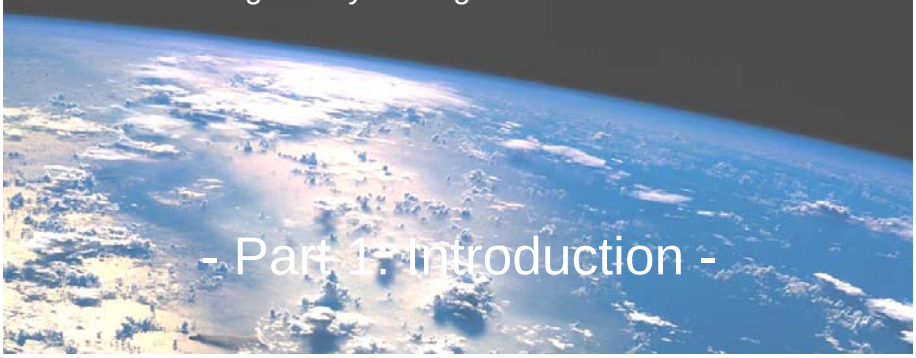
Fall Semester 2004

29.9.2004 (First: 14.4.2004)

C·O·S·T ENGINEERING™

„Design and Marketing of Rockets"

Lecture Series given by Dr.-Ing. Robert Alexander Goehlich



- Part 1: Introduction -

General

The Reason why I am here...

Welcome to Ohkami Lab

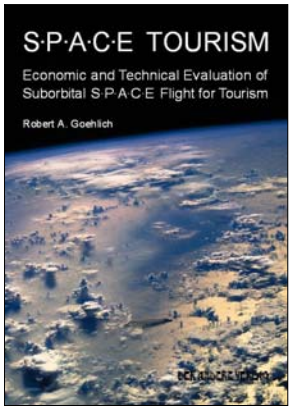
Space System Engineering

R. Goehlichさんとの出会いなど

- フランスで開催された宇宙大学で出会う(02/05)
  宇宙開発の将来について語り合う
- Ph.D学生時代に「宇宙旅行」を出版(02/05)
- 日本学術振興会（JSPS）の
  外国人特別研究員としてSD
  学科に滞在(03/09-05/08)
- 宇宙開発の市場性、コスト等
  についてオープンな講義を
- 活発な質問と討論を期待

2003/11/05

SD学科教授　狼　嘉彰



General

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Content

- **General**
- **Introduction**
  - Goal Definition of this Lecture
  - Summary of each Lecture
- **Definition**
  - Cost Engineering (Theory)
  - Cost Engineering (Practice)
- **Student Project**
- **Requests from Audience for Lectures**

Introduction

Goal Definition of this Lecture

The aim of this class is to increase the awareness of aerospace and non-aerospace students for economical optimization (design, marketing, strategy, etc.) of rockets concerning development, production and operation. Economical optimization of expendable and reusable rockets will be an essential key point for a future growing space market.

Introduction

Summary of each Lecture (Part 1)

Week	Date	Topic	Short Description
1	29.9.	Introduction	short summary of each lecture, definition of cost engineering, requests from audience for lectures
2	6.10.	Cost Engineering Methods	discussion of 17 main cost items (e.g. pre-launch operating cost, development amortization cost, administration cost, etc.)
3	13.10	Cost Engineering Tools	introduction of various tools (such as TRASIM and TRANSCOST), discussion about applications and limitations, bottom-up versus top-down cost estimation approach
4	20.10	Strategies to Reduce Cost	Cost of governmentally contracted projects (Business as Usual) may be reduced drastically under favorable conditions (Smart Business), which are discussed here (e.g. engine over-designing, timing, type of contract, annual funding profile, etc.)
5	27.10	Basics about Rocket Science	ideal rocket equation, delta velocity, Earth's atmosphere, solar system, Newton's laws, Kepler's laws (easy-to-understand-examples)* *it is advisable to bring a pocket calculator for this class
6	10.11	Basics about Space Transportation Systems	expendable versus reusable rockets, single-stage versus multi-stage rockets, propulsion technology, typical ascent/descent trajectory, spaceports (easy-to-understand-examples)* *it is advisable to bring a pocket calculator for this class

