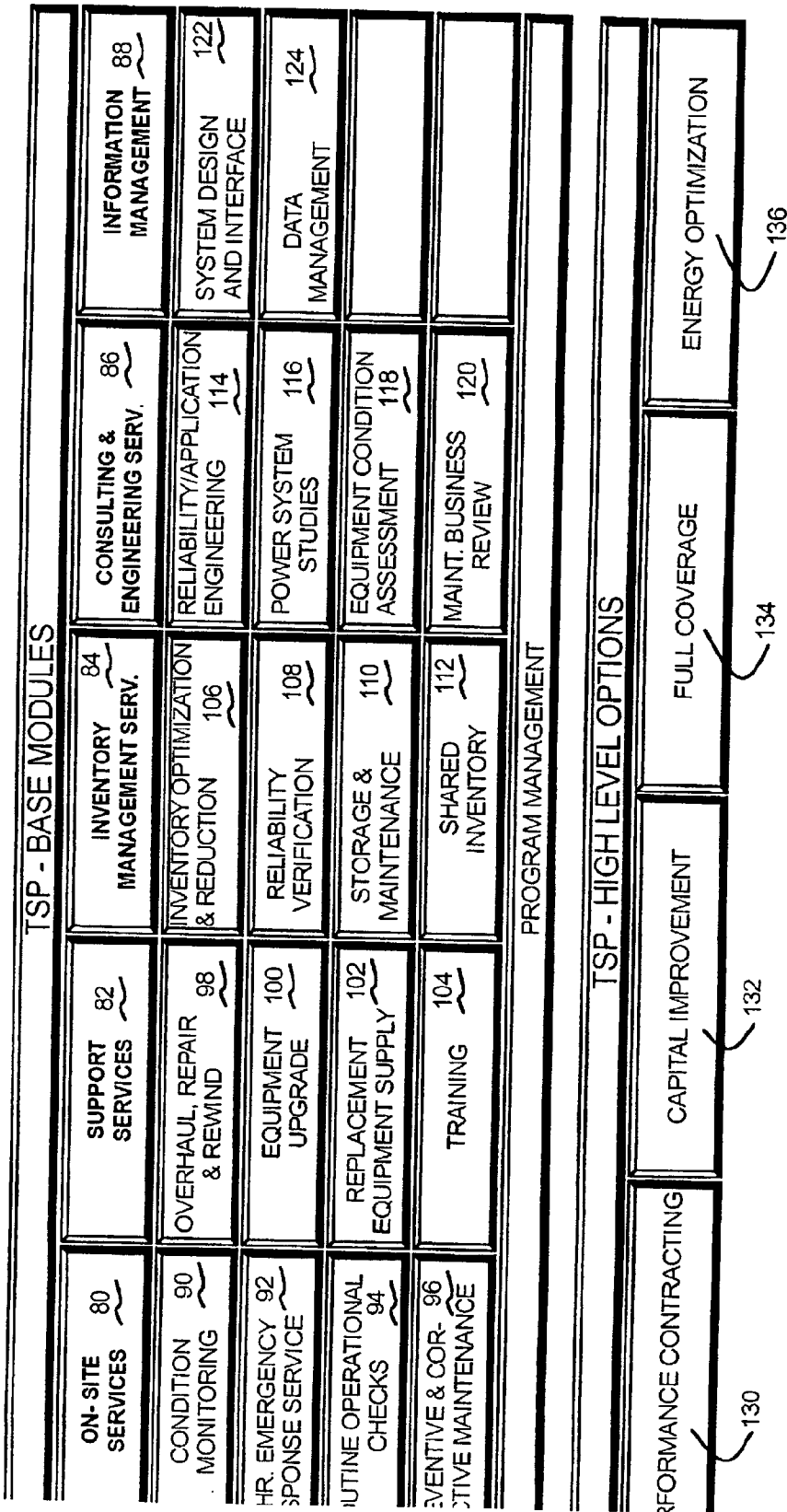


FIG. 3



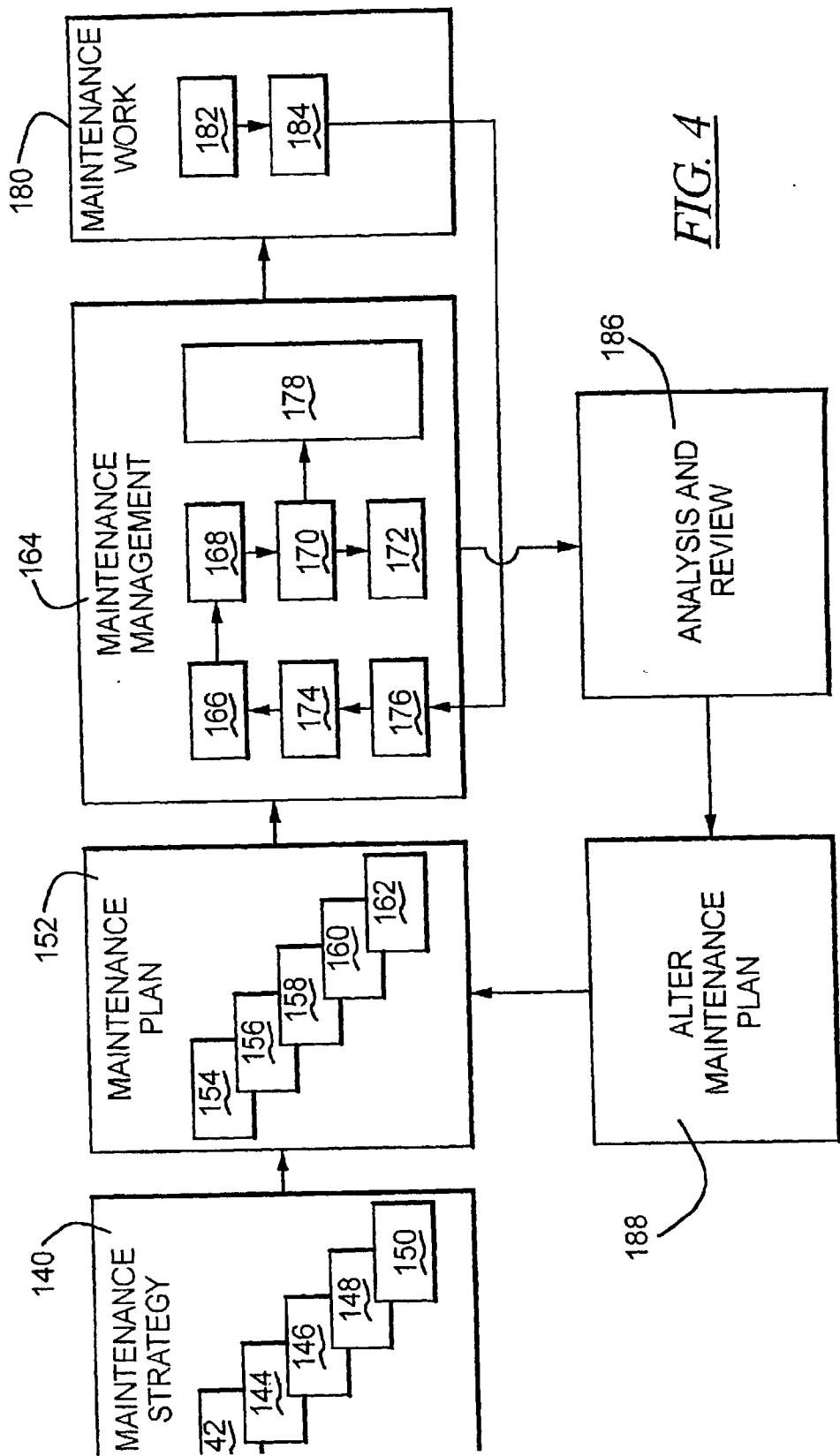
