

Capital Expansion and Organization Enhancement for Spaceflight in 2019

- Successfully raised additional 220 million JPY during 2nd round of Series A funding
- Collaborated with JAXA and Tohoku University to enhance R&D capabilities
- External director appointment from ANAHD and H.I.S.

(1) Successfully raised additional 220 million JPY during 2nd round of Series A funding.

PD AeroSpace, LTD. (Headquarters: Nagoya City, Aichi prefecture, CEO: Ogawa Shuji, hereinafter referred to as “the company”), hereby announce capital expansion of 220 million JPY through third-party allotment of shares in November 30th, 2018. We are delighted to announce THVP-1 Investment Limited Partnership (general partner, TOHOKU University Venture Partners Co., Ltd.), CHUBU-NIPPON BROADCASTING CO.,LTD., Innovation investment limited partnership (General partner Future Venture Capital Co., Ltd.), two (2) private investors, which brings grand total of five (5) parties as our new shareholders.



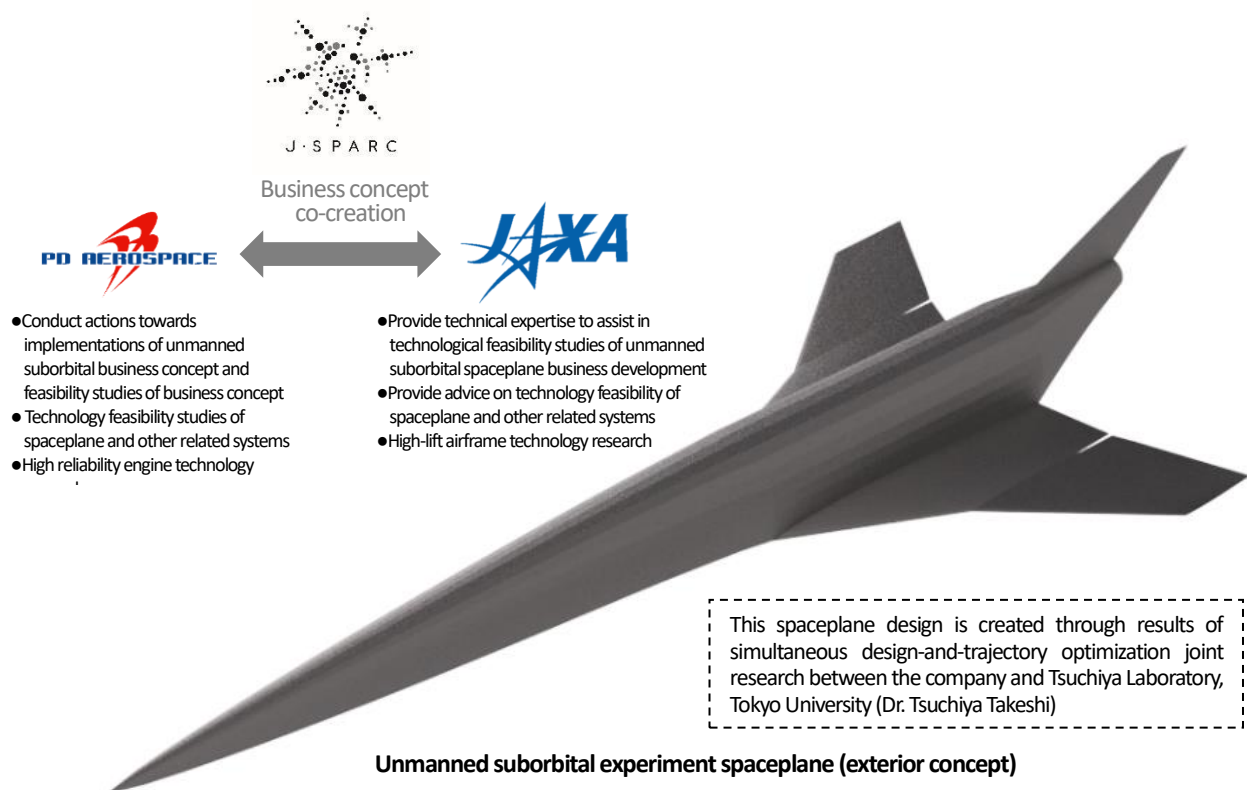
THVP	TOHOKU University Venture Partners Co., Ltd.	http://thvp.co.jp/	Venture Capital
CBC	CHUBU-NIPPON BROADCASTING CO.,LTD.,	https://hicbc.com/whatscbc/	Corporation
FVC	Future Venture Capital Co., Ltd.	https://www.fvc.co.jp/english/	Venture Capital
AWA Paper	AWA PAPER & TECHNOLOGICAL COMPANY, Inc.	https://www.awapaper.co.jp/e/	Corporation

