C·O·S·T ENGINEERING I

„Design and Marketing of Rockets"

Lecture Series given by Dr.-Ing. Robert A. GOEHLICH

WHERE: Keio University, Yagami Campus, Department of System Design Engineering, Lecture Room No. 14- 218/216 (building 14 at 2. floor), 3-14-1 Hiyoshi, Kohoku-ku, Yokohama 223-8522

WHEN: Every Wednesday, 16:30 – 18:00 (first class: September 29, 2004)

WHO: Open to students, industry, citizens, etc. There is no prerequisite. Transfer of credits to other universities on request. Visitors are always welcome!

COST: None

CONTACT:

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DESCRIPTION: This information is about a novel lecture called **Cost Engineering I (Design and Marketing of Rockets)** at Keio University, Department of System Design Engineering.My motivation for this topic is to increase the awareness of aerospace and non-aerospace students for economical optimization of launch vehicles concerning development, production and operation. Economical optimization of expendable and reusable launch vehicles will be an essential key point for a future growing space market. 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. If applied all strategies, the cost of projects could be reduced drastically of the traditional Business as Usual costs.

BIBLIOGRAPHY: Robert A. Goehlich was born in Berlin, Germany, in 1975. He received his Ph.D. in Aerospace Engineering from Technical University Berlin. His investigations are focused on cost engineering (economical optimization of vehicle systems, aerospace industry and organizations) and space tourism. He worked at Israel Institute of Technology (Israel), University of Washington (USA), National Aerospace Laboratory (Japan), Kourou Spaceport (French Guiana). Currently, he is lecturing "Space Tourism" and "Cost Engineering" (Design and Marketing of Rockets) at Keio University and doing cooperational research at JAXA in Japan.

SCHEDULE:

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
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

Note: Schedule is based on 90 minutes lecture/week.