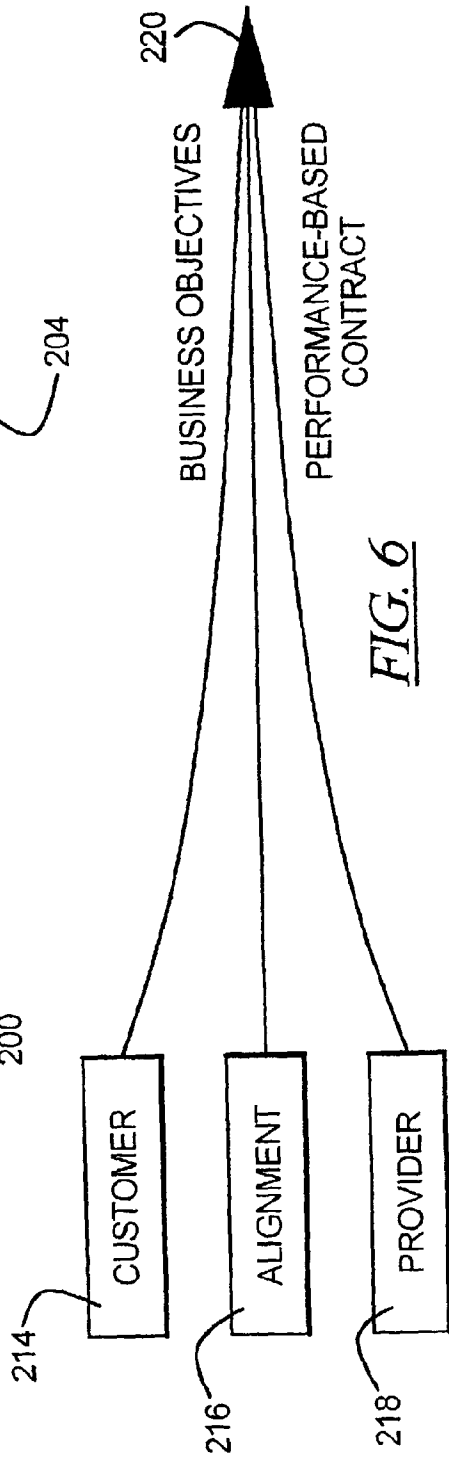
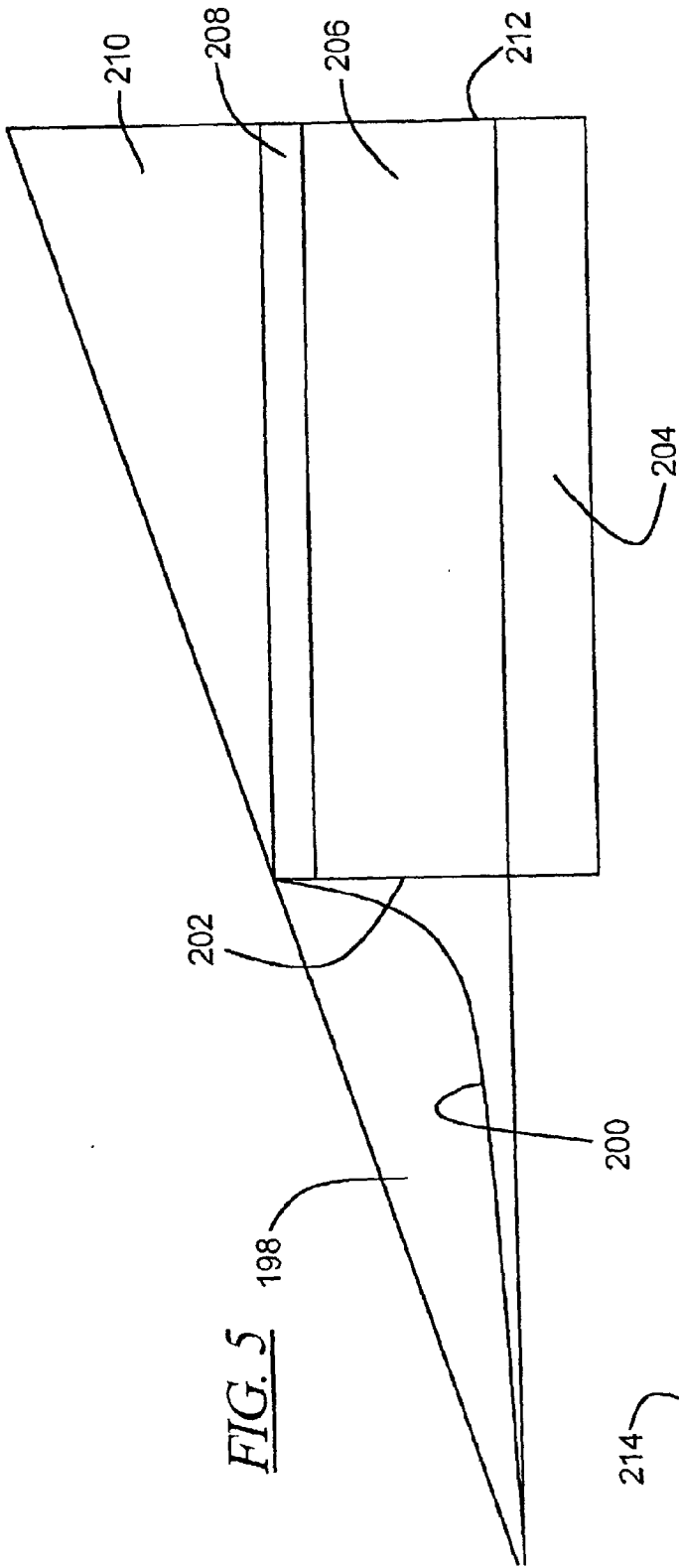


