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NEW BATH UNIVERSITY OF TECHNOLOGY

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13. ABSTRACT

In this report one will find a description of the new University of Technology located at Bath, England. Particular attention is given to a discussion of the facilities and curriculum of the School of Engineering.

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NEW BATH UNIVERSITY OF TECHNOLOGY

Following the end of WWII, nine new technological universities were created in Great Britain to provide increased opportunity for students to receive a higher education. One of these new schools is located at Bath which is situated on the River Avon, considerably downstream from Stratford. Bath lies directly west of London and can be comfortably reached by train in about two hours time from the City. I made a recent visit there at the invitation of Prof. F.J. Wallace who is Head of the School of Engineering.

The new University at Bath has its roots in the origins of technical education in the 19th century. The Bristol Trade School, which opened in 1856, gained the patronage of the Society of Merchant Venturers in 1880 and a new building was opened in 1885 to house both the Trade School and the Marine School. In 1894 the name was changed to the Merchant Venturer's Technical College, and during the first half of this Century quickly developed in the field of technical education. In 1949 control passed to the Bristol Education Authority and rapid expansion followed in new premises. The college became a College of Advanced Technology in 1960, and became an independent institution with direct grant status in 1962. In 1966 it received its Royal Charter as the University of Bath and a completely new university concept - both of building and teaching - was planned and is still being carried out in the City of Bath. The School of Management and the School of Architecture and Building Technology are, however, still located in Bristol which is about a 15 minute drive from Bath.

Bath itself is one of the most beautiful cities I have seen in Britain and has been described as "the finest example in history of a planned Georgian city." Its fame goes back to the Romans who erected temples and elaborate baths here because of the phenomenal springs of hot water, from which half a million gallons of water still gush every day at a constant temperature of 50° C. It was in the 18th century that Bath really came into its own, when brilliant management, architecture and town planning turned it into a mecca for England's fashionable society, which flocked here to dance, gamble and take the waters. Today Bath still has its beauty and its many links with the past make it a fascinating place in which to live. But it is also a thriving modern city of about 85,000 inhabitants, with plenty of sport and entertainment and, of course, the world-famous festival of the arts.

The University at Bath is still under construction. It is situated on a hill to the southeast of the city, and the campus is undoubtedly one of the better university sites in the country. The planning and architecture are modern and so are the approaches to teaching and staff-student relationships. The 190-acre site is on the slopes of Claverton Down which is about 650 ft above sea level. Although physically located only a mile and a

quarter from the center of Bath, it is almost surrounded by open countryside. A very pleasant educational environment indeed!

The layout of the University is based on a linear pattern of growth. A long central core is provided by a pedestrian Mall, along which are arranged the main administrative and social buildings, restaurants, the library, the Computer Center, and general teaching rooms. Specialized lecture rooms and laboratories belonging to the various schools spread outwards from the buildings of the Mall, which will itself be extendable so that the University can add new units as well as increase the size of existing ones. In this way the various parts of the University will be able to grow independently. The Mall concept obviously forms a focus for university activity and excludes all but pedestrian traffic from the interior of the campus. In addition to a high-rise 210 study-bedroom complex spanning the Mall there are, on the north, terraces of student apartments. The total effect achieved through this layout is extremely pleasing. The atmosphere is quiet, unhurried, friendly and the natural surroundings are soft and beautiful. I envied these students their lovely spot. The present enrollment is approximately 2500 of which about 10% are postgraduate students. Apparently the University will be allowed to grow, eventually reaching a student population of about 7,500.

The University awards both undergraduate and graduate degrees with the main subjects of study being the pure and applied sciences, engineering, architecture, management, education, modern languages and sociology. According to the catalog, "the courses have been designed to demonstrate that technology can provide an intellectually stimulating field of study in its own right. At the same time, all the students study wider aspects of the sciences, arts or social sciences in the belief that these develop the judgement and broaden the outlook of the technologist." Certainly this is the modern trend in technical education.

