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October 1989

FMC UTILIZES ALLEN-BRADLEY PLC TO SOLVE UNIQUE CONTROL PROBLEM

At FMC's Paradise Peak gold Mine in Gabbs, Nevada, they recently installed a new Heap Leach operation. When FMC was studying the feasibility of this new major operation, Wayne Armbrust, FMC's Electrical and Instrumentation Supervisor, observed that he was facing circumstances that exceed the parameters of conventional control circuits. The following is Mr. Armbrust's study and final decision on solving this unique control problem:

The trouble with conventional control schemes as applied to this particular project was the distances involved in the routing of control wiring and the locations of the control points to be interlocked. When using a conventional control on a size 2 starter there is a problem that develops that limits the distance that remote stations or interlocks can be located from the contactor. The problem is caused by AC induction related to end strength of current required to close and hold the coil of a starter. Another problem faced is the voltage loss due to the distance.

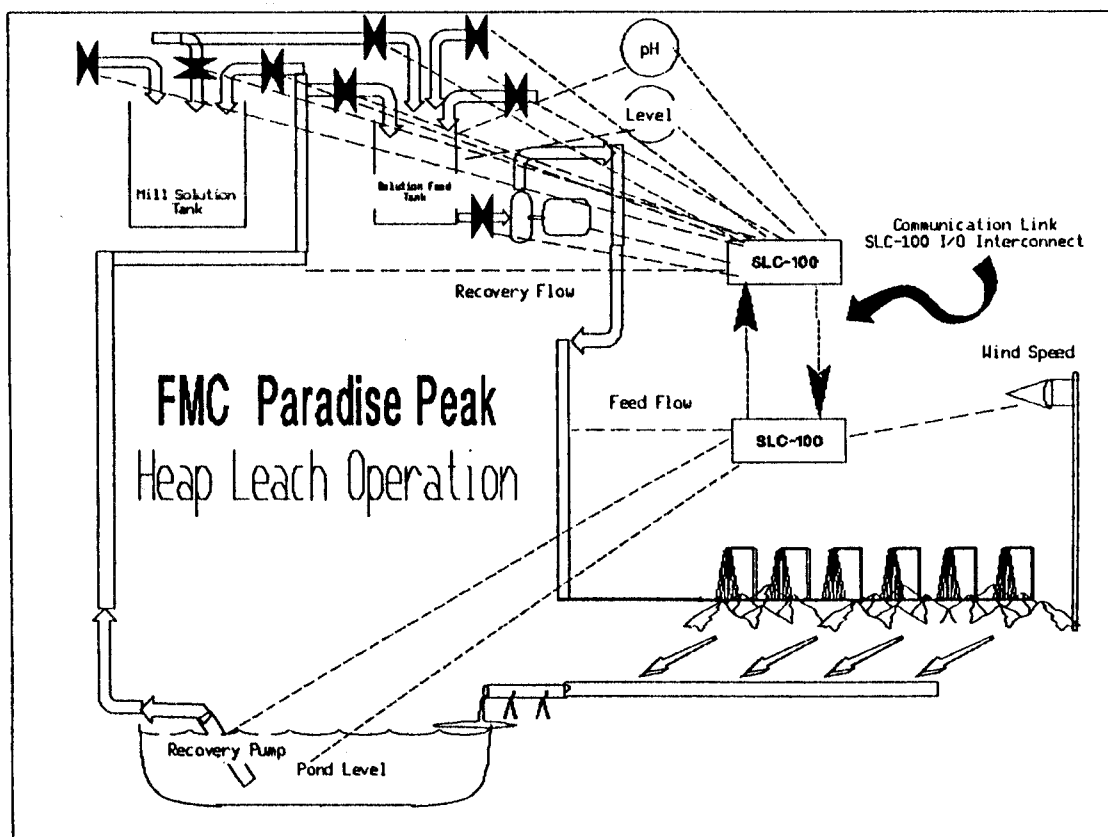
The initial distance between points of control is in excess of 1600 feet (one way). This figure multiplied by the number of runs required to complete the interlock requirements and include the master control room (an additional 500 feet away) would result in a total run of about 8500 feet. With a maximum exposed pair distance (the distance that these wires lay together) of about 2000 feet.

(Cont.'d on Page 4)

PRODUCTIVITY - DOLLARS AND SENSE

Every month we read government reports of increased productivity. Output per labor hour rises another fraction of one percent, and Bureau of Labor Statistics data show a total productivity gain of about 12 percent since 1977. The impression of the public is that 100 million production line employees are pressing their shoulders to the wheel a bit harder to bring more goods to market in less time.