FIG. 4



TECHNICAL SUPPORT PROGRAM

TECHNICAL FIELD

[0001] The present invention relates generally to a modular system of providing technical services, for example, to industrial plants and facilities.

BACKGROUND ART

[0002] Technical services are performed at manufacturing plants and other types of plants and business facilities by employees of the business or by outside service providers.

[0003] According to the current state of the art, the case is such that in the majority of instances the customer pays for the provided services to the plant by the service provider according to time and expense. The individual services are performed on the basis of specific contracts; i.e. software updates are made, motors are replaced, system status analyses are carried out, etc., when the customer considers it necessary or following some corresponding guidelines. Up to now, the providing of services has all been a transactional relationship.

[0004] Among the services provided according to the known art are emergency services, usually with appointment of personnel to perform the service, and repair/replacement services. The repair/replacement service partly ensues with warehoused parts of the service provider. When a software update is made, this likewise ensues with standard software that is then brought up to the needed system condition on the basis of the functional errors that then turn up.

[0005] The above-described prior art is not what is best for the customer. The customer needs a technologically and organizationally better solution.

[0006] As global competition increases and supply chains become shorter, businesses are being forced to find new ways to increase plant performance while simultaneously reducing costs. Complexity of the business adds to the costs, and one area of significant complexity for manufacturing businesses is plant maintenance. In addition to adding complexity, maintenance can make up anywhere from 5-40% of the total costs of production. While maintenance is critical to the business outcome, it is often regarded as a necessary evil, and as a result it has been difficult to achieve sustained improvement in performance from an in-house maintenance group without intense management effort that detracts from the core business process and the core competency.

DISCLOSURE OF THE INVENTION

[0007] An object of the invention is to provide a better solution for providing technical services to a customer, particularly to enhance the customer's financial system result (profit) and to lower the costs over the life time of the system (life time costs). For this purpose, the availability and the reliability—in the form of availability time windows on demand—are adapted to the demand of the production processes, of the market, etc. The present invention makes an optimum solution of the customer needs possible, i.e. a solution matched to the customer business demands.

[0008] A further object is to provide increased equipment reliability and availability, reduced costs through a proactive Business Based Maintenance approach, minimized down-

time, optimized asset management, capital solutions, and fast response when and where it is needed.

[0009] Another object of the present invention is to provide modular standardized services for technical support. A customer is offered modular services and free to select those technical services that meet the customer's needs.

