بسم الله الرحمن الرحيم

HOSSAM MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

HOSSAM MAGHRABY

Cairo University

INTEGRATED PLANNING OF AIRCRAFT ROUTING AND CREW SCHEDULING

By

Ibrahim Abdelrazzak Aref Deeb

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
Aerospace Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Under the Supervision of

Prof. Dr. Aly Hashem

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Title of Thesis:

Integrated planning of aircraft routing and crew scheduling

Key Words:
Airplane routing; crew Scheduling; Bender Decomposition; Branch and Bound; Linear programming

Summary:

The solution process iterates between a master problem that solves the aircraft routing problem, and a sub-problem that solves the crew pairing problem. This technique reduces computing time and eases the linkage procedure between the two problems and at first achieving sub-optimal non-integer results and then a branch and bound algorithm is performed to get the optimal integer solutions.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other University or Institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Ibrahim Abdelrazzak Aref Deeb Date: / /2021

Signature:

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Nomenclature and List of Abbreviations

Nomenclature

a_{ij}^{d}	Route Scenario Flight Coverage Matrix Element
a_{ik}	Pair Scenario Flight Coverage Matrix Element
b_{wj}^{d}	Route Scenario Short Connection Presence Matrix Element
b_{wk}	Pair Scenario Short Connection Presence Matrix Element
c_j	Cost of Route “j”
c_k	Cost of Pair “k”
d	Day Index
D	Total number of days
F	Flight Index
i	Total number of flights
j	Route Index
k	Pair Index
M	Total number of crews
N	Total number of aircraft in the fleet
P	Set of Feasible Pairs
R	Set of Feasible Routes
S	Set of Short Connections
u	Dual variable for Primal Sub-problem
w	Short Connection Index
x_j	Decision Variable for Route Scenario “j”
y_k	Decision Variable for Pair Scenario “k”
Z_o	Objective Function Value for Primal Sub-problem
Z_m	Objective Function Value for Master problem

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