

A Student's Perspective on the MEng Chemical Engineering Process Design Project in Partnership with Industry

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This case study gives a student perspective of the Chemical Engineering Design Project in association with GlaxoSmithKline (GSK). Links to CS15 and CS18.

Reasons for engagement

The final year Process Design module is part of the MEng programme and usually involves a partnership with industry, in this case with GlaxoSmithKline (see Rielly – CS15 and Simmonds – CS18).

The engagement

Initial contact was between the University lecturer and five students, with the academic handing the students an initial design brief from GSK to develop a process for manufacture of an active pharmaceutical ingredient (API). Students were not handed all the information they needed at once and were instead encouraged to conduct research about the relevant processes, products and operations. The group was encouraged to organize themselves to include one chairman (responsible for organizing and moderating meetings, setting out meeting agendas and keeping an updated project plan) and one secretary (responsible for recording and distributing meeting minutes).

The period of the project was 12 weeks and included a visit to the department by a GSK engineer a few weeks into the project. This allowed students enough time to become familiar with the project and prepare a list of things for discussion.

The course was structured so that in addition to the overall group project, each member of the team had their own individual piece of the project to work on. In the case of this group the individual projects were divided up based on each member having a specific piece of the process to do a detailed design on. The decision as to who would design each piece of kit was decided by the group rather than the academic.

There was also a visit to the GSK API manufacturing facility in Dartford later in the project which gave the students a chance to see the operation of an API plant first hand and another Q & A session was held. The students also held a technical presentation of their work so far (8-9 weeks into the project) which was open to GSK employees, the presentation (whilst considered by the students to be an extra burden during the already busy project schedule) was actually a good chance for GSK engineers to give their feedback on what the students had designed so far and for the students to talk about their individual design projects with the GSK staff.

Issues

One of the main issues we had was that some of the information we needed in

order to progress our designs required experimental data that quite often had to be obtained in a laboratory. The nature of the chemicals involved along with the extremely high value of the pharmaceutical products meant that lab work was not available to us. Whilst GSK were as helpful as they could possibly be with the information they had, quite often their processes were run from experience of what worked through trial and error. This quite often led to students having to work backwards from a GSK designed process to determine the basic information required to be able to design their own alternative processes. I had to make some fairly large assumptions in order to progress my own design. In hindsight having worked on a real design project for the past three months I feel that this was actually a rather good simulation of a real design project, quite often you don't get all of the information you require and end up having to make assumptions in order to progress a design.

It would have been easy to constantly email our GSK contact with questions as we would have at least five new questions a week. These were normally discussed and overcome in the weekly meetings with our academic and any questions that required GSK input were gathered into a single document and sent to the contact. This structured approach meant that the GSK contact was not constantly receiving emails from us and we were happy with this as long as we got relatively frequent replies.

Benefits

The visit to GSK was a good chance for us to see a real API facility operating and gave us a good idea of the scale of operations involved as well as giving us all sorts of new ideas about how to progress our individual equipment designs. Giving the presentation in a professional environment was a good experience and one that will probably come in helpful in the future.

The project was very well structured with the students able to focus on GSK's suggested report format and structure. As the team leader it was a great help that I had a structured report format to be able to base my weekly project plans around, the weekly meetings with our academic were an excellent opportunity for us to ask questions regarding both our individual projects as well as discussing the group's progress.

Unintended outcomes

I wasn't initially intending to volunteer for group chair but when I saw that the project was centred around a pharmaceutical process I decided to give it a go. I had one year of experience working as a process engineer in an API facility in my industrial placement year and felt that I would be able to provide the group with direction, especially in the initial weeks. The outcome of this was that I was able to develop my people management skills and was able to gain a small insight into what it would be like to manage a group of people during a real design project.

Academic/Industrialist/Student perspective

I felt that the project gave me the opportunity to develop my skills as a team leader as well as a team member. The project was very well organised, with GSK suggesting a format to our final report very similar to a real design report it helped us remain focused when developing our project plan, with definite milestones to achieve.

Performing the project alongside a real company made me take the project a little more seriously than I perhaps would have. The whole experience felt a lot like a company project rather than one we were doing for University.

Reflections

In hindsight I would have taken a more open view of the design options available

to me had I not already spent some time working in an API facility and thus already ruled out some options as 'unfeasible'. For example continuous operation is not generally practical in most API productions but towards the end of the project I had begun to wish I had explored that avenue a bit more closely as there are a lot of marks available for screening of ideas. Even if you think an idea is not feasible to begin with it is worth performing a study just to confirm.

I think at times we followed some of GSK's suggestions with a bit too much enthusiasm without stepping back to explore other possible design options. If we were working entirely from scratch like the other groups were then we may have been a bit more open minded with what options were available to us. It was at times very easy to simply follow the same design approach as GSK do in their manufacturing facilities.

Context

Adam Kellett graduated from Loughborough University with a first class Master's degree in Chemical Engineering with Management. He spent his industrial placement year at Avecia Pharmaceuticals (now a part of Nicholas Piramal India Ltd) and is currently employed as a Process Engineer with Briggs of Burton Ltd, who are involved in the brewing, food, pharmaceuticals and healthcare industries.