[0010] A further object of the invention is to provide technical services at two levels, a basic level and a high end options level. Examples of high end options include business oriented services, financing, full coverage for repair and replacement, etc.

[0011] Another object of the invention is to offer to the customer a menu of equipment which can be covered by the technical services and to also offer to the customer a menu of technical services.

[0012] In the present system, a customer desiring maintenance services or other technical services is provided a menu of available technical services from which to select desired technical services. A uniform service architecture is provided. Modules are provided at various business levels, from the general to the specific. In one embodiment, three levels are provided. Examples of the three levels include a business-oriented level that is offered as an option, a technology-oriented level that is offered as modules, and a device level which is referred to as a equipment spectrum.

[0013] The maintenance services offered also fall into the broad areas of technical services, consulting, repair service, parts supply, etc. The customer needs are evaluated using an audit and interview process and the customer is offered the services as modules selected from a menu. The modules, which are implemented through software modules and hardware as well as maintenance processes and procedures, are installed at a local level in each plant. However, operation and control of the service is provided through regional facilities that are linked to the local facilities by a communication connection, such as through the Internet. The regional facilities are provided at regions around the globe so as to offer 24 hour support to the local service locations, including providing a regional center in the Far East, one in the European Union, and one in a NAFTA country. One of these regional centers are open during business hours at any time of the day to provide support for the local service locations. The regional centers are in turn connected via communication links to a single world-wide headquarters.

[0014] Electronic system plans are employed, potentially based on standard organization software like CMMS (Computerized Maintenance Management Systems), CAD data, electronic handbooks, and Excel lists. This software is respectively employed at a location of a specific customer or can be provided over the Internet. An Enterprise Asset Management System (EAMS) is utilized between the individual locations, and the Enterprise Resource Planning System is located over the whole thing, this running, for example, on the basis of SAP program technology. The individual programs run on a standard operating system platform; they are implemented either in the computer system of the customer system or on servers of the respective provider center, for instance a Customer Service Center. However, monitoring by the respective Customer Service Center is always a feature, this center being in charge in a country or international regions as well, for example USA

and Canada. Communication via the Internet with special measures for secure transmission are provided.

[0015] The present invention provides outsourced technical support as a part of a business strategy. The outsourced technical support is provided for plants or parts of plants. According to the present invention, plants are defined broadly to include airports, steel mills, hospitals, mines, ship yards, large buildings, hotels, chemical plants, cement plants, subway systems, railway systems, container terminals, oil drilling rigs or platforms, paper mills, oil or natural gas pipeline systems, lime plants, water treatment plants including desalination, fresh water pipelining and waste water treatment, food service facilities, etc.

[0016] The maintenance services offered also fall into the broad areas of technical services, consulting, repair service, parts supply, etc. The customer needs are evaluated and the customer is offered the services as modules selected from a menu.

[0017] Decisions on maintenance services are divided between the global, regional or local level. Business strategies for the customer, choices of modules to use, etc. are preferably made on the global level. Regional level decisions are determined by regional laws and regulations, manpower availability, etc. The local level is the plant level wherein decisions at that level are specific to the needs of that plant.

[0018] Within the context of the present application, maintenance services refers to and includes all those services described herein.

[0019] The invention addresses the challenges being put to companies by reducing complexity, thereby enabling greater focus on the core business. One area of significant complexity for manufacturing businesses is plant maintenance.

[0020] The present invention delivers business-based professional maintenance services on a modular basis throughout the world, not only for systems and installations, but for all machinery and equipment. The present invention utilizes vast worldwide technical expertise and presence to provide the business-based maintenance, for example, by focusing on business aspects such as return on assets, return on investments, and plant and equipment availability for producing output.

[0021] Businesses face increases in productivity demands and international competition while striving to keep up with technical developments. The present invention provides outsourcing of numerous internal processes as a cost effective and asset effective strategy. The outsourced services cover maintenance during the operational phase and include the modernization of a plant.

[0022] As a further service, on-call and logistic services provide dependable requirement-oriented fault elimination of product systems and plants. Field service staff is available at the plant and repair services carry out necessary repair work at repair centers while on-line service centers communicate directly with the technical plants. Logistics services ensures that the correct parts are provided.

[0023] Thus the present invention provides commercially focused strategies and takes on more performance based relationships with customers that include accepting more calculated risk in a win-win partnership approach. The

invention provides for a full range from small contracts with few services to comprehensive (all inclusive) maintenance agreements at the other end of the spectrum.

[0024] A more specific aspect of the present invention is embodied in a motor management program which is covered in more detail in a PCT patent application docket number P00,1822, being filed by the same applicant as the present invention, and which is incorporated herein by reference. The present invention is provided according to the framework outlined in a patent application for plant maintenance technology architecture, docket number P00,1823, filed by the same applicant as the present application and incorporated herein by reference. An overall concept within which the present application represents an aspect is disclosed in a menu driven management and operation technique, docket number P00,1824, also incorporated herein by reference and which is being filed by the same applicant as the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] FIG. 1 is a process flow of steps to implementation of outsourced maintenance according to the present invention;

[0026] FIG. 2 is a schematic diagram showing the equipment spectrum to which the present invention may be applied including showing equipment modules available on an outsourced basis;

[0027] FIG. 3 is a schematic diagram showing modules of technical services available under the present invention;

[0028] FIG. 4 is a block diagram showing implementation of the technical services;

[0029] FIG. 5 is a diagram showing the utilization of the present technical services during the life cycle of a plant; and

[0030] FIG. 6 a diagram showing alignment of the customer's goals and the service provider's goals according to the present invention.

