09 February 2009

TO WHOM IT MAY CONCERN

Our School is most appreciative of the vacation work that companies have offered our students in the past and would like to use this opportunity of putting forward a framework of ideas which would assist the Employer to deploy a student in a mutually beneficial manner. Firstly, my colleagues and I firmly believe in the importance of Vacation Work employment in educating our engineering students and imparting a real world feel to their studies. While it is difficult to always find exciting work for students, employers often underestimate the student's ability to contribute to the company at a meaningful level. This letter therefore seeks to address both of these issues. Of necessity some generalization must creep in as a clearly focussed letter would require a good insight into the actual engineering activities in which your company is engaged. To avoid this problem I have attempted to cover a number of engineering issues which will then allow you to adopt or discard where appropriate.

First year Students

In the first half year of study a typical student would have a foundation in the areas of Mathematics, Physics and Chemistry. The only engineering courses taught at this level are "Engineering drawing" and "Engineering". The former course teaches computer aided as well as conventional drafting techniques. The latter course simply introduces the student to a number of interesting aspects of Civil, Mechanical, Electrical, Electronic, Agricultural and Survey engineering and shows how the disciplines come together.

If a student does receive employment during this midyear period of six weeks then the nature of the work that could be undertaken is somewhat limited. Probably, the best tasks for a first year student, at least in large organizations, would be to accompany a mature artisan as they correct various outages in the plant. This maintenance work would give valuable insight into the workings of pumps, filters, electric motors, IC engines, heat exchangers, workshop machinery, pipework systems and general machinery. It would be beneficial for the student to assist, under guidance, with these tasks and the dirtier the hands the better. It is difficult to believe that a good design can spring from the mind of a person who has had minimal exposure to the difficulties of stripping various machines etc in confined spaces and in some cases in an unpleasant environment. Engineers graduating from universities must have good practical skills and awareness as well as the ability to apply theory; their involvement in maintenance in the early part of their degree is therefore advisable. A mechanical engineering student should also not be restricted to purely mechanical tasks as broad exposure to Civil, Chemical and Electrical problems is advantageous. It would also be quite acceptable if a student were given a workshop course where lathes, milling, welding and drilling machines were used. It is however accepted that only large companies and organizations can do this.

.

Perhaps of equal importance to a student at this level would be that they would learn to interface with other engineers, management, artisans and labourers thereby enhancing their awareness of personal relations and communication.

At the conclusion of first year, the student will have been taught basic Engineering Design and Introduction to Engineering materials. It would therefore be acceptable if the student were tasked to propose modifications that would improve simple designs that are prone to failure. Eg. adding gusset plates to strengthen supports, rerouting pipework and other utilities, improving the flow of manufactured items. In addition in the case of large factories, the actual process used in say the manufacture of paper, the generation of steam or power or the sterilization and bottling of milk could be assigned as a task for the student or small team to unravel and understand. Improving the "flow" of raw materials or even manufactured components from one machine to another would assist the student to grasp the importance of efficient routing of items.

Second year students
From the second year onwards, the student will begin to rapidly acquire engineering skills with courses in Metallurgy, Strength of Materials, Manufacturing, Thermodynamics, Fluid Dynamics and Machines dominating the syllabus. This means that a student after 18 months at University could be called upon to offer more extensive design proposals for factory equipment involving basic mechanisms and fluid flow. Alternatively, a student could be assigned the task of evaluating the reasons for poor performance in a production process. An involvement in measurement and experiment such as estimating water and or steam losses in a factory is possible. Having completed a second computer course in their second year, a student should manage most programming and spread sheeting procedures. This would open up small energy or costing audits and other programming tasks.

Third/Fourth year students
From the third year onwards, the students will have grown significantly in confidence due mainly to the significant increase in the number of engineering courses that they have passed. A new area covered is Heat Transfer and they should now feel confident to carry out quite extensive design work.

By now they should have a good understanding of machines, metallurgy, manufacturing processes and vibration analysis which implies that they could be assigned projects on which they can work alone or in small groups and with little supervision. Working with engineers, for example using ASME Code 8 for boiler vessel design and the using CAESAR to analyse pipe stresses, would represent an excellent opportunity for our students. Specifying pipe hangers is an additional task which would be good training. Heat exchanger sizing is another area that students could tackle. An exposure to planned systematic Shutdown procedures such as cleaning, descaling and preventative maintenance techniques is welcome.

In all cases we encourage employers to insist on the submission of a report detailing, in normal report style, the student's findings and conclusions. Presenting their findings in a small boardroom meeting is also excellent training in public speaking. If these requirements are made known in advance, it is a valuable driving force encouraging the students to search harder and deeper for understanding and to act in a professional manner.

Wherever possible, we encourage employers to register our students for courses on Safety, Labour Relations and on any engineering seminars currently being held in house.

Yours faithfully
Professor Glen Bright
Head of School:
School of Mechanical Engineering.