Internship subject within the Applied Mathematics team

Centre de Recherche Claude Delorme (Loges en Josas – 78)

Title:

Field service management and assets maintenance

Context:
Claude Delorme Research Center (CRCD), the Air Liquide R&D center in Europe, engages its activities among three main axes of research: healthcare, advanced technologies and sustainable development solutions.

Some of the activities within Applied Mathematics group at CRCD Air Liquide focus their efforts on key technologies for logistics and supply chain management including Operations Research (OR). Our R&D projects are concerned with effective resource allocation by automatically balancing trade-offs and satisfying business constraints for optimization problems arising in gas transportation/distribution networks. We propose optimization models, analytical and heuristic algorithmic solutions, followed by their development and validation through simulation. To that aim we use Operations Research and optimization technology combined with programming/software tools. This leads to the development of decision support systems and optimization tools in order to improve the efficiency of the Air Liquide supply chain.

The main objective of the current project is to define a decision support tool helping choosing the best maintenance policies and associated workforce planning in order to reduce overall cost (travels, equipments replaced, and repairs).

Main steps of the project:

- **State-of-the-art** on customer installation management: academic/research papers, and software on the market survey.
- **Statistical analysis** on equipments reliability/**failures historical data**.
- **Identification of the technical specificities and goals** needed by AL in this area in order to define the specificities of a future software tool.
- Analyze the adequacy of the software tools available on the market to the needs.
- **Definition of routing models optimizing preventive** and **corrective** maintenance of **an equipment**.
- Definition **of routing models optimizing preventive** and **corrective** maintenance of **multiple equipments** grouped at same location.
- Definition of routing models optimizing maintenance travel costs (while considering only fixed maintenance tasks).
- Develop a **prototype** testing the possibility to optimize both parts together : planning of visits and trade-off between preventive and corrective maintenance
- **Pilot test** on one region/country.

Profil:
We are looking for talented students with background in computer science, applied mathematics, and interested to pursue an internship in the context of an Operations Research experience. The internship projects are concerned with applying advanced analytical methods for solving optimization problems occurring in gas distribution and transportation at Air Liquide.
The experience required is to be in the 3rd year of study (Bac+5). The student will be integrated into our research team which contains 5 members at CRCD and collaborates closely with the R&D logistics group at Delaware Research & Technology Center (DRTC), the Air Liquide R&D center in United States of America. The allowance will be according to Air Liquide paying scale.

Duration:

5 to 6 months before September 2013

Place:
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