(2) Collaborated with JAXA and Tohoku University to enhance R&D capabilities

i) Concluded MoU with JAXA J-SPARC Program

Japan Aerospace Exploration Agency(President : Mr. Yamakawa Hiroshi, hereinafter referred to as “JAXA”) and the company formally signed memorandum of understanding regarding business concept co-creation within the scope of JAXA Space Innovation Partnership (J-SPARC) program. Both parties, under J-SPARC framework, is aiming to achieve successful business incubation of the company’s reusable suborbital spaceplane through sharing of JAXA’s technical capabilities, know-how, and equal cooperation between both parties to obtain new knowledge and technology breakthrough. Results of this development will be used to further advance Japan’s future space transportation research, development and utilization.

1. Business concept consideration to anticipate future technological feasibility in unmanned suborbital spaceplane business.
2. Research and experimentation to achieve successful development of unmanned suborbital spaceplane.



- Regarding Space Innovation Partnership(J-SPARC)

J-SPARC (JAXA Space Innovation through Partnership and Co-creation) is a new co-creation type R&D program aiming to bring new ideas in space or space related industries. J-SPARC will start with dialogue between JAXA and private sector players looking forward to participate in space industry. Both parties will then commit to commercialize new business ideas, and jointly conduct R&D and experimentation to finalize business model concept and exit strategy.

In addition to expanding opportunity to use spaceplane and space environment, JAXA will lead further development and experimentation in space industry through synergy of technological expertise, experience, diverse international and domestic network, and other capabilities that JAXA possess.

(Provide assets such as basic research and validation with clear role assignment, human resource such as engineers and researchers, spaceplane, facilities, data tools and other forms of asset)

J-SPARC website <http://aerospacebiz.jaxa.jp/solution/j-sparc/>

ii) Building Research and Development Framework with Tohoku University

We hereby announce formal signing of joint research contract with Obayashi Laboratory, Institute of Fluid Science, Tohoku University and Sawada Laboratory, Graduate School of Engineering, Tohoku University. Purpose of this joint research would be to develop reusable suborbital spaceplane.

The company will work together with Professor Obayashi Shigeru to confirm and validate aerodynamic characteristics of spaceplane in all suborbital flight profile including takeoff and landing phase using analysis methods.

The company will work together with Professor Sawada Keisuke to confirm and validate aerodynamic characteristics of spaceplane, especially with aerodynamic characteristics during transonic flight (including flutter characteristic) using analysis methods.

To date, the company has signed consulting contract with Specially Appointed Professor Masuya Goro of Tohoku University, Leadin Graduate School (formerly Professor of School of Engineering, Department of Aerospace Engineering, Space Technology Studies) and has assumed position of technical consultant for the company. This joint research contract will further enhance cooperation with Tohoku University's research institutes.