MODES FOR CARRYING OUT THE INVENTION

[0031] Referring first to FIG. 1, a process for offering technical services to a customer is shown, including first a pre-screening 10 at the first contact with the customer. Included in this pre-screening is a first contact questionnaire to the prospective customer and discovery of information about the prospective customer via the Internet, and other sources.

[0032] In a second step, customer needs are discussed 12, which covers finding out what the customer needs, answering a questionnaire directed to the technical services program, which is done through several meetings. A letter of intent 14 is prepared to establish a consensus to consider the technical services program. These first three steps in the process provide tests of the customer's commitment to proceed.

[0033] The next step is to determine the needs and priorities 16 of the customer. Priority areas for improvement are identified. As a tool to identify these, a maintenance business review having, in one embodiment, 22 aspect areas, might be performed using a questionnaire. Topic areas are set forth

for example in tabular format and the questioner observes and asks questions to determine the answers to the questions. The questions are also divided into five levels to identify a sophistication level of the prospective customer's technical and maintenance services, systems and procedures, personnel and resources, and current management and leadership.

[0034] For smaller businesses, a brief maintenance business review is offered, directed to 10 to 15 business aspects. This shortens the process from the full review where costs and time commitments are to be kept low.

[0035] As a further step 18, a technical services program proposal is prepared and presented to the prospective customer. This is done with reference to the menu of modular services and options which will be discussed later. This menu is also referred to as a program structure. As an important part of the proposal 18, the goals of the business are considered, an implementation plan is developed, a contract structure is determined, a return on investment is studied, and key performance indicators are identified.

[0036] These same aspects are considered during the negotiation and execution of the contract 20. Once the contract is made, the outsourced technical services are implemented at 22. A business based maintenance or BBM analysis is performed. An asset condition assessment is performed. Equipment conditions are assessed, and a CIP is implemented. The implementation 22 of the technical services program also utilizes a menu of services.

[0037] The outsourced technical services offered according to the present invention are provided as a menu of services. One such menu is shown in FIG. 2. The menu of FIG. 2 is an equipment oriented menu offering modules relating to specific equipment. The first section of the menu is directed to a class of equipment grouped as automation and drives 30. Below this are automatic control systems 32, SCADA systems 34 and drive systems 36. The second portion of the menu is directed to electrical distribution systems 38. Under this broad category are modules, or menu items, directed to switchgear, switchboards and MCC's 40. Cables and busway equipment 42 are another module offered, as is circuit breakers, low voltage, medium voltage and high voltage switches 44. The modules under electrical distribution systems further include direct current systems 46, protective devices 48, emergency systems 50, grounding systems 52, transformers 54, capacitors and reactors 56, and metering and energy management equipment 58.

[0038] Rotating equipment 60 also must be considered in the equipment modules. First among rotating equipment is a module directed to motors 62. Thereunder are modules for generators and exciters 64, pumps, fans and gearboxes 66, production material and handling equipment 68, and turbines 70. A general class referred to as other equipment 72 is also provided as a catch all class.

[0039] Virtually all of a customer's technical equipment will fall under one of the foregoing categories. The customer has certain core competencies relating to its core business that these should be left to the customer to address. However, the various technical aspects that play a supporting roll in the plant's production may each be addressed by the present invention by selection of corresponding modules from the equipment menu of FIG. 2.

[0040] The technical services are also provided as modules offered via a menu as shown in FIG. 3. The upper

portion of the menu sets forth the basic modules of the technical services. These are divided into five aspects, including on-site services 80, support services 82, inventory management services 84, consulting and engineering services 86, and information management 88. On site service modules include condition monitoring 90, 24 hour emergency response service 92, routine operational checks 94, and preventative and corrective maintenance 96. Under support services 82 are provided overhaul and repair and rewind services 98, equipment upgrades 100, replacement equipment supply 102, and training 104.

[0041] The inventory management services 84 provide modules for inventory optimization and reduction 106, reliability verification 108, storage and maintenance 110, and a shared inventory 112. The consulting and engineering services 86 provide reliability and application engineering 114, power system studies 116, equipment condition assessment 118, and a maintenance business review 120. The class of modules relating to information management 88 provide a system design and interface module and a data management module.

[0042] Not only are there basic service modules but the present invention also provide high-end modules as shown at the lower portion of FIG. 3. The first such high end module is a performance contracting module 130. This is followed by a capital improvement module 132, a full coverage module 134 and an energy optimization module 136.

[0043] The outsourced technical service provider and/or the customer looks to these menus to discover modules that best fit the customer's needs. For example, the customer may choose a storage and maintenance module 110 for transformers 54 and choose a 24 hour emergency response module 92 for switchgear 40, along with other modules.

[0044] Once the modules are chosen they are implemented, for example, as shown in FIG. 4. The implementation begins with the development of a maintenance strategy 140. The maintenance strategy development requires a business plan evaluation 142, an operational analysis of the plant 144, a criticality analysis 146, a component identification 148 and a failure analysis 150. The maintenance strategy 140 is followed by defining maintenance plans 152. According to the invention, the maintenance plan 152 development includes defining a hierarchical plant index 154, determination of key performance indicators 156 for the plant, the assignment of criticalities 158 for the plant components, performance of a failure analysis 160, and assignment of maintenance actions 162.