The academic work of the University is organized through a number of Schools of Study, each of which cooperates with the others in arranging teaching and research in its own field. There are 13 Schools at present, but others may be added in the future. These are: Architecture and Building Technology; Biological Sciences; Chemistry and Chemical Engineering; Education; Electrical Engineering; Engineering; Humanities and Social Sciences; Management; Materials Science; Mathematics; Modern Languages; Pharmacy; Physics. The Schools were intentionally <u>not</u> grouped into the traditional Faculties of Arts, Science and Technology in order to avoid any suggestion of dichotomy between the arts and the sciences, and to promote free, uninhibited cooperation between Schools across the whole range of the academic spectrum.

Many of the degree courses are of the four-year work-study type (this is commonly referred to in Great Britain as a "sandwich" course), and manufacturing firms, government research establishments, national boards and

city-town and county councils participate in the practical training of the students. This close relationship between industrial training and university education provides students with a wide and sound practical background, and an early understanding of the economic and other factors involved in management. During their periods of industrial training, students are paid by their employers just as in the United States. But during their periods in the University, they receive normal local grants to pay for their expenses.

Wallace explained that many of the students in engineering cooperate with the British Aircraft Corporation (BAC) and with the Bristol Division of Rolls-Royce (R-R) both of which are located only a short distance to the north near Bristol. He went on to explain, however, that this year for the first time it has not been possible, because of the economic slowdown, to place every student with a participating industrial firm.

The School of Engineering, which was naturally the one having the greatest interest for me, is housed in a beautiful new building having a total of 90,000 ft^2 of floor space. Laboratories and workshops are on the ground floor, administrative offices, staff rooms, lecture and reading rooms, and a computing room are on the second floor. Drawing and design offices, lecture theaters and the joint common room for staff, students, technicians, and clerical staff are on the third floor.

The School offers a four-year course leading to the award of a BSc degree at Honours and Pass levels, in the fields of engineering broadly covered in aeronautical, mechanical, production and systems engineering. Close links are maintained with the Schools of Electrical Engineering, Mathematics, Materials Science, Management, and Modern Languages, all of whom contribute to the teaching of the students of the School of Engineering. The School is organized on the basis of the following subject groups: Thermodynamics and Propulsion; Fluid Systems and Control; Materials and Structures; Aeronautics; Applied Mechanics; Production; and Engineering Design.

In spite of the fact that the engineering programs have been primarily designed to educate undergraduates, there is a considerable amount of research underway. I am speaking, in particular, of the aeronautical research activities I visited. Wallace conducted me on a tour of the research facilities which included a low turbulence subsonic wind tunnel having a test section of approximately 6 x 6 ft^2 and a maximum velocity on the order of 200 ft/sec. At the moment, this tunnel is being used to study a variety of problems classified as industrial aerodynamics; e.g., smoke dispersion from stacks, wind loading on various structures, etc. In addition, I saw a supersonic tunnel in which a boundary layer bleed problem is being investigated. This particular study was motivated by early Concorde inlet design problems and it is being financed by the British Aircraft Corporation, designers of Concorde. Another interesting investigation involved the use of an analog

computer in the study of the response of various structural members to static and dynamic loads. Here the intent was to use the computer to model and to predict the type of response given by a variety of structural components.

One of the most interesting new programs in the School of Engineering culminates in the award of a BSc Degree in "Engineering in French" or "Engineering in German." Great Britain's forthcoming membership in the EEC is certainly the motivation for these new curricula as the trend in Europe is toward more and more multinational engineering projects whose success will greatly depend on the ability of individuals to effectively communicate with one another. Students who reach a satisfactory standard in the language by the end of their second year may select these special courses in years three and four. The language study is taken to a higher level, laboratory and technical work is carried out in the language, and certain elective subjects are presented in it. Part or all of the industrial period following the second year is spent in industry in either France or Germany. The technological content of the course is unaltered for students following these schemes, the programs of laboratory and project-work being modified to accommodate the increased language study.

