Cooperation between The United Kingdom and Japan in the Field of Turbomachinery

Cooperation between The UK and Japan in the field of turbomachinery almost certainly began when Mitsubishi acquired the licence to manufacture Parsons steam turbines towards the end of the last century. However, the cooperation lapsed for many years until about 20 years ago when academic exchanges began.

Exchanges between British and Japanese Universities began in the early 1970's when several Japanese Professors, including Prof Namba of Kyushu University and Prof Tanida of Tokyo University, visited the Whittle laboratory at Cambridge University. The exchanges were initially confined to the field of unsteady flow through turbomachine blades, a topic that at that time appeared to be extremely popular in Japanese Universities. They came about largely through the influence of Dr Denis Whitehead who was (and still is) an internationally known authority in the field of unsteady flow in turbomachinery. Dr Whitehead visited several Japanese Universities as part of this exchange.

As a result of these initial contacts a few Japanese students came to Cambridge to study for M.Sc or Ph D degrees in the 1970's and this was the start of a steady flow of Japanese students and academic visitors to the Whittle laboratory.

It is possible for Japanese research workers to visit a British University in two ways. They can either come as students and study for a postgraduate degree or they can come as academic visitors.

Academic visitors are usually people who are already distinguished in their field of research and who wish to make contact with researchers working in a similar field at a British University. In theory they must be invited to the British University by the head of the department concerned but in practice such an invitation may be made unofficially by an individual faculty member who will then get the approval of his head of department. The host British University makes no charges to such visitors and makes all its research facilities such as libraries, computers and experimental equipment freely available to them. However, in general the visitor is responsible for finding his own living expenses because British Universities have very limited funds to support academic exchanges. It must be stressed that such invitations are usually reserved for people who are already internationally recognized experts in their field of research. Many Japanese turbomachinery researchers have spent periods of up to 2 years in the UK in this way. They have invariably been well received and have made valuable contributions both to technology and to Japanese-UK relations.

Regarding students, it is of course possible for a Japanese student to come directly to a British University to study for a postgraduate degree immediately after graduating from a Japanese University but this is usually very difficult to arrange because of the problem of finding financial support. In the UK most British postgraduate students receive a scholarship from the government, usually via one of the Research Councils, to pay their Univer-

* Whittle laboratory, Cambridge University Engineering Department

原稿受付日 平成4年9月21日
sity fees and living expenses. These scholarships are not available to overseas students and the Universities themselves seldom have funds to support such students. Hence it is usually necessary for the student to find financial support (currently amounting to about £10000 per year) from a source in Japan. As a result most of the Japanese students coming here have been employed and supported by large companies such as Mitsubishi, Hitachi, etc. Often they have already obtained postgraduate degrees in Japan and come here as students simply because it is the only way for them to spend some time in Britain.

Oxford and Cambridge Universities are the most popular choices partly because they are the best known but also because they are the easiest places for a Japanese student become integrated with other students and to join in University life. This is because of the college system whereby all students have to be a member of a college, many of the colleges were founded about 500 years ago and have very strong traditions. The colleges will provide overseas graduate students with accommodation and with dining, social and sports facilities. Oxford University specializes in heat transfer problems of turbine blades and has a special laboratory, the Osney lab, devoted to this subject. Cambridge has the Whittle laboratory which studies all aspects of turbomachinery aerodynamics, for both steam and gas turbines, and has achieved an international reputation for its work on computational fluid dynamics applied to turbomachinery. At the Whittle laboratory we have had some excellent Japanese students who came in this way, averaging about one per year. As a result we now have close contacts with many Japanese companies and research establishments.

Language is of course a problem for any Japanese visitor to the UK. Most academic visitors and students can read English well enough for them to pursue their studies and even to give informal seminars describing their work, but initially it is more difficult for them to mix socially, especially outside the Laboratory where they are working. This must be an even greater problem for their wives if they accompany them. However, they usually adapt well and are able to mix socially with their British colleagues after a few months. Language is less of a problem for the British visitor to a Japanese University or company. Very few British Engineers speak more than a few words of Japanese but everyone they are likely to come into contact with speaks English well enough to communicate and it is even possible for them to lecture in English.

On the technical side the major cooperation has been between Rolls-Royce and the Japanese Aero Engine companies, especially IHI, on the IAE V2500 aircraft engine. This engine is now an great success and is an outstanding illustration of the power of international collaboration. For a time many Japanese engineers working on this project were based in Derby so that they could work closely with their Rolls Royce colleagues. On a smaller scale a British company, Noel Penny Turbines, which specializes on small gas turbine engines, has performed design work for several Japanese companies.

Further strong technical collaboration occurs from the use by many Japanese turbomachinery companies of CFD computer codes developed at the Whittle laboratory. Japanese companies have always been amongst the forefront of the application of CFD to turbomachinery design and have made very good use of our codes. It seems that they are able to integrate new methods into their design process much more rapidly than can their Western counterparts. For those of us who develop such codes it is very stimulating to see them being used so effectively and contributing so much to improvements in turbomachinery performance which benefit the whole world. Japanese companies have also performed much research and testing to validate these codes and it is extremely gratifying to us that they have been so willing to publish the results of these validations in the technical literature.

As a result of this cooperation many of the faculty members of the Whittle laboratory have visited Japan, either to attend conferences or as guests of either a University or a large company. We have always been very grateful for the fantastic hospitality that we receive there, and regret that this is much more than the hospitality that own
Cooperation between the United Kingdom and Japan in the Field of Turbomachinery—(3)

traditions lead us to offer to Japanese visitors who come to Britain.

As a result of the collaboration between the Whittle Lab and Japanese Universities and Companies we receive many short term Japanese visitors who are always keen to visit Cambridge when they attend a conference in Europe. They are always very welcome but should remember that in Britain people are not expected bring gifts when they visit, to do so causes us some embarrassment if we are not able to offer a gift in return.

In summary; UK-Japanese cooperation has developed very rapidly over the past 20 years, mainly in the academic field. However, with most new large aero engine projects now involving international cooperation we can expect further joint projects and closer ties between the Japanese and UK turbomachinery industries.