But this glamorized vision of North American diligence is not the true message of productivity gains. Today's worker exerts a great deal of energy, but so did his father and grandfather before him. What really advances productivity is the talent and decisions of management that help the worker use that energy more effectively. There are three major trends in management that are making us more productive:
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1. Technology and new equipment.
2. Labor/Management coordination.
3. A "systems" understanding of business operations, replacing the separated, "functional" approach of the past.

Advances in technology constantly reduce both production time and waste. The craftsman who in the past applied his skills directly to machining or assembly tasks now "supervises" automated machines that perform the work. Output is more rapid because both the direct performance speed and the feed rate to the next unit are higher. Furthermore, a single worker can often monitor several machines. And, because testing and measurement are also automated, quality improves while reject rates are reduced.

But none of these gains can be realized without closer coordination of Labor and Management. The traditional adversary roles are diminished in favor of greater cooperation. The publicity given to Labor "give-backs" is only the tip of a far more significant iceberg. A more informed labor force has reached awareness that labor-saving equipment is an industry survival force, and not a pernicious mechanism to destroy jobs. Management, in turn, is discovering that the individual worker has both the ability and willingness to suggest improved methods for doing his job better and faster. Quality teams, recognition of individuals for unique personal contributions, and advertised announcement of Labor's participation for improvement are all evidence of the changing level of Labor/Management cooperation.

Technological improvements have brought about considerable displacement of individual workers, but in many ways enhanced Labor/Management coordination. As robotics, programmable controllers, and computers have shifted the skill requirements placed on the individual, the numbers of people capable of working with this new hi-tech equipment have been too small to fill the open positions. Industry has found it essential to upgrade the talents of laborers by training or retraining them to work with the new equipment. Manufacturers and distributors of hi-tech equipment have helped to meet these training needs by providing training programs, and businesses purchasing the new gear have been willing to underwrite extensive training time for their people. Such refocusing of talent has "closed the loop," bringing management and the worker even closer to each other.

Finally, a systems approach to management is replacing the parochial separation of Production/Finance/Marketing functions. One key example of this shift is that the purchasing agent no longer defines his work in terms of "lowest price," but recognizes the "lowest total cost" influences of manufacturing and Just-In-Time delivery. Perhaps most important in the trend to systems management is the reorientation of thinking about replacement of capital equipment. In the past, new equipment was procured only when the old was fully depreciated (by Finance) and considered no longer functional (by

Production), based on Marketing's forecasts that extrapolated the demand and competition of the past. Capital equipment decisions are now effected on the basis of maximum future productivity rather than comparison with past standards.

North American industry has been the world leader in advancing productivity for generations, but is today called upon to meet severe competition from Asia and Europe. The off-shore firms are working from a base-line of experience established over the brief forty years since World War II, and the resulting dynamic of those businesses has threatened our leadership. But American firms are fighting back with innovative technology and renewed management understanding and will maintain their established lead.

Are Inventories Really Under Control?

So far, most industries aren't bulging with inventories. One key reason is the greater flexibility offered by just-in-time systems, which allow manufacturers to match production with orders more closely. For example, in the past five years, auto-parts suppliers have reduced the average duration of their production runs by 45%, notes Susan R. Helper, an economist at Boston University. By making smaller batches, companies have been able to keep inventories down. But the same innovations that help reduce inventories may create new problems. Shorter production runs and leaner stocks mean that manufacturers need a smoother flow of orders. Therefore, production schedules need to be more stable than in the past. Business Week, 7/31/89, p. 71

Secret For Increasing Productivity

People who are not doing well generally want to do a good job and need guidance as to how they can improve. People who are doing well want to be told how they can do even better. Feedback is therefore a vital step in the motivation process, yet managers will freely confess that their feedback practices are perhaps the weakest part of their managing. This is especially true in sales management, because salespeople have production reports and incentive pay schedules that give them automatic feedback. But those reports and schedules don't say what -- or how -- to do better. Sales & Marketing Management, 7/89, p. 37.

Child Care

For years, business groups have bitterly opposed Democratic proposals that would require companies to give workers unpaid leave if they become sick or have to care for sick relatives or newborns. But their position is softening. Privately, business lobbyists acknowledge that they are willing to accept compromise legislation mandating unpaid leave for employees who are parents of newborns only. "We'll probably just hold our nose and take it," says one top business analyst. Watch for such a compromise to emerge after lawmakers return from their August recess. Business Week, 8/28/89, p. 39

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BUSINESS PLANS SHOULD BE PLANS

"This is a very large and multi-faceted corporation. We can't afford to wander aimlessly into the year ahead; we must have a detailed Business Plan. Our planning work begins early, in August or September, and the finished Plan is approved by early March."