With regard to the "Engineering in French" program, it may be of some interest to know how the British and the French coped with this problem in the design of Concorde. While visiting the BAC Filton plant where the British Concordes are assembled, I learned that the design and fabrication of Concorde has been successfully accomplished by establishing a daily commuting service by air between Aerospatiale in Toulouse, France and their British partners at BAC Filton. That is to say, that each day a group of British engineers fly to Toulouse and, likewise, the French engineers make the flight to Filton. It struck me as a great deal of shuttling back and forth but apparently the directors of this program have found it necessary in order to insure maximum and effective communication between both design and fabrication groups.

For further information on these new programs of study see Appendix A. In Appendix B one will find additional details of the staff and engineering courses offered in the final two years of the BSc degree.

APPENDIX A - Engineering with French

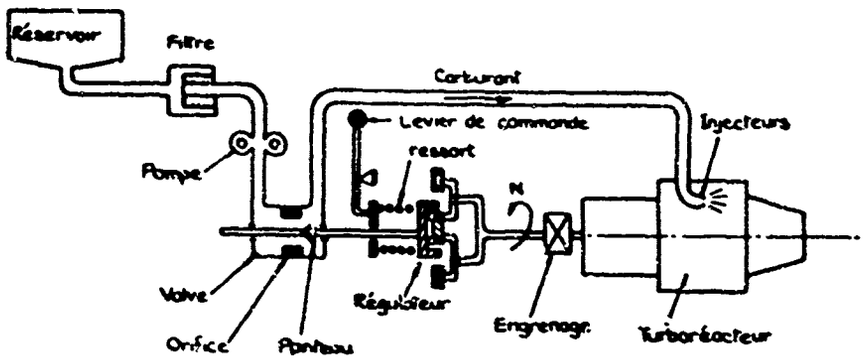
Bath University of Technology

School of Engineering
School of Modern Languages

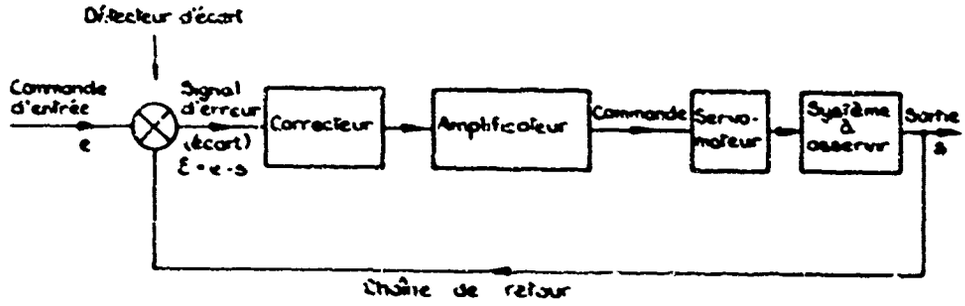
BSc Degree in

ENGINEERING WITH FRENCH

(Four-year sandwich scheme)



Régulation de dosage d'un réacteur



Système asservi à boucle fermée

Introduction

This course integrates the study of engineering with the study of the foreign language. The aim is to offer a technological education of degree standard acceptable to the Council of Engineering Institutions and at the same time provide a course of language study which will enable the engineer to work professionally in French and to appreciate contemporary French society.

In addition to advanced language study, part of the Engineering syllabus is taught in French, laboratory instruction and report writing are also carried out in French, and, since the course runs as a four year sandwich scheme, part of one industrial period is spent in French industry.

The course leads to the award of a B.Sc. Degree in Engineering with French.

Conditions of Entry

All students are enrolled initially for the Degree in Engineering and the option to choose the degree in Engineering with French is available to selected students at the end of the second year. This selection depends upon satisfactory performance in the French language subject during the first two years of the course, for which subject an 'O' level pass in French is the normal entry requirement.