[0045] The plan 152 is the foundation for the maintenance management 164 wherein standard jobs 166 are used for tasks due 168 on work orders 170 and requested work 172. The work orders 170 lead to a work schedule 178. From the management 164, the maintenance work 180 is performed by work groups 182 until the work is completed 184. The completed work feeds back into a work history 176. The work history 176 is provided for an equipment register 174, which is a hierarchical plant structure of the company within which the standard jobs 166 are performed.

[0046] The maintenance management part 164 is subject to analysis and review 186 according to this invention. Historical data is reviewed, failure analysis is reviewed. A

review is made of safety issues, employ statistical techniques to evaluation frequency of work and employ reliability engineering techniques to evaluate design out requirements. These can lead to an altering of the maintenance plan **188**. For example, modification of the quality maintenance plan is done by failure analysis, review of maintenance actions, frequency of work, duration of work and by entering new equipment items. Alterations of the maintenance plan is part of the continuous improvement cycle.

[0047] Technical services according to the present invention is involved in a plant during much of the plant's history. For example, as shown in **FIG. 5**, a plant is constructed at **198** and early on the technical services has only a small involvement as indicated at **200**. Just prior to commissioning of the plant at **202**, the sharp upswing in the technical services curve indicates increased involvement. After commissioning **202**, the operation **204** of the plant provides a foundation on which is built the condition based inspection and preventative maintenance services **206** of the invention. Overlying the inspection and preventative maintenance services **206** is repairs **208** made to the plant during its lifetime. These may fluctuate particularly under the processes of the prior art, but under the continuous servicing provided by the present invention, the repair involvement is steady. Over this is the modernization potential **210** realized by modernization projects. This leads to technical innovation as indicated by the increasing height of the line. The time line of involvement of the technical services program ends at the decommissioning **212** of the plant.

[0048] As illustrated in **FIG. 6**, through the application of the present invention, the business objectives of a customer **214** come into alignment **216** with the business objectives of the service provider **216** under the performance based contract **220**.

[0049] Thus, the technical support program is a modular service package that tailors the maintenance improvements to the budget of the business and to the customer's business objectives. An important aspect is that the modular service package leaves the core competencies to the business while taking on any or all of the non-core competencies. Benefits are provided including a reduced cost through pro-active business based maintenance, a minimized downtime, an optimized asset management including capital solutions and a fast response when and where the customer needs it.

[0050] In further detail, the modules offered under the basic services include a condition monitoring program. Using state of the art methods to assess the condition of the plant and the machinery such as thermography, vibration measurements, ultrasonic testing, partial discharge testing, oil and fluid analysis, and technical endoscopy, advanced warning of problems is provided.

[0051] An aspect of the present technical services is that emergency calls costs are covered by the agreement at no added expense to the customer.

[0052] In undertaking the technical support program, the maintenance business review has been performed. This identifies improvement potentials so that measures can be derived from that review to improve the maintenance effectiveness, based on the implementation of a continuous improvement process. The goals are to provide short-term recommendations focused on the development and imple-

mentation of a Maintenance Quality Improvement Plan and provide short-term recommendations focused on the development and implementation of a Maintenance Quality Improvement Plan.

[0053] An audit or review is performed using a standardized approach and objective assessment techniques. Categories for the audit include: management responsibility, maintenance systems and procedures and personnel and resources. This is a maintenance business review which reviews the maintenance and considers it as a business.

[0054] An equipment condition assessment is provided. Assessment is made of information correctness, housekeeping, physical and mechanical condition, mounting and base condition, vibration levels and insulation. Both in-service equipment and spare parts are evaluated. The Equipment Condition Assessment is designed to provide a formal, structured and cost efficient way of assessing the physical, mechanical and electrical health of the plant equipment. Equipment is reviewed at to determine if it is critical. Standardized tests and inspections are utilized and a numerical value is assigned for use in trending and comparison.

[0055] According to the invention, computerized maintenance solutions offer an efficient maintenance operation using computers to plan, schedule and record maintenance work. The computers run software for such tasks which is also capable of handling materials management and spare parts logistics. The success of the computerized maintenance management system relies on activities such as design, selection, installation, population and staff training. Populating the software with the data from the planning phase requires a significant man-power effort. Under the present invention, this man-power effort is provided as a service to the customer in a combined maintenance and information technology function. In a preferred development, the provider has at hand intensive understandings of special applications and relevant industrial experience, and works hand-in-hand with the maintenance provider. One aspect of the computerized maintenance solution is to deliver and implement interfaces to the enterprise resource planning system of the customer for purchasing an access control systems, materials and document management systems and condition monitoring systems.

[0056] As a result of these advances, the business strategy of the customer takes into account the ongoing changes resulting from globalization, technical advances and increasing competition. Best maintenance practices help reduce costs, increase plant availability, and improve product quality.

[0057] An additional basic module mentioned above is the inventory management services. The module offers the customer a physical count and identification, an inventory optimization analysis, and segregation and verification. The count and identification feature helps to identify recorded inventory, identify unrecorded inventory, collect nameplate data, and update the database. A visual inspection can also be performed as part of the inventory process. The inventory optimization and reduction delivers to the customers the benefits of reduction in inventory investment and carrying costs, release of the value contained in the redundant inventory, a reduction of inventory maintenance and occupancy costs. It also releases the storage space occupied by the unneeded inventory for other uses. A positive cash flow

results. A verification procedure is used to reduce risks of premature failure of required inventory. The segregation separates required from redundant inventory and permits the customer to verify that its required inventory is ready for active service duty. A benefit is that the customer may purge the redundant inventory.

