

## ACADEMIC EXCHANGE BETWEEN BALTIC UNIVERSITIES AND KOBE UNIVERSITY

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**Abstract.** For long years, Baltic cities and Kobe city had strong relationship at administrative aspect and academic aspect. Recent several years, the relationship has been recognized again and started cooperative activities again. And there are some cooperative plans in future. In this paper, authors would like to explain history and starting/restarting chance of relationship between Baltic university and Kobe University, cooperative activities in recent years, and cooperative activities at now and in future.

**Keywords:** Academic Exchange, Vilnius Gediminas Technical University, Riga Technical University, Kobe University, Graphic Science, Cooperative Activities

### 1. History and starting/restarting chance of relationship between Baltic Universities and Kobe University

In 1991, faculty level agreement of academic exchange was established between Riga Technical University (hereafter, RTU) and Kobe University (hereafter, KU). For KU side, dean of faculty of Engineering signed on the document, and for RTU side, deans of following five faculties were signed on the document as shown in Fig. 1.

- Faculty of Architecture and Constructions
- Faculty of Chemical Engineering
- Faculty of Electrical Power Engineering
- Faculty of Instrumentation Engineering and Automation Apparatus Building
- Faculty of Mechanical Engineering

Promotion of cooperative activities in the field of education and research was described in the document.

Earlier than establishment of academic exchange agreement, Riga city and Kobe city established sister city agreement in 1974. Kobe city sent clock tower in 1993 to celebrate independence of the Republic of Latvia and the tower is still located in Riga city now as shown in Fig. 2. Riga city and Kobe city has been keeping friendly relationship and had ceremonies celebrating anniversary of the agreement.

Comparing to sister city agreement, academic exchange agreement was not successful. After long time, the persons concerned with the agreement disappeared in both universities. If Dr. DOBELIS of RTU did not recognize existence of the agreement, it might be abolished as invalid agreement.

In March 2010, Dr. MAKUTĖNIENĖ of Vilnius Gediminas Technical University (hereafter, VGTU) came to Osaka Japan and visited Osaka City University and discuss about future cooperative activities between VGTU and Osaka City University in the field of graphic science when SUZUKI was a staff of graphic science education in the university. As shown in Fig. 3, Dr. MAKUTĖNIENĖ also visited Osaka University to experience virtual reality system.

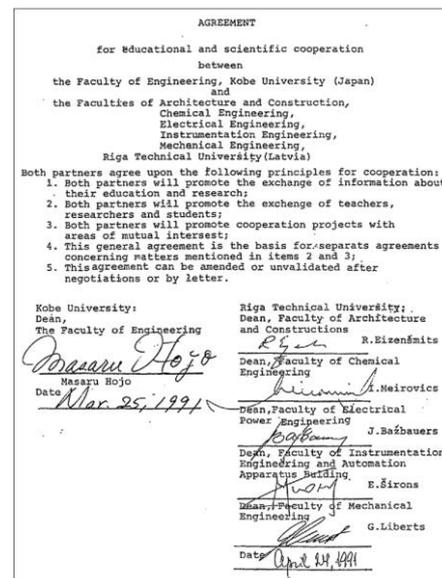


Fig. 1. Document of academic exchange agreement between RTU and KU (1991)



Fig. 2. Memorial clock tower sent from Kobe city (1993)

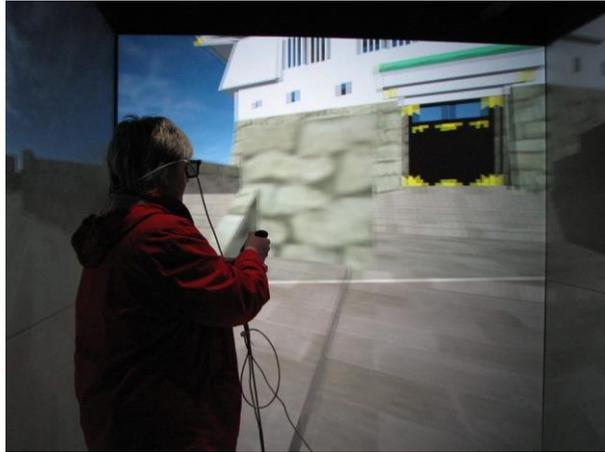


Fig. 3. Dr. MAKUTĖNIENĖ trying to experience virtual reality system in Osaka University (2010)