Degree Scheme

The undergraduate course in Engineering is arranged as a four-year sandwich scheme with stages of academic study alternating with periods of practical training in industry. Students following this course must be sponsored by an industrial organisation. The course is broadly based for the first two stages, and a wide range of subject electives in the third and fourth stages permits specialisation in any one of the following fields:

Mechanical Engineering
Production/Management Engineering
Power and Propulsion Engineering
Aeronautical Engineering
Systems Engineering

Students may take a degree in Engineering with French in any of the above fields, the following variations from the non-language scheme being introduced in the third and fourth stages. These consist of advanced work in the foreign language, technical translation, and, in addition during the third stage (in the French language).

(i) Formal teaching of the engineering subject 'Vibrations'

(ii) Selected laboratory experiments and associated reports

(iii) Weekly seminars on a wide range of technical subjects

(iv) A study of contemporary French society with special reference to industry

At the end of this stage the students concerned are required to spend a minimum of three months in French industry through arrangements made, where possible, between the sponsoring organisation and French firms;

and during the fourth stage (In the French language):

(i) 'Mécanique Appliquée', a general course in Applied Mechanics covering the fields of Engineering studies within the School

(ii) Continuation of the weekly seminars on technical subjects begun in the third stage

(iii) A written account of the student's experiences in French Industry

(iv) A Group Project, including design work, on some aspect of engineering

Notes

(a) The Engineering with French degree course has been so designed that the total load on the students concerned is no greater than for those following the Engineering degree course

(b) The assessment scheme and honours classifications are similar to those for the degree in engineering

(c) Graduates seeking membership of one or more of the professional institutions are exempted from the whole of Part I of the Council of Engineering Institution's examination and from Part II on a subject-for-subject basis. The requirements of the I.Mech.E., I.Prod.E , or R.Ae.S. can be met completely by appropriate choice of Third and Fourth stage subject electives.

FURTHER INFORMATION MAY BE OBTAINED FROM

The Registrar,
Bath University of Technology,
Claverton Down,
Bath BA2 7AY.

APPENDIX B Details of Academic Program

The School of Engineering

Address :
Building 4 East
Claverton Down
Bath BA2 7AY
Telephone: Bath 6941

Professor F. J. Wallace, MSc, PhD, DSc, CEng, FIMechE
(Head of School)

Professor J. Black, MSc, PhD, CEng, FIMechE, FRAeS

E. J. Purser, BSc(Eng), CEng, MIMechE, ACT(Birm)
(Director of Studies)

J. Grosjean, MSc(Eng), CEng, MIMechE, AFIMA,
MSEE, MSocCE(France)
(Director of Studies in Engineering with a Modern Language)

Compulsory Subjects

Environment of the Business Enterprise	2 hrs per week
Mathematics	4 hrs per week
Instrumentation and Control	2 hrs per week
Design Course, Industrial and Engineering Seminars	4 hrs per week
Laboratory Course	6 hrs per week

SEMESTER 4 — (15 working weeks + 1 examination week)

Elective Subjects : 4 subjects at 2 hrs/wk. 8 hrs per week

A—MECHANICAL ENGINEERING	B—PRODUCTION ENGINEERING
Materials & Structures	Mechanical Technology
Mechanics of Fluids	Production Technology
Dynamics & Vibrations OR Théorie des Vibrations et Dynamique des machines	Dynamics & Vibrations OR Théorie des Vibrations et Dynamique des machines
Thermodynamics OR Production Technology	Business Planning & Control I

C—AERONAUTICAL ENGINEERING	D—POWER & PROPULSION ENGINEERING
Aircraft Structures	Materials & Structures
Aerodynamics	Mechanics of Fluids
Aircraft Stability	Dynamics & Vibrations OR Théorie des Vibrations et Dynamique des machines
Vibrations & Aeroelasticity OR Théorie des Vibrations et Dynamique des machines	Thermodynamics

