PEOPLE

MARIE CURIE ACTIONS

**Marie Curie Career Integration Grants (CIG)**

**Call: FP7-PEOPLE-2012-CIG**

FINAL REPORT

“IO\_Q&RM”

**Research results of the 1st period (first two years) and the 2nd period (Oct,1,2014-Jan,31,2015)**

A detailed timetable for this 2.5-year integration phase discussed in the research proposal is given below. It is based on the full time commitment of two Ph.D students starting from 01-09-2012. Dark cells refer to tasks scheduled for the students.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Tasks | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 2012 |
| Objective 1 |
| Literature review |  |  |  |  |  |  |  |  |  |  |  |  |
| Data acquisition & analysis |  |  |  |  |  |  |  |  |  |  |  |  |
| 2013 |
| Objective 1 | Objective 2 | Objective 3 |
| Modeling |  |  |  |  |  |  |  |  |  |  |  |  |
| Validation |  |  |  |  |  |  |  |  |  |  |  |  |
| Literature review |  |  |  |  |  |  |  |  |  |  |  |  |
| Modeling |  |  |  |  |  |  |  |  |  |  |  |  |
| Optimization |  |  |  |  |  |  |  |  |  |  |  |  |
| Numerical study |  |  |  |  |  |  |  |  |  |  |  |  |
| Literature review |  |  |  |  |  |  |  |  |  |  |  |  |
| Data acquisition & analysis |  |  |  |  |  |  |  |  |  |  |  |  |
| 2014 |
| Objective 3 | Objective 4a (SPC) |
| Modeling |  |  |  |  |  |  |  |  |  |  |  |  |
| Optimization |  |  |  |  |  |  |  |  |  |  |  |  |
| Numerical study |  |  |  |  |  |  |  |  |  |  |  |  |
| Validation |  |  |  |  |  |  |  |  |  |  |  |  |
| Literature review |  |  |  |  |  |  |  |  |  |  |  |  |
| Data acquisition & analysis |  |  |  |  |  |  |  |  |  |  |  |  |
| 2015 |
| Objective 4a (SPC) | Objective 4b (CBM) |
| Modeling |  |  |  |  |  |  |  |  |  |  |  |  |
| Optimization |  |  |  |  |  |  |  |  |  |  |  |  |
| Numerical study |  |  |  |  |  |  |  |  |  |  |  |  |
| Validation |  |  |  |  |  |  |  |  |  |  |  |  |
| Literature review |  |  |  |  |  |  |  |  |  |  |  |  |
| Data acquisition & analysis |  |  |  |  |  |  |  |  |  |  |  |  |
| 2016 |
| Objective 4b (CBM) |
| Modeling |  |  |  |  |  |  |  |  |  |  |  |  |
| Optimization |  |  |  |  |  |  |  |  |  |  |  |  |
| Numerical study |  |  |  |  |  |  |  |  |  |  |  |  |
| Validation |  |  |  |  |  |  |  |  |  |  |  |  |

To assess the progress of the project, there are four *milestones* in this timetable:

1. In March/April 2013, two paper drafts (one paper per graduate student) should be finished or submitted in the area of reliability modeling for complex systems with multiple failure processes.

**H. Peng, and Q. Feng, “Reliability and Maintenance Modeling for Systems Subjected to Logistic Degradation Processes with Random Onset Time,”, Quality and Reliability Engineering International, 29(5), 709-718, 2013.**

**S. Song, D. W. Coit, Q. Feng, H. Peng, “Reliability Analysis for Multi-Component Systems Subject to Multiple Dependent Competing Failure Processes”, IEEE Transactions on Reliability, 63(1), 331-345, 2014.**

**H.Peng, and Q.Feng, “Reliability Analysis for Degrading Systems with 100% Quality Inspection after Burn-in”, International Journal of Business Analytics, 1(2), 34-47, 2014.**

1. In October/November 2013, two paper drafts should be finished or submitted in the area of optimization for maintenance activities, sampling and inspection plan or upgrading decisions.