[0058] Energy optimization is implemented by a complete system review which results in optimization recommendations with the objectives of energy savings and reducing variance in monthly energy costs. Under the routine operational check module, daily monitoring of operational system parameters and review of work process efficiency is provided.

[0059] A shared inventory module as mentioned above, the inventory review to identify potential inventory sharing partners. A facility consensus on common repair specifications and inventory levels. Excess inventory can be liquidated. Storing, maintaining and managing of a shared mutual inventory is provided. The shared inventory benefits include reduced inventory investment and carrying costs, reduced storage, maintenance and occupancy costs. It releases the value in redundant inventory, effecting a positive cash flow. A reduction in the number of premature equipment failures due to storage and maintenance practices is also realized. This also provides a forum to discuss other mutual sharing opportunities.

[0060] A high end modules in further detail include the following: A contract is prepared for agreement between the customer and provider. Task sheets or maintenance schedules are prepared outlining the scope of the work, and estimates of costs are prepared.

[0061] A commercially focused strategy is adopted and a performance based relationship is established between the customer and provider by which the provider accepts some calculated risk. This is different than a time and materials maintenance agreement. In addition to accepting equipment and materials costs, the provider may also accept risks at to labor costs.

[0062] The performance contracting option features tangible value-added evaluation systems, key performance indicators, a third party validation of asset review, and scheduled reviews. Risks are minimized while the provider and customer enter into a win/win relationship using a performance based fee, at least in part. This could depend not only on the maintenance performance but also on the market condition for the plant. Effectiveness is provided through measured criteria.

[0063] The high level option of full coverage features asset review and equipment placement. This provides the customer with predictable costs, equipment replacement including labor over the term of the contract, and reduced inventory. These high level options are focused on prevention, prediction, correction, inspection, and detection under the umbrella of business based maintenance.

[0064] The present invention is applicable to technical maintenance situations for a variety of businesses, including e-business (electronic business). On line ordering of parts or services is considered in this regard. The present invention is also particularly useful for B-to-B (business to business) companies.

[0065] As a feature of the performance based contract, a guarantee may be included to specify an up-time for the on-line service. For instance, the conditions of the contract may specify a 98 percent up time for the on-line service being served by the present method.

[0066] A further high level option available to the customer it to offer financing for equipment that is being serviced under the present method.

[0067] Thus, the present invention offers customized outsourced technical services to a customer. These are related to the business strategy of the customer. The method of the present invention provides that the technical services provider becomes aware of the customer needs and then offers a modular service package tailored to the needs of the customer. Each solution for each customer is different. Different combinations of the modules are offered depending upon the customer's needs. This has a greater benefit for the customer.

[0068] Complex plants and facilities are serviced according to the present invention.

[0069] Under the present invention, a business based maintenance is provided following a comprehensive approach with results oriented equipment management. Business needs are identified and then a tailored packages of services are developed to meet defined objectives. An efficient partnership is formed between the customer and maintenance services provider which is focused on a win/win outcome. The key performance indicators provides strength to performance based contracts by checking such things as availability, cost reductions, and safety. A shared profitability enhances the ownership of the customer and is a key strategy for management and employee success.

[0070] The objectives of the programs are to maximize equipment and system reliability, optimize return on maintenance expenditures, reduce inventory investment, and improve cost avoidance. Basic modules provide a base and are technology oriented and cover basic maintenance needs. Atop the basic modules are high end options which take the customer to a business based maintenance solution tuned to the special needs of the business. The basic modules of the technical support program are designed to ensure that maintenance issues are detected and addressed at their earliest stages. This increases reliability as well as availability of power generation and distribution equipment and systems, automation systems, drive systems, control and instrumentation systems as well as information technology systems. The result is that the bottom line dollars of the business will increase.

[0071] An aspect of the present invention is to provide a technical support program. The business strategy of the customer is taken into account in ongoing changes as a result of globalization, technical advances and increased competition. The technical support program is a part of the strategy to develop business based maintenance. A broad range of maintenance services are offered which are designed to provide comprehensive vendor-independent solutions. The benefits of the technical support program are increased equipment reliability and availability, reduced costs through a pro-active business based maintenance approach, minimized down time, optimized asset management, capital solutions, and fast response when and where the customer needs it.

[0072] By offering the modular service packages, the technical support program the modular tailors the maintenance improvements to the budget of the business and to the business objectives. Benefits are provided including a reduced cost through pro-active business based maintenance, a minimized downtime, an optimized asset management including capital solutions and a fast response when and where the customer needs it.

[0073] The business based maintenance is a process that defines the equipment and maintenance needs in terms of the business goals of the customer. A uniquely tailored maintenance strategy has been developed to help the customer reach their objectives. Working with the maintenance organization, the providers engineers and maintenance specialists have assessed the current situation and developed strategies based on the plants specific requirements. By working closely with the employees of the company, sustained improvements are achieved which leads to success.

