

MANAGEMENT GUIDELINES

Nurturing and expanding engineering resources

Current market forces are requiring unique methods to develop staff members

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Developing, maintaining and expanding an experienced engineering team during vigorous economic growth can be difficult due to competing incentives in the job market. Many factors need to be properly addressed to support the ongoing evolution of a high-performance engineering team. A targeted approach to hiring and managing engineering personnel can help companies retain their valuable engineering resources and avoid many of the pitfalls that can lead to cycles of rebuilding the team from the ground up.

History. The hydrocarbon processing industry (HPI) is booming. Oil prices remain in the \$60 per barrel range, and most future projections indicate an extended period of business expansion due to low excess petroleum production capacity, high refinery utilization and, of course, the unrelenting and increased worldwide demand for hydrocarbons. The economic malaise of the HPI, which has lasted for nearly two decades, has finally been shattered.

As some industry experts with long-term memories might recall, the 1970s was an active period for HPI expansions. Higher petroleum prices supported upstream investment in such areas as Alaska, the Gulf of Mexico and several non-OPEC member nations. At the same time, the downstream sector was thriving, with more than 300 operating refineries. The last major US grassroots refineries

were completed in Louisiana during this period, and the synfuels business was a budding industry.

It was also during this expansion period that there was a substantial demand for professional engineers. To be an engineer in the capital-intensive HPI, however, one had to acquire highly specialized skills that took several years to develop and hone. Based on

■ Prosperous economic times challenge employers to retain key personnel with traditional incentives

the engineering registration criteria of the 1970s and 1980s, it took a minimum of eight years for a freshman college student to become a fully licensed professional engineer. Nonetheless, chemical engineering schools, which were producing approximately 2,000 graduates per year in the mid-1970s, experienced a large influx of students. By the early 1980s, the chemical engineering graduate supply had increased to approximately 7,000 per year.

As with all business cycles, however, this period of expansion eventually ended. Excess petroleum supplies and ample refining capacity exceeded final product demands due to the higher prices. Subse-

quently, oil prices entered a long period of low relative value. Upstream investment was reduced, the emerging synfuels industry stalled, and downstream refinery expansion investments were no longer justified. Additionally, as jobs disappeared, many engineers took alternate jobs and career paths. Many shifted into different engineering disciplines while others migrated to the computer industry. Still others became entrepreneurs, teachers, accountants and a multitude of other professions. As a result, the pool of approximately 100,000 chemical engineers that existed in the early 1980s was reduced to the approximately 33,000 chemical engineers who are practicing today.

Current market trends. As a new period of economic vitality in the HPI is entered, the current demand for experienced engineers is greatly straining available resources. As a result, maintaining and developing an experienced engineering team is becoming more and more difficult.

Our free-market economy, which is characterized by the reallocation of labor via immediate cash incentives, is a stark contrast to the slow skill development process associated with the HPI. The hard-earned skill set developed by engineers is not easily replaceable because of the time it typically takes to develop and hone less-experienced personnel to function at the level required by the demands of complex oil and gas projects. This long-

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term developmental process has resulted in a short-term personnel mismatch that has become very problematic for the HPI during the current upturn in the business growth cycle.

Petroleum companies are struggling to find the personnel resources to adequately staff and upgrade facilities to capture today's marketplace incentives. Service companies are likewise at a disadvantage to capitalize on these same opportunities as they try to secure the staff necessary to execute their labor-intensive products, and equipment supply companies simply cannot fully support their manufactured goods for a given project.

In spite of these existing challenges, it is important to remember that every problem brings with it a unique set of opportunities, and the marketplace rewards those organizations that are able to capitalize on them. Thus, in order to address the additional workload, a company may choose to increase the existing engineering workforce's hours, leverage the quality of the existing talent base or implement some combination thereof.

However, methods such as increasing the engineering workforce's hours (usually via workweek extensions) or hiring new engineers may prove detrimental. Long-term workweek extensions lead to worker burnout, lower overall productivity and encourage job hopping while hiring new employees increases the salary structure without positive results. Additionally, a rapid, large employee increase (or decrease) often produces a reduction in loyalty from both the employer and employee. This is a demotivating work factor and it creates a less-effective engineering team.

The preferred solution is to reconcile the current engineering-marketplace disparity to more efficiently leverage existing personnel resources by utilizing an active and direct management style. While modest workforce expansions can also be pursued, the quality of personnel takes precedence over quantity.

This approach is guided by the belief that active and direct one-on-one personnel support produces stronger and more effective engineers. Indirect approaches via procedure, conceptual direction or policy often yield lower results. Engineers are knowledge workers who pride themselves on the value of their skills. The unique capabilities they possess are extensions of their own personalities. Successes are felt as personal compliments, and technical failures are interpreted as shortcomings of their own personas. Thus,

direct approaches, especially for engineers, are favored.