**C. van Oosterom, H. Peng and G.J. van Houtum, “Optimal maintenance policies for a Markovian deteriorating system with population heterogeneity”, Submitted to IIE Transactions, 2013.**

**Q. Zhu, H. Peng and G.J. van Houtum, “A Condition-based Maintenance Policy for Multi-component Systems with a High Setup Cost of Maintenance”, Submitted to OR Spectrum, 2013.**

1. In June/July 2014, two paper drafts should be finished or submitted in the area of multi-objective optimization for quality control, reliability and maintenance activities.

**Q.Zhu, H.Peng, and G.J. van Houtum, “Optimization of an opportunistic maintenance policy for components under condition monitoring”, Submitted to European Journal of Operational Research, 2014.**

**H. Peng and G.J. van Houtum, “Economic production lot-sizing for a degrading machine under condition-based maintenance policy”, Submitted to European Journal of Operational Research, 2014.**

**Q. Zhu, H. Peng and G.-J. van Houtum, “Remote Monitoring and Condition Based Maintenance for High-Tech Capital Goods”, Proceedings of the Second International Conference on Railway Technology: Research, Development and Maintenance, Ajaccio, Corsica, France, April 2014.**

1. In June/July 2015 two paper drafts should be finished to proposal new SPC charts for micro-manufacturing systems.

**H.Peng, “Condition-based Maintenance: Capital Goods Industry”, Analyzing Risk through Probabilistic Modeling in Operations Research, in print, IGI global, 2015.**

**J.P.C. Driessen, H.Peng, G.J. van Houtum, “The effect of imperfect inspections on maintenance optimization under a reliability constraint”, working paper.**

**Q.Ge, H.Peng, G.J. van Houtum, I. Adan “Reliability Optimization for Series Systems under Uncertain Component Reliability in the Design Phase”, working paper.**

1. In June/July 2016 two paper drafts should be finished for joint optimization for statistical process control and condition-based maintenance, or joint optimization of lot-sizing and condition-based maintenance.

**Presentations:**

“An opportunistic maintenance model for multi-component systems

under a mixture of different maintenance policies” IEEE CASE Conference, Taipei, Taiwai (2014)

“The effect of imperfect inspections on maintenance

optimization under a reliability constraint” MIMAR Conference, Oxford, United Kingdom (2014)

“An opportunistic maintenance model for multi-component systems

under a mixture of different maintenance policies: a case study” IIE Annual Conference, Montreal, Canada (2014)

“Optimal maintenance policies for a safety-critical system and its deteriorating sensor”, INFORMS Annual Conference, Minneapolis, MN, 2013.

“Optimization of a opportunistic maintenance policy for components under condition monitoring” INFORMS Conference, Minneapolis, U.S. (2013)

“Optimization of a opportunistic maintenance policy for components under condition monitoring”, the 2nd International Symposium on System Informatics and Engineering, Xi’an, China, 2013.

“A Condition-Based Maintenance Policy for Multi-Component Systems

with High Setup Costs of Maintenance: Wind Turbine Application” ESREL Conference, Amsterdam, the Netherlands (2013)

“A Condition-Based Maintenance Policy for Multi-Component Systems

with High Setup Costs of Maintenance: Wind Turbine Application” MMR Conference, Stellenbosch, South Africa (2013)

“Optimization of a opportunistic maintenance policy for components under condition monitoring” OR2013 Conference, Rotterdam, the Netherlands (2013)

“Optimization of a opportunistic maintenance policy for components under condition monitoring: a case study”, EURO-INFORMS Joint International Meeting, Rome, Italy, 2013.

“A Condition-Based Maintenance Policy for Multi-Component Systems

with High Setup Costs of Maintenance”, INFORMS Annual Meeting, Phoenix, AZ,2012.

“Maintenance optimization for a Markovian deteriorating system with population heterogeneity”, INFORMS Annual Meeting, Phoenix, AZ, 2012.