東北大学

Obayashi Laboratory <http://www.ifs.tohoku.ac.jp/edge/>

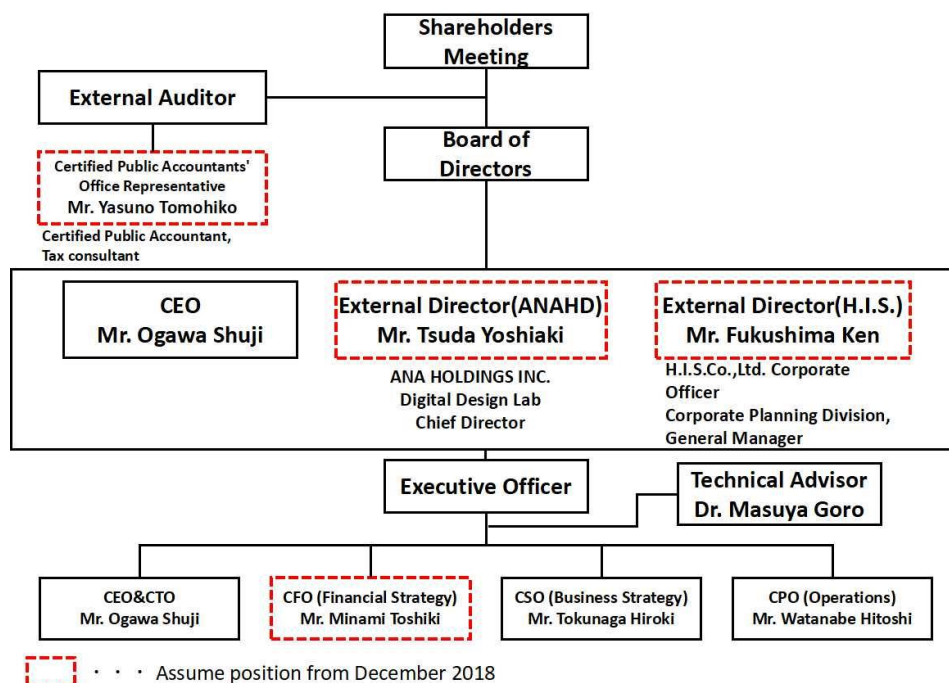
Sawada Laboratory <http://www.cfd.mech.tohoku.ac.jp/>

* Please refer to attachment 1 regarding details of cooperation framework with Tohoku University.

(3) External director appointment from ANAHD and H.I.S.

The company aims to enhance corporate governance through this appointment of the following external directors and external auditor.

External director	External director	External auditor
		
ANA HOLDINGS INC. Digital Design Lab Chief Director Mr. Tsuda Yoshiaki	H.I.S.Co.,Ltd. Corporate Officer Mr. Fukushima Ken	Yasuno Tomohiko Certified Public Accountants' Office Certified Public Accountant Mr. Yasuno Tomohiko



■PD AeroSpace, LTD. Company Overview

(1) Foundation date	May 30, 2007
(2) CEO	Ogawa Shuji
(3) Address	Headquarter : 3519 Arimatsu Midori-ku Nagoya Aichi 458-0924, JAPAN R&D center : 1-27 Minatohonmachi Hekinan Aichi 447-0844, JAPAN
(4) Number of Employees	14 employees (including seconded employee) *As of December 25 th 2018
(5) Business Outline	Spaceplane development, manufacturing, other space related business

Contact details for media inquiries regarding this press release

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 TEL: 0526-95-8228 E-mail info@pdas.co.jp Office hour (weekday) 09:00 - 18:00; closed on weekends

Regarding Joint Research with Tohoku University

To date, the company has deep cooperation with Tohoku University. The company had signed consultation contract with Specially Appointed Professor Masuya Goro (formerly Professor of School of Engineering, Department of Aerospace Engineering, Space Technology Studies), one of the leading expert of scramjet (jet engine where combustion takes place in supersonic flow) in Japan. Professor Masuya has assumed office of technical consultant within the company.

On this occasion, in order to further accelerate development, the company has signed joint research contract with Obayashi Laboratory, Institute of Fluid Science, Tohoku University and Sawada Laboratory, Graduate School of Engineering, Tohoku University.

Furthermore, the company is planning to cooperate with researchers associated with Tohoku University Aerospace Research Liaison Committee. With such cooperation, we intend to cooperatively utilize creativity, ingenuity and research potential of aerospace research departments in Tohoku University and effectively accelerate development.

From now on, we are looking forward to work closely and conduct joint research and development with Tohoku University for the purpose of developing reusable suborbital spaceplane that can reach altitude 100km and return (land).

Dr. Masuya Goro




Dr. Masuya assume professorship in School of Engineering, Tohoku University after working in JAXA Kakuda Space Center (formerly known as NAL (National Aerospace Laboratory) Kakuda Space Propulsion Technology Laboratory). Dr. Masuya specialize in spaceplane propulsion, especially in the field of scramjet engine research. Dr. Masuya has broad knowledge and experience from theory to experimentation, and is the leading expert regarding scramjet engine in Japan. Dr. Masuya is currently working in Tohoku University, Center for Education and Research on Science for Global Safety as Specially Appointed Professor, and assume office of technical consultant in the company from September 2018.