Fig. 4. A group photo taken at the 14th International Conference on Geometry and Graphics (2010)



Fig. 5. SUZUKI visiting VGTU to proceed the process of academic exchange agreement (2013)

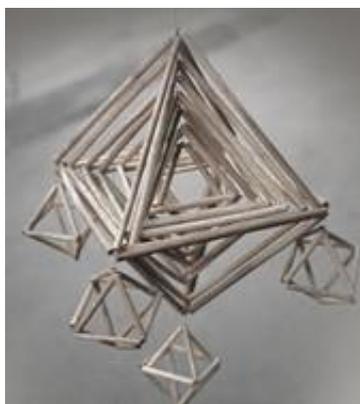


Fig. 6. A shape of traditional Puzurs

In August 2010, Dr. DOBELIS visited Kyoto Japan to participate the 14th International Conference on Geometry and Graphics held in Kyoto University as shown in Fig. 4. Dr. DOBELIS and SUZUKI got to know each other at the conference and discuss about future cooperative activities.

These visits from Baltic countries to Japan were starting and restarting chance of relationship between Baltic Universities and KU.

## 2. Cooperative activities between Baltic Universities and KU in recent years

### 2.1. Establishment of academic exchange agreement between VGTU and KU

After SUZUKI moved from Osaka City University to KU in October 2010, SUZUKI realized significance of cooperative activities beyond a university because worldwide topics in liberal arts education were highly required in KU. Therefore, Dr. MAKUTĒNIENĒ and SUZUKI started discussion to establish academic exchange agreement. After long discussion, SUZUKI visited VGTU to received official document with signature of Dr. Rimantas BELEVICIUS, dean of the Faculty of Fundamental Sciences as shown in Fig. 5. After process of KU side, the exchange agreement was officially established on 26th March 2014.

### 2.2. Exhibition titled 'Riga Days in Kobe'

Dr. DOBELIS and SUZUKI also agreed with strengthening a relationship between RTU and KU in the field of graphic science. As the year 2014 was the 40th anniversary of sister city agreement between Riga city and Kobe city, Kobe city government had decided to have several events in Kobe city. One of the event was exhibition titled 'Riga Days in Kobe' held from 12th to 17th June. Dr. DOBELIS and SUZUKI decided to have a corner titled 'Adventure of Light and Shape –Exhibition of Academic Exchange between Riga Technical University and Kobe University-' in the exhibition and exhibit academic exchange panel in the event.

Considering theme of exhibition 'Adventure of Light and Shape', each university made panels explaining relationship between culture and light/shape. RTU selected Puzurs (see Fig. 6.), regular octahedron ornament, as a subject of the panel. Puzurs is constructed at solstice and equinox day or at ceremonial occasions. Following text is summary of explanation of Puzurs on the panel made by RTU.

For centuries culture and traditions has been inalienable part of Latvian identity. Through songs, dances, festivals and celebrations in national costumes people still keep alive the spirit of our ancient philosophy.

The changes of seasons – solstices is the most important events of the year. Changes in nature are closely bound with lifecycles and there is on key for all of them. "Puzurs" is a symbol of beginning and ending, ancient knowledge compares it with a model of universe. It is a part of all solstice rituals and most important moments of people lives such as the time of birth and wedding.

In Baltic region Puzurs was known long before first arrival of Christian missionary. Ancient historical research indicates the period of early agriculture as the origin moment of Puzurs. More than four thousand years ago Latvian peasants made "Puzurs" of the cereal stem at the end of the summer season. At the beginning it was symbol of welfare but in the same time it contained the philosophy of the space and time. Three dimensional structures of "Puzurs" consist of vertical axis which signifies the time line - past, present and future. The horizontal axis defines four angles. Each of them symbolizes one solstice ritual in summer, autumn, winter and spring time. One complete module of "Puzurs" is made of 12 elements. According to earliest Latvian calendars one year consisted of twelve months.

Order of the solstice rituals were closely bound with lifecycle of the people. Worldview and sense of the Nature in ancient Latvian civilization describes the expression: "Universe has the order but it is not static. It is moving all the time."

Basic module of "Puzurs" is made of dry straw, cereal stem or reed which is cut in pieces of correct size – structural elements. Then all the pieces are joined by wool yarn. One "Puzurs" can be made from 12 up to 600 elements. The crystalline structure of the "Puzurs" basic module is the same as the atomic structure of carbon.