We've all heard this rationalizing speech more than once, and we tend to accept it on the grounds that the murky crystal ball of the planner is a challenging tool to work

with. But is it reasonable to expect an organization to function efficiently when decisions on future direction are shrouded in mystery and secrecy for six or eight months of every year?

The planning process has become bureaucratized and self-destructive because management too often insists on (1) annual, 12 month plans that overlook the reality that some programs cycle from start-up to completion in as little as three months and some take as long as forty-five months; (2) a focus on dollars-and-cents cost and return, and this language of common denominator planning fails to define employee action, vendor performance, and market response clearly.

Because federal and local governments require tax/operating reports on a one-year schedule and stockholders expect annual reporting of fiscal results, we tend to tie our planning to these same dates. But corporate programs rarely require exactly twelve months to unfold. Construction of a new plant may take 24 months, overhauling the company's computerized management information system can be a 16 month task, restructuring the customer service operation might require seven months, and a seasonal sales program can often take five months to unfold.

Arbitrarily establishing January 1 as the time of new beginning imposes artificial deadlines on most programs. For short-term operations, that often means that start-up is postponed until "after the first of the year," even when the logical beginning should have been November 1. And since final approval of the business plan may not come until March 1, the program is four months out of phase. Longer programs may have been approved in last year's business plan, and include a rational requirement for progress reports in October and April. But management will often require an added status review as of December 31 -- extra work for the program manager and his people that distracts them from true program effort.



In addition to these timing disruptions, planning managers tend to place so much emphasis on financial detail that business plans become data-focused rather than action focused. Plans for bringing a new plant on line provide comprehensive construction and equipment cost information, but give short shrift to resulting needs for new personnel, to training and retraining. As a result, construction goes smoothly but bringing the finished new production unit on line is slow and sometimes chaotic. In a similar way, sales plans become a detailed outline of sales and profit dollar goals, with breakdown by month and by product line. But discussion of customers is limited to naming major buyers, marketing and sales strategies are generalized, and action plans are rife with amorphous terms like "when available" or "as the situation demands."

A more effective approach to business planning is to make the process a continuing activity rather than a part of the annual fiscal reporting process. Each project or program should focus on essential activities of people, and interim reviews of progress and results on level of achievement and the need to adjust future action to keep the project plan on track. Budgetary reviews are essential, but should be a supplement to the program plan, not the primary focus. Plans that unfold in this manner are "people-focused" and should be subject to continuing revision because the people involved are not always consistent and predictable. It's a more difficult planning concept, but also a philosophy that is more likely to yield success.

PEOPLE AND PRODUCTS

Las Vegas Branch now stocks Bowers Surface Raceway -- a complete surface wiring system that interchanges with Wiremold.

Also now in stock in Las Vegas is Taymac Industrial Grade Raintile Outlet Covers that are U/L listed, NEMA 3R rated, and meet NEC and OSHA standards.

Sparks welcomes Greg Lafayette as our new salesman. Greg will be calling on industrial and construction customers in the Reno-Lake Tahoe area. Many of you will see him soon!

Las Vegas welcomes three new employees:

Bob Mottram - Inside Sales, recently moved from Portland, where he worked for North Coast Electric.

Jerry Reeder - Counter Sales, a long time resident and member of the Las Vegas electrical industry.

Sean Stears - Warehouse/Delivery. You will meet Sean delivering your material.

Our congratulations to Jeff Hansen for getting accepted into the Electrical Apprenticeship Program. Jeff was a valued employee and we wish him well -- as a potential customer.

When 99% Is Not Enough

For a quality program to succeed, we have to accept the axiom that everyone wants to do their job right. Knowing that 80% of the mistakes that take place in a company are caused by inadequate or bad systems for coping with ordinary situations, it behooves management to have in place systems that will allow workers to perform with optimum quality. An uninspired work force means uninspired profits. Inspired workers don't work harder, they just work smarter. Knowing that people want to do their jobs correctly, it is the responsibility of management to create an environment within which this can be accomplished. Ed Berman, The Electrical Distributor, 6/89, P. 40

The nature of the material being handled requires dependability and reliability of the operation of the total system. Several potential solutions to the problem were explored and evaluated.

Potential solutions were:

Use Larger Control Wire. This solution would reduce the line loss, but would not significantly reduce the lateral induction problem. Relay logic would be required as with other options. This method would add to the overall cost.