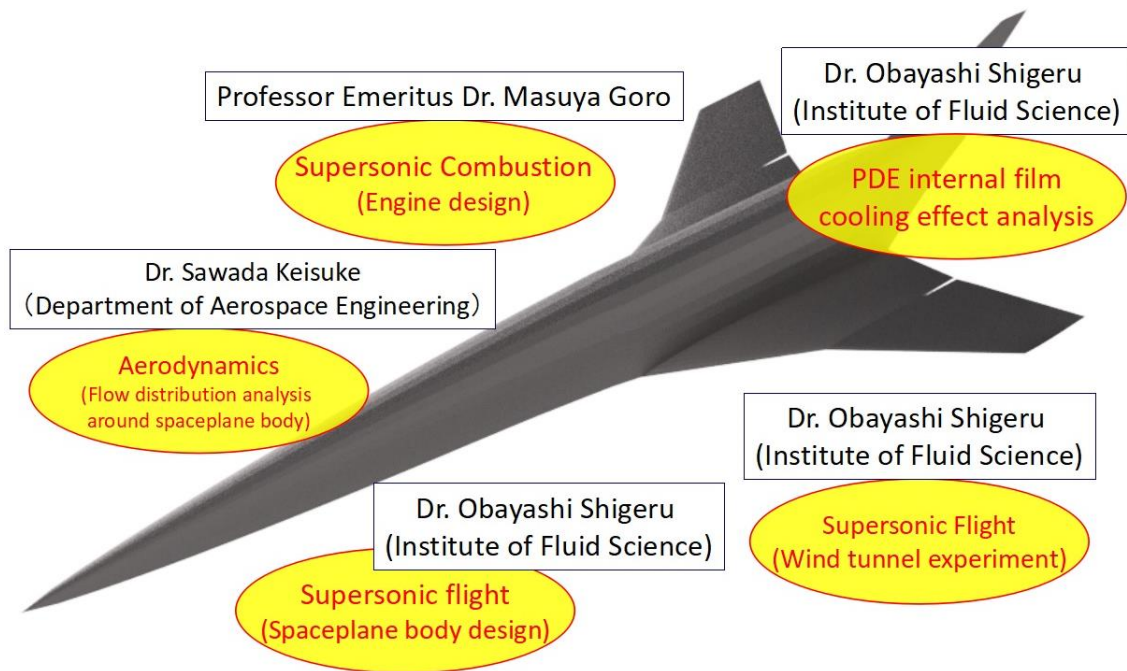
Obayashi Laboratory

Confirm and validate aerodynamic characteristics of spaceplane in all suborbital flight profile including takeoff and landing phase using analysis methods.. At the same time, Obayashi Laboratory will also use multi-objective optimization method and provide information that will contribute to spaceplane design.

Sawada Laboratory

Confirm and validate aerodynamic characteristics of spaceplane, especially with aerodynamic characteristics during transonic flight (including flutter characteristic) using analysis methods., and provide information that will contribute to spaceplane design.

PD AeroSpace, LTD. Technical Consultant	Joint research	Joint research
		
Tohoku University Graduate School of Engineering Dr. Masuya Goro Professor Emeritus・Specially Appointed Professor	Tohoku University Institute of Fluid Science Dr. Obayashi Shigeru Professor	Tohoku University, Graduate School of Engineering Dr. Sawada Keisuke Professor
【Technological know-how】 Scramjet engine performance calculation, supersonic inlet performance and other related fields	【Technological know-how】 Evolutionary computational method (genetic algorithm) technology, Supersonic internal flow analysis	【Technological know-how】 Techniques in flow separation induced by vortex generator, Flutter phenomenon analysis technology and other related fields



Laboratory	Joint research theme	Technological/patented know-how
Obayashi Laboratory	Spaceplane design	Evolutionary computational method (genetic algorithm) techniques Main wing transonic flow optimization Complex optimization techniques of airframe shape
	Optimization of engine internal flow	Supersonic internal flow analysis techniques Engine shape optimization using genetic algorithm
Sawada Laboratory	Flow distribution around spaceplane body	Techniques in flow separation induced by vortex generator (VG) Stall control techniques using VG Transonic buffeting start point prediction techniques
	Flutter analysis	High precision flutter phenomenon analysis techniques Flutter delay design margin reduction techniques Flutter start boundary improvement design techniques