[0074] In one aspect of the invention, the provider of these services is a manufacturer of products and systems as well as plants, and is a maintenance services provider with know-how. Such a provider offering modular services according to the present invention can keep the plant fully operational and the equipment up to date. A significant feature of the present invention is that the services are vendor independent.

[0075] The objectives of the program are to maximize equipment and system reliability, optimize return on maintenance expenditures, reduce inventory investment, and improve cost avoidance. Basic modules provide a base and are technology oriented and cover basic maintenance needs. The high end options take the customer to a business based maintenance solution tuned to the special needs of the business. The basic modules of the technical support program are designed to ensure that maintenance issues are detected and addressed at their earliest stages. This increases reliability as well as availability of power generation and distribution equipment and systems, automation systems, drive systems, control and instrumentation systems as well as information technology systems. The result is that the bottom line dollars of the business will increase.

[0076] The best maintenance practice of the present invention puts the customer ahead of his competition allowing the customer to focus on his core business. Increased equipment availability and reliability are provided, while aligning maintenance to the business strategy of the customer and reducing maintenance costs. Eliminating the cost of unplanned shutdowns and optimizing asset management is also another advantage of the present invention.

[0077] Thus, customized maintenance services are provided for a business covering every type of plant and equipment irrespective of manufacturer or technology. Worldwide support facilitates success in the application of the present method.

INDUSTRIAL APPLICABILITY

[0078] The present invention finds industrial applicability in providing technical services to industrial plants, for instance.

[0079] Although other modifications and changes may be suggested by those skilled in the art, it is the intention of the

inventors to embody within the patent warranted hereon all changes and modifications as reasonably and properly come within the scope of their contribution to the art.

What is claimed is:

1. A method for implementation of customer-related maintenance services for an industrial system, comprising the steps of:

providing technical and maintenance services on a pro-active basis; and

providing modules of said technical and maintenance services wherein said modules are standardized and freely combinable with one another.

2. A method of providing technical services to a customer, comprising the steps of: providing a menu of technical services offered to the customer, said technical services being modular;

performing ones of said modular technical services which are selected by the customer as outsourced services, said services being customized according to the customer's needs.

3. A method of providing technical services to a customer, comprising the steps of:

performing an evaluation of a customer's technical practices and facilities;

providing a menu of available technical services to the customer, said menu including modular technical services available on an outsourced basis;

making recommendations to the customer of selected ones of said modular technical services based on results of said evaluation; and

providing on an outsourced basis ones of said modular services selected by the customer.

4. A method as claimed in claim 5, further comprising the steps of:

valuing compensation of said outsourced modular services depending on performance indicators.

5. A method as claimed in claim 1, further comprising the step of:

providing said technical and maintenance services in three performance levels.

6. A method as claimed in claim 1, further comprising the step of:

providing said technical and maintenance services at a business-oriented level as well as in a technology-oriented level and in an equipment level.

7. A method as claimed in claim 1, further comprising the step of:

universally performing the technical and maintenance services from managing, planning and coordinating the services down to operational activities with the processes implemented across all functions.

8. A method as claimed in claim 1, further comprising the step of:

providing condition monitoring and routine operational checks.

9. A method as claimed in claim 1, further comprising the step of:

providing an inventory optimization and reduction with a goal of reducing spare parts warehousing.

10. A method as claimed in claim 1, further comprising the step of:

providing a shared inventory with a goal of reducing inventory investment and carrying cost as well as storage, maintenance, and occupancy cost.

11. A method as claimed in claim 1, wherein said services are aimed to maintain equipment manufactured by the service provider as well as OEM equipment.

12. A method as claimed in claim 8, wherein said services include an equipment upgrade.

13. A method as claimed in claim 1, wherein said services include evaluating equipment for upgrade possibilities in order to improve their functionality.

14. A method as claimed in claim 1, wherein said services include—verifying the equipment reliability.

15. A method as claimed in claim 1, wherein said services include providing maintenance services aligned to the customer's changing business-objectives.

16. A method as claimed in claim 1, further comprising the steps of:

performing a maintenance business review.

17. A method as claimed in claim 13, wherein said maintenance business review routine includes: a standardized and repeatable assessment systematic on the basis of an assessment handbook.

18. A method as claimed in claim 1, further comprising the steps of:

performing an equipment condition assessment according to the methods of visual inspection, offline tests and online tests.

19. A method as claimed in claim 1, further comprising the steps of:

a comparative audit including a snapshot audit at two comparative points in time, wherein the data from each snapshot audit is utilized to evaluate individual equipment categories on a predetermined 1-10 scale.

20. A method as claimed in claim 1, wherein each equipment category is weighted according to its criticality, the weighted-score can be summarized to provide an overall equipment condition evaluation, which can be compared to other points in time.

21. A method as claimed in claim 1, further comprising the steps of:

providing said services on performance-oriented-contract basis.

22. A method as claimed in claim 1, further comprising the steps of:

providing technical support programs including services for electrical distribution systems, automation and drives systems, and rotating equipment.

23. A method as claimed in claim 1, wherein said steps are implemented according to the prescriptions of a service manual.

24. A method as claimed in claim 1, wherein said industrial system is one of a airport, steel mill, hospital, mines, ship yard, large building, hotel, chemical plant, cement plant, subway system, railway system, container terminal, oil drilling rig or platform, paper mill, oil or natural gas pipeline system, lime plant, water treatment plant including desalination, fresh water pipelining and waste water treatment, and food service facilities.

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