Use Low Voltage DC. Although this is a feasible solution, it would require a relay logic panel and reduced voltage DC power supply. The requirement for relay logic panels would add a space location problem as well as added minor expenses.

Telemetry Control. A logical solution, but an extremely expensive method. Costs here exceed all the other methods by a magnitude of at least 10 times.

Mini-Programmable Controller (Micro Processor Computer). This was considered the best selection because of the low unit cost and other reasons as outlined.

The unit selected was Allen-Bradley's SLC-100, Mini PLC. The SLC-100 (pronounced 'Slick-100') is a low cost but very versatile programmable controller. It is considered a "mini-PLC" as it is the smallest PLC offered by Allen-Bradley in terms of logic points and function.

This unit had already been successfully applied to a retrofit of a batch system and performed extremely well. Other factors considered included the fact that there would be no need for relay hardware for the interlock logic. Probably the single major factor was the extremely low (solid state) input currents which eliminated the concern over linear induction over the distances involved. The SLC-100 also allowed a unique application of interlock logic in the fact that two units were used (one at each extremity -- about 1500 feet) to develop the necessary permissive conditions at each location. This unique condition was accomplished through using the output of one remote unit to feed logic condition to the input of the complementary unit. Only a minimum of space was required to mount the units; one was actually installed inside the remote field starter, thereby eliminating the need for any additional panels for relay logic.

An additional benefit with the use of this particular unit is that it is IBM-PC Programmable, an option that has proven extremely valuable in its abilities to display, edit, print, and store program logic. The SLC-100 can be programmed through use of the hand-held portable programmer, or the IBM-PC and stored on EEPROM, or on disk. EEPROM storage means there is a "HOT" backup that can be stored separate from the CPU. This means the program logic can be developed and loaded to memory of the EEPROM, then taken to the field and downloaded to the CPU. The advantages of this kind of function are substantial. The option of changes in the field or shops or program development under tightly controlled conditions is an advantage that conventional hand relay logic will never offer.

The real surprising part was the cost was less than the comparable set of relays required to accomplish the same goal. In addition, a great deal of wiring time was saved and a lot of confidence was developed in the units by the technicians during the installation and testing.

Unique applications similar to this may have a very real value in FMC's future, in addition to conventional uses already proven.

CROUSE HINDS JOINS GMI FAMILY

We are pleased to welcome Crouse Hinds Construction Materials as one of our major suppliers. Crouse Hinds manufactures top quality fittings, cast outlet boxes, enclosures, plugs, receptacles, and lighting for heavy duty and hazardous locations. They have been one of the most respected electrical suppliers for years, and we look forward to a long and beneficial relationship with this valued vendor. Both branches will stock a full line of Crouse Hinds products.

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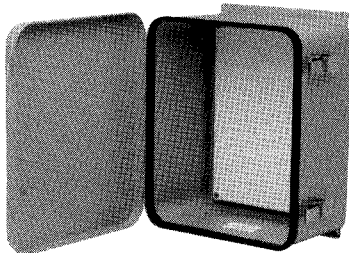
To better serve our customers, we have a Toll Free "800" number! Now you can call 1-800-223-1890 from anywhere in the state of Nevada and talk to GMI-Sparks free of long distance charges.

Sparks has also expanded to be open for phone and counter service at 7:00 a.m. The branch is open during lunch hour, so you can get what you need starting at 7:00 a.m. straight through the work day. TOLL FREE 1-800-223-1890

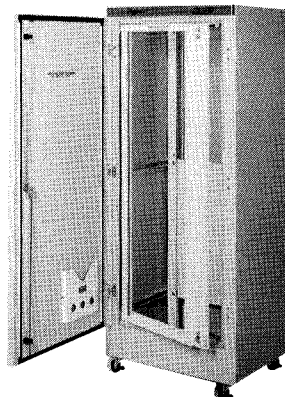
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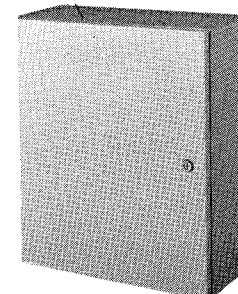
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DESIGNLINE "DLB" LIFT-OFF COVER,
QUICK-RELEASE LATCH BOXES (D-2)



DESIGNLINE ELECTRONIC RACK
ENCLOSURES (D-15)



DESIGNLINE SINGLE DOOR NEMA
TYPE 4, TYPE 12 AND TYPE 13
ENCLOSURES (D-5)

DESIGNLINE