E—SYSTEMS ENGINEERING	F—STRUCTURAL ENGINEERING
Electronics & Electromechanical Systems	Materials & Structures
Digital & Sequential Systems	Structural Technology
Dynamics & Vibrations OR Théorie des Vibrations et Dynamique des machines	Dynamics & Vibrations OR Théorie des Vibrations et Dynamique des machines
Thermodynamics OR Production Technology OR Mechanics of Fluids OR Aircraft Stability	Mechanics of Fluids

C — AERONAUTICAL ENGINEERING

Aerodynamics † Aircraft Stability Flight Performance	OR Mechanics of Flight
Aircraft Structures	OR Materials & Structures † Materials Technology
Mécanique Appliquée † Advanced Eng. Dynamics	OR Dynamics & Vibrations
Analogue Computing † Computational Mathematics Statistics Industrial Noise Control	

D — POWER & PROPULSION ENGINEERING

Materials & Structures	OR Material & Structures † Materials Technology
Mechanical Vibrations OR Mecanique Appliquée OR Industrial Dynamics † Advanced Eng. Dynamics	OR Dynamics & Vibrations
Control	OR Control
† Incompressible Fluid Mechanics Fluid Power Rotodynamic Machinery	OR† Fluid Systems
* Thermodynamics † Flight Vehicle Propulsion OR† Power Plant Engineering Flight Performance OR Internal Combustion Engineering	OR* Thermodynamics
Analogue Computing † Computational Mathematics Statistics Industrial Noise Control	

E — SYSTEMS ENGINEERING

* Electromechanical Systems * Control	OR* Control
Mechanical Vibrations OR Mécanique Appliquée OR Industrial Dynamics † Advanced Eng. Dynamics	OR Dynamics & Vibrations
† Incompressible Fluid Mechanics Fluid Power Rotodynamic Machinery	OR† Fluid Systems
† Power Plant Engineering OR† Flight Vehicle Propulsion OR Internal Combustion Engineering	
OR† Aircraft Stability Flight Performance	OR Mechanics of Flight
OR Manufacturing Technology II	OR Production Technology
Analogue Computing † Computational Mathematics Statistics Industrial Noise Control	

FINAL YEAR — (Autumn term 10 working weeks: Spring term 1 examination week + 10 working weeks: Summer term 2 examination weeks + 5 working weeks).

Compulsory Subjects

Business Policy & Organisation	2 hrs per week
Design Course & Industrial Seminars	4 hrs per week
A Project or the Advanced Laboratory Course	6 hrs per week

Elective Subjects

8 Subject units to be chosen — 8 hrs per week

This choice should include not more than 4 one-unit subjects, nor more than 2 Mathematics options.

* Indicates compulsory subjects
† Indicates Autumn term subject

A — MECHANICAL ENGINEERING

Materials & Structures	OR Materials & Structures † Materials Technology
Mechanical Vibrations OR Mécanique Appliquée OR Industrial Dynamics † Advanced Eng. Dynamics	OR Dynamics & Vibrations
Control	OR Control
† Incompressible Fluid Mechanics Fluid Power Rotodynamic Machinery	OR † Fluid Systems
† Power Plant Engineering OR Internal Combustion Engineering	
OR Manufacturing Tech II Automation	OR Production Technology
OR Thermodynamics	OR Thermodynamics
Analogue Computing † Computational Mathematics Statistics Industrial Noise Control	

B — PRODUCTION ENGINEERING

* Manufacturing Tech II Automation	OR * Production Technology
† Manufacturing Technology I † Manpower Management Operational Research * Business Planning & Control II	
	Materials & Structures † Materials Technology
Mechanical Vibrations OR Mécanique Appliquée OR Industrial Dynamics	OR Dynamics & Vibrations
Analogue Computing † Computational Mathematics Statistics Industrial Noise Control	

F — STRUCTURAL ENGINEERING	
* Structural Technology Materials & Structures	OR Materials & Structures / Materials Technology
Mechanical Vibrations OR Mécanique Appliquée OR Industrial Dynamics † Advanced Eng. Dynamics	OR Dynamics & Vibrations
Analogue Computing † Computational Mathematics Statistics Industrial Noise Control	