The structural complexity of the "Puzurs" depends of the creativity. Range of different shapes and elemnts is wide. Starting from simple and ascetic "Puzurs" which is made only from 12 reed elements, and ending with composition of diverse structures which combined with adornment of feather, dry bent-grass or yarn tassels.

In spite of that traditional "Puzurs" itself have never been used as a daily lighting source, in some regions it is called - lantern. To be correct, "Puzurs" lights up only for one time in its lifetime.

Lifetime of this delicate and complex structure is not long. Usually for three evenings "Puzurs" is swinging over the room guarding from darkness and malice. Lighted by open fire it is making incredible shadow images on the wall. After the mission is completed "Puzurs" is burnt in the fire. This moment is the end and the beginning of one period of life.

On the other side, KU selected Andon, Japanese traditional lampstand, as a subject of the panel. History of light source, history of Andon and shapes of traditional Andons were described on the panel. In addition to traditional Andon, some of geometric

Andons made by 3DCAD, 3D printer and paper folding were introduced also as shown in Fig. 7. And many geometric Andons constructed by KU graduate school students were exhibited at the corner as shown in Fig. 8.



Fig. 7. Geometric Andons explained on panel

Fig. 8. Exhibited geometric Andons constructed by KU graduate students

At the corner, KU held Andon craft workshop. The shape of Andon derived from Kobe port tower, one of famous symbol architectures in Kobe city. The shape of Kobe port tower is perfect hyperboloid of revolution of one sheet. As shown in Fig. 9, plastic bottles, papers and drinking straws were selected as material of craft Andon for primary school students, junior high school students and high school students. Fig. 10 shows Andons crafted by participants of the workshop.



Fig. 9. Flyer of Andon craft workshop

Fig. 10. Andons crafted by participants of Andon craft workshop

### 2.3. BALTIC - KOBE University Engineering Graphics Education Seminar 2014

A seminar titled ‘BALTIC - KOBE University Engineering Graphics Education Seminar 2014’ was held on the 3rd November 2014. The purpose of the seminar was promotion of mutual cooperation between Baltic universities and KU in the field of graphic science. Dr. MAKUTĖNIENĖ, Dr. DOBELIS, Dr. ODAKA of KU and SUZUKI participated the seminar to report and discuss graphic science education in each country and future works as shown in Fig. 11. And a class with exercise titled ‘Graphic science education for manufacturing making good use of paper folding’ was performed as shown in Fig. 12.



Fig. 11. Engineering Graphics Education Seminar 2014

Fig. 12. Class with exercise of graphic science Education for manufacturing

## 2.4. Lectures in RTU and VGTU

Dr. ODAKA and SUZUKI visited RTU on the 5th November 2014 to present lectures. After courtesy visit on Dr. Uldis SUKOVSKIS, vice rector of RTU, and Dr. Igors TIPANS, deputy rector of RTU (see Fig. 13), SUZUKI made presentation with exercise making use of paper folding to teach basis of differential geometry and laws of illuminance, and Dr. ODAKA explained content of graphic science education in KU as shown in Fig. 14.

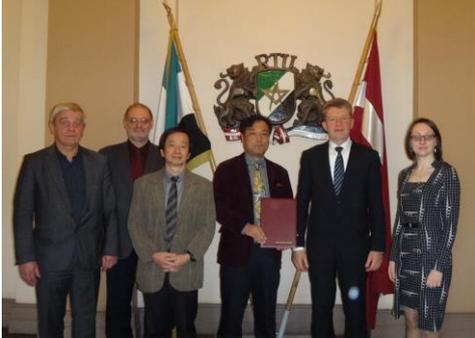


Fig. 13. Courtesy visit at RTU



Fig. 14. Lectures at RTU

Dr. ODAKA and SUZUKI also visited VGTU on the 7th November 2014. After courtesy visit on Dr. Antanas ČENYS, vice rector of VGTU and Dr. Rimantas BELEVIČIUS, dean of the faculty of fundamental sciences of VGTU (see Fig. 15), SUZUKI and Dr. ODAKA made same presentation as those in RTU as shown in Fig. 16.



Fig. 15. Courtesy visit at VGTU



Fig. 16. Lectures at VGTU

## 2.5. Acceