

1. Job/Fellowship Description

Job/Fellowship Reference:

C2008 –INETI /003/2008- Process Optimization & Energy Supply-DMS

Summary:

- A- Optimization of the design and scheduling of flexible industrial processes under energy constraints, aiming to minimize inventories and operating costs and maximize energy efficiency, observing environmental regulations.
- B- Optimization of the planning and operation of sustainable energy distribution networks at strategic (planning) and operational (scheduling) levels, aiming to develop simulation scenarios/tools to support decision making.

Main research field: Engineering

Sub research field: Process Engineering

Job Description: (The dead-line for this call is 30th September 2008)

The candidate will integrate the on-going research work at the host Department (DMS) in one of the following areas:

A -Design and scheduling of flexible industrial processes under energy constraints: Optimization of the design and/or scheduling of industrial processes with the aim of minimizing inventories and operating costs and maximizing energy efficiency, while complying with environmental regulations.

B- Planning and operation of sustainable energy distribution networks: Optimization of the design and management of energy supply networks, at both the strategic (planning) and operational (scheduling) levels, aiming at the development of scenarios and tools to support decision making, based on simulation models which combine energy supply, demand, transport and conversion.

Both areas rely on the development of elaborate deterministic and stochastic optimization models, where issues such as environmental impact assessment, formal handling of uncertainty and of multi-objective decision making, need to be incorporated.

Currently the Portuguese Government declared Energy as a major national priority, which sets a challenge in the DMS team's research agenda, to which the candidate is expected to make a significant and original contribution, while pursuing his/her own research interests

The host department has a good publication record on the optimal design and scheduling of industrial processes, as well as on the optimal design and management of supply-chain networks.

Optimization models tend to be of the mixed integer linear programming (MILP) or mixed integer non-linear programming (MINLP) type and optimization is conducted through the development of formulations with the GAMS software and solvers CPLEX, DICOPT, BARON, etc. Multiproduct production facilities are modeled on the basis of

State-Task Networks (STN), Resource-Task Networks (RTN) or related mathematical representations. Constraint programming (CP) package (ILOG's OPL modeling language) has also been applied on its own or as a hybrid MILP/CP. A considerable investment has also been made on the development of new mathematical formulations and their association with heuristics, in order to achieve an increasingly higher computational performance.

Whenever process simulation might be required we make use of ASPEN PLUS and gPROMS, depending on the issues at stake. MATLAB is also used by some of the staff. The host Department has very good computing staff and facilities and undertakes multidisciplinary work in collaboration with national and international teams.

These include amongst the former three Departments of the Technical University of Lisbon: Dept.of Engineering and Management (IST/DEG), Dept.of Biological and Chemical Engineering (IST/DEQB) and IST/CESUR (the Centre of the Dept. of Civil Engineering/Operations Research and Systems Engineering), one Department of Mathematics, of the Science and Technology Faculty, of the New University of Lisbon (UNL/DM) and the Department of Chemical Engineering of the Lisbon High Institute of Engineering.

Amongst the latter is acquiring greater relevance the extensive collaboration, involving the secondment of staff, with the research group of Prof. Ignacio Grossmann at the Chemical Engineering Department of the Carnegie Mellon University, USA.

The candidate is expected to take advantage of this collaborative set-up and, in due course, develop his/her own line of autonomous research. S/he is expected to take the initiative to submit applications for both projects and general funding, nationally and internationally.

DMS and his partners are committed to engage in collaborative work with the Industry and the candidate, when the opportunities arise, is expected to share in the effort.

The job does not involve lecturing duties, but the candidate is expected to present and attend seminars. Also some co-supervising of post-graduate students is a common activity within the host group and he/she is expected to make a contribution, while his/her career development will be our major concern and will be a matter for early discussion and joint commitment.

Qualifications and Experience required

Applicants should hold a PhD for at least 3 years and display evidence of managerial skills, independent research and significant scientific accomplishments. For both areas A and B, experience in the use of the above mentioned modeling and optimization tools will be valued. In addition for area B, it will also be valued the candidate's proficiency in the use of geographical information systems (GIS) and their integration in supply-chain mathematical models.

The successful candidate will have a satisfactory publication record and should propose, after adjustment to the new environment, his/her innovative research project in agreement with the nature of the on-going research. The successful candidate will enjoy working in a stimulating environment, where his/her own ideas and initiatives will be encouraged. He/she is expected to master the English language at the written level, although local support will be always available. The language of communication can be English, Spanish or Portuguese.

Contract

An initial contract of maximum duration of 5 years will be offered to the successful candidate, who will be recruited under an "contrato de trabalho a termo certo", whose

level of payment, if celebrated “em dedicação exclusiva” (full time with exclusivity), and according to article 18 of the Regulation released by FCT, the Portuguese Science Foundation, promoter of this initiative, runs at the moment at slightly over 43000 Euro/year, subject to the current tax and social security deductions. The successful candidate, will celebrate a contract with INETI - Instituto Nacional de Engenharia, Tecnologia e Inovação, I.P., or with the entity that will come to succeed it in its attributions and competences.

Evaluation and Selection

This call is *ab initio* aimed at the recruitment of one researcher, which will be offered a contract following the formal approval by the sponsoring body, the Portuguese Science and Technology Foundation (FCT). If the quality of the applications, under this call, is considered by FCT to be of a sufficient high standard, the number of job offers may increase accordingly.

Applications should be addressed to the E-mail address phd.dms@ineti.pt in a Word file or, preferably, in a .pdf file format, with a CV (including names and addresses of at least two referees) and a covering letter indicating which area A or B (or both) the application is made for.

The jury is made up of 5 members: 2 from INETI/DMS, 2 from IST and one international established scientist in the field.

The DMS is a Department of the Portuguese National Institute of Engineering Technology and Innovation (Instituto Nacional de Engenharia Tecnologia e Inovação, I.P.), which is an inclusive, equal opportunity employer: www: <http://www.ineti.pt>

Vacant posts: 1 (See “Evaluation and Selection” section)

Type of contract: Contrato a termo certo (“Fixed term Contract”)

Job country: Portugal

Job city: Lisbon

Job company/institute: Instituto Nacional de Engenharia, Tecnologia e Inovação (INETI) / Process Modeling and Simulation Department (DMS)

Application deadline: 30th September 2008

2. Organization contact data

Organization/Institute: Instituto Nacional de Engenharia, Tecnologia e Inovação, IP -

Address:

Paço do Lumiar, 22

Lisboa - 1649-038

Portugal

Email: joao.ferreira@ineti.pt

Website: <http://www.ineti.pt/>

3. Required Education Level

Degree: Doctoral degree (PhD)

Degree field: Engineering (Applied Mathematics acceptable, if research experience is found to be adequate)

4. Required languages

Language: English

Priority: High

Reading: Excelent
Writing: Good
Comprehension: Good
Conversation: Excelent

5. Required research experience

Main Research Field: Engineering

Research Sub-Field: Process Systems Engineering

Years of Research Experience: minimum 3 years of post-doc research (under well justified circumstances the Jury might recommend candidates with less post-doc experience)

6. Selection Committee

Prof. Ignacio E. Grossmann, Carnegie-Mellon University, USA

Prof. Ana Paula Ferreira Dias Barbosa-Póvoa, IST/DEG, Lisbon, Portugal

Prof. Henrique Aníbal Santos de Matos, IST/DEQB, Lisbon, Portugal

Doctor Augusto Orlando Lopes de Queiroz Novais, INETI/DMS, Lisbon, Portugal

Doctor Pedro Miguel Gil de Castro, INETI/DMS, Lisbon, Portugal