Introduction

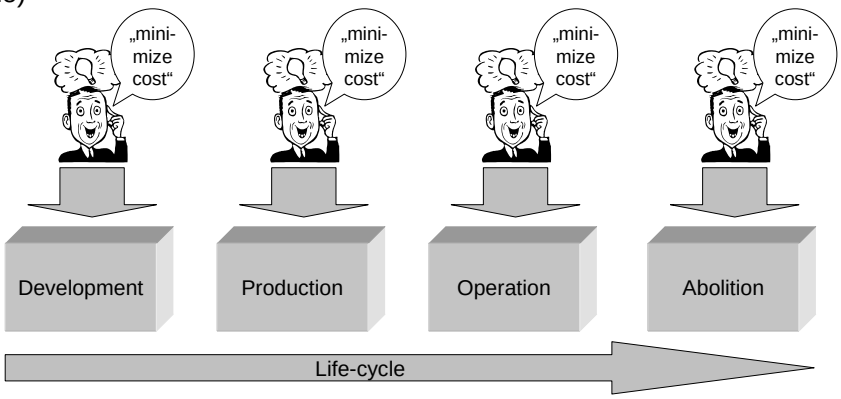
Summary of each Lecture (Part 2)

Week	Date	Topic	Short Description
7	17.11	Basics about Space Tourism	discussion of aircraft-like-operations, possibilities and limitations, ethics, health, environmental pollution, vehicle concepts (easy-to-understand-examples)* *it is advisable to bring a pocket calculator for this class
8	1.12	Case Study for a Typical Suborbital Rocket for Space Tourists	fleet life-cycle costs, optimized launch rate, optimized full operational fleet, optimized Return on Investment
9	8.12.	Case Study for a Typical Orbital Rocket for Space Tourists	fleet life-cycle costs, optimized launch rate, optimized full operational fleet, optimized Return on Investment
10	15.12	Benefit Estimation	defining objectives, estimating weights, selecting benefit functions, overall benefit
11	12.1.	Conclusion	necessary next steps, feedback
12	19.1.	Special 1: Improve Space Organizational Effectiveness	working in effective teams, human resource management, effect of technologies on today's job, decision-making, self-motivation, negotiation
13	26.1.	Special 2: Improve Marketing of Space Transportation Systems	customer behaviour, advertising, pricing of satellite launch services, space market segmentation, public relations
14	2.2.	Special 3: Improve Program Planning for Space Industry or Organization	scenario technique, program evaluation methods, analyzing information, pitfalls, alternative approaches

Definition

Definition of Cost Engineering (Theory)

„*The goal of Cost Engineering is to determine a vehicle design and its operation for minimum life-cycle costs. This means that costs have to be taken into account as a main decision criterion for the whole program duration.*" (D. Koelle)



Definition

Definition of Cost Engineering (Practice)

Case A

- *Step 1: Build a Rocket within 15 minutes in a team.*
- *Step 2: Cut costs of 50 % (by reducing material of 50 %) within 5 minutes.*

Case B

- *Step 1: Build a Rocket within 15 minutes in a team by using only 50 % of material as used in Case A's Step 1.*

Review:

Compare results of Case A with Case B.

Requests from Audience for Lectures

No. 11

Please fill out the lecture survey form.

The reason is to figure out your knowledge about space engineering to prepare suitable lectures in future.

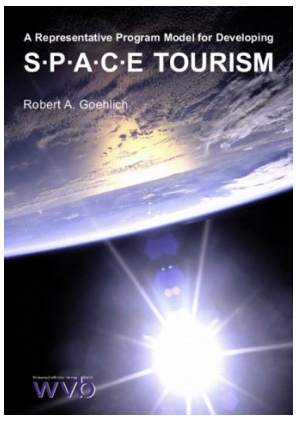
Do not be worry if you cannot answer all correct. Please just try.

Ganbatte!

Lecture`s Textbook

No. 12

- Paperback Version
- Price: 2500 Yen
- More info:
  - www.amazon.de
  - www.robert-goehlich.de



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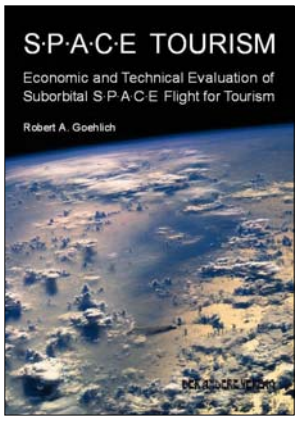

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