Formally recognizing these personal engineering successes sets the stage for additional improvements, just as directing a skilled and intelligent individual by using bureaucratic mechanisms and indifferent policy is often counterproductive. Bureaucracy and policy leave little room for personal accomplishment. Engineers who experience this indirect approach are more likely to seek instant gratification elsewhere via cash incentives rather than remain with their present organizations. There are ways to counter this behavior, but it all starts with active management and direct support aimed at:

- Maintaining the existing organization
- Expanding the organization
- Developing the organization

Maintenance. It is more prudent to retain the existing team than to rebuild a team from the ground up. Significantly more effort is required to add skilled personnel than to retain existing personnel. A staff exodus can instantly paralyze a project, resulting in immediate financial losses. The cost and time it takes to find replacement personnel adds more overhead burden.

Even if a replacement team composed of exceptionally talented individuals is found, it will take some time to develop an effective and cohesive team culture. This adds more overhead costs in the interim due to the decline in worker productivity. Large organizations with diverse personalities will require even more unification time. Thus, the first priority is to ensure that the needs of the existing team members are satisfied.

The personalities, motivations and values of individual team members vary. To ensure that the potential of each is fully realized, in-depth knowledge about motivations, strengths and limitations is required. Once this is done, individuals can be placed in positions that coincide with their particular motivations and strengths. It is more effective to build upon and utilize native engineering or interpersonal talents than attempt to train an individual to be proficient in an area where he/she may never perform well.

For instance, those engineers who are very analytical and do not communicate well (and may never change) should be challenged in support positions that require significant calculations, while engineers who have an outgoing personality and prefer numerous and varying projects may be suitable for project development roles. If a situation exists in which there are engineers who are productive but are being surpassed

in their careers by others, these individuals may be placed into some types of recognized mentoring roles. Thus, the mentoring engineer is not only "rewarded" by the recognition of those above and below in rank, but may also achieve a sense of gratification by helping to develop productive engineers.

Of course, in a fast-paced industry that demands high performance and bottom-line results, taking the time to maintain an engineering staff through individual support may not seem economically feasible. However, if we look at the cost associated with losing just one member of the team compared to the extra effort it would take to keep that team member motivated and supported, we can see that a one-on-one management style is more than justifiable.

In addition to the obvious project disruptions, schedule delays and coverage by others to accommodate the unassigned work, a new engineer must be recruited. The cost of replacement will usually result in a higher base engineer salary as an incentive to attract the new recruit, and there may also be a 20% recruiter fee beyond this, as well as continued project disruption until the new engineer is hired.

A new person also carries the risk of unproven performance, or underperformance, which may lead to additional overhead. Generally, even with the finest recruiting efforts, one out of four individuals is not appropriate for the team. Thus, the benefits to the organization of taking the extra effort needed to maintain existing team members outweigh the associated costs of replacing them.

Expansion. Quality personnel additions take precedence over the quantity of personnel additions. It is common knowledge that organic growth and expansion is the natural outcome of any organization's proven success. When this expansion is due to the success of an organization's engineering team, it clearly follows that the core group and culture must first be retained to provide the backbone for incremental growth. Once you have assured that your core group will remain in place, you can then begin to expand the group from the inside out.

It is paramount that managers be vigilant in selecting additional team members. Having one strong contributing member is better than having several weak or disruptive members. If additions are made to the team, based on quantity rather than quality, such actions can lead to a reduction in

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team effectiveness, unnecessary overhead burden and the possible downgrade of a high-performance team to a dysfunctional group.

In addition to individual quality, how well the new member fits within the team's work culture is also important. As new members are being interviewed, the recruiting team must look closely at how well the candidates will merge into the team and whether a good fit exists. For instance, if the culture of the organization is based on openness, a flat hierarchy, and collaboration, then authoritarian engineers would not be good candidates for the team. They would be likely to force themselves into the group and alienate productive members, thereby undermining the team output. For this reason, it should be the recruiting team—rather than the hiring manager—that determines how well the candidate will merge with the team. It is incumbent on the hiring manager to ascertain and implement the team's decision.

While cash can be used as a work incentive, it can also work against the organization's expansion. New employee pay incentives are often high in business expansion cycles relative to incentives paid to current employees. This encourages job hopping by default. Cash alone instills an expectation in employees for monetary incentives at every new job but it doesn't instill any sense of loyalty to one organization. Thus, the individual is rewarded while the overall organization is penalized, resulting in a loss in team effectiveness, additional overhead burdens and possibly job schedule losses due to personnel turnover.

Besides cash incentives, emphasis should be placed upon project visibility, job responsibilities, job accountability, work location, personal career growth and workplace environment. These are some of the additional motivators that can be used to recruit outside resources and encourage them to join the organization.

Development. Communication, employee empowerment, an open positive culture, rolling flexibility and satisfactory reward structures are the vehicles needed to facilitate ongoing personnel development, as well as maintain an experienced and effective team.

