Research theme	Maintenance Engineering
Research title	Creating a Framework to Develop a Scalable Maintenance Program for Unmanned Aircraft Systems
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Company	Aerialtronics
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Background

The operation of Unmanned Aircraft Systems (UAS) undoubtedly has a great impact on the aviation industry as the rapidly increasing use raises many public safety challenges when deployed in the National Airspace System (NAS). Moreover, the absence of a mandatory maintenance program (as strictly is required for the aviation industry) and the absence of a specialized maintenance framework to cope with the unique nature of UAS aircraft design, result in incomplete maintenance programs for UAS. This problem is supported by several studies in this area, concluding that deficient maintenance is recognized as a significant cause of system failure. These studies show the need for a proper maintenance program for UAS to avoid potential catastrophic accidents in both civil and non-civil environments.

Assignment

Currently no formal maintenance approach to develop maintenance programs for UAS is available. Aerialtronics acknowledges this problem and is looking for a framework to develop scalable maintenance programs for commercial UAS. A scalable framework provides an opportunity of determining the maintenance policies for the most critical components of the UAS first, which can later be expanded to less critical components if time and resources allow for it. This thesis proposes such a framework together with a pilot study to evaluate the applicability and results of this framework and recommendations on the implementation of this framework within Aerialtronics.

Results

The performed research provides a framework to develop scalable maintenance programs for UAS based on the Reliability Centered Maintenance (RCM) approach and uses a linear and user-friendly Boolean flowchart methodology to lead the analyst through the process avoiding as much subjective decision making issues as possible. The framework acknowledges the technical characteristics of UAS design such as the high rate with which components are replaced and/or updated. An extensive manual is created to make sure that all the important information required during the process is not lost over time. A pilot study was performed to evaluate the applicability and results of the framework which concluded that minor alterations were necessary but that the framework in general yielded the desired result.

Personal experience

The assignment offered me the unique possibility of experiencing both the theoretical as the practical side of maintenance engineering in a very interesting field: unmanned aircraft systems. Another interesting aspect was the creation of manual to guide the analyst through the process. This not only requires you to understand the theoretical part of every aspect, but also make it understandable for others who will work with it. Overall a very pleasant graduation period with lots of interesting aspects.