One of the most effective ways to ensure retaining an experienced engineering team is by providing each member with opportunities for individual growth,

and by recognizing team members' personal accomplishments. Being recognized for personal achievements and being given ownership over a project are the inherent goals of many highly skilled engineers. Team members will have faith in the organization's capacity to help them attain these goals if they are provided with a supportive work environment in which a junior employee has the opportunity to advance to a higher level.

Furthermore, it is important to assist in the personal development of existing team members because they are positioned to have the greatest impact on immediate project needs. They are familiar with the organization's culture, policies and procedures, whereas replacement individuals must go through a period of orientation before they can contribute.

Because jobs and work scopes constantly change, personal flexibility is a key developmental area. As opposed to being assigned to a single job, assignment to multiple activities requires a greater degree of self-training and responsibility, which helps to keep engineers motivated and productive. Many times during a job, we enter a lull period in which our engineering resources can be better utilized elsewhere. Being flexible, therefore, can provide the dual benefit of personal career development and more productive employees.

The importance of face-to-face communication between managers and team members cannot be overemphasized. In today's fast-paced, dynamic environment, we are awash in so many e-mails, meetings, voicemails, PDAs, and endless phone calls that quality communication has become a lost art. A single face-to-face meeting can often more effectively build bridges toward a productive goal than endless e-mails and telecons. We need to keep ideas simple and clear.

Recognizing individual achievements and supplementing cash incentives with "softer" rewards will go a long way in helping leaders nurture and maintain their existing engineering teams during expansion periods.

Case 1. Steve is a senior engineer who is past retirement age, but may work a few more years. During Steve's long and successful career, he held numerous positions, all with the same company. He does not want undue stress at this point in his career; however, because of the current economic boom in the HPI, he has been offered jobs by several competing firms. Because of his wealth of experience, his

present employer does not want to lose him—not to another company nor to retirement—at this time. He is a valuable resource, especially during a period of expansion.

The approach used to retain and further motivate Steve was to give him a raise, immediately present him with well-deserved high-level personal recognitions, and reemphasize his job security. As previously stated, while cash is a motivator, it should not be used as a sole motivator since it sets a poor climate. The raise was given to indicate the company's willingness to meet one of several needs. All engineers, especially more experienced personnel, need to be recognized at appropriate levels. A long-term senior employee such as Steve has earned friendships and developed good working relationships throughout the organization, and, as such, his rewards are commensurate with these accomplishments.

Because Steve's achievements and skills were recognized in a wider company environment, he has continued to work for his present company and remains a loyal, strong contributor who is an asset to the company and a leader to his team.

Case 2. Jean is a young process engineer. Though not apparently subject to predatory recruiting, she has not been challenged appropriately by her company and her job satisfaction appears to be waning.

Due to a shortage of more senior engineers, Jean was assigned to lead a new program that would normally be reserved for more seasoned individuals. Her duties included far more than just engineering skills. Sales, coordination of proposals, team building and direct client contact were some of the additional responsibilities included in her new position. Jean is supported in her new position by the company's general resources, and she now has influence in how they can be allocated.

This approach not only resolved a personnel staffing issue within the company's engineering program, but also helped to develop a younger individual into a more productive engineer. Jean now has a larger, stronger influence over business, and the dollar volume she directly influences has been dramatically increased. Her former job function is now covered by less experienced individuals.

Although she has only been in the new business program for a short period, Jean is responding positively and is leading "outside of the box" thinking to make

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this opportunity a success. Also, her time is invested beyond what would normally be expected of an individual with similar experience.

Case 3. George is a senior process engineer who has reached a plateau in his successful career. He is outgoing, enjoys travel and is a conceptually strong process person who can think on his feet. However, he has been somewhat despondent since this career plateau was reached.

To reinvigorate George, his company moved him into process development, where his natural talents could shine and where he could gain personal satisfaction from his work. Process developmental projects are at the early stages of a potential design; they require conceptual activities rather than detailed design activities. In addition, developmental projects require a large amount of networking with the client to incorporate all positive attributes into a design. As such, an outgoing person is needed to extract and assimilate all of the potentially good ideas that are available within the minds of

many people to make a marginal project into a successful business project. With a change in job responsibilities, George's enthusiasm returned. His positive nature is contagious, and he has become a leader for his company once again.

These cases illustrate how important it is for an organization to use an active and direct one-on-one management approach to retain its highly skilled engineering personnel.

Engineering the future. Human assets have significantly higher value in expansionary business cycles and they serve as the basic differentiator for companies that are successful in capturing and executing profitable projects during times of marketplace disparity. For this reason, it is important to appeal to employees as individuals, placing them in positions that not only play to their strengths but also engage and motivate them over the long term, thereby strengthening the team, as well as the overall organization. Recognizing individual accomplishments, providing them

with opportunities for growth and ensuring that new personnel fit cohesively within existing teams are the keys to nurturing and retaining a company's engineering resources during periods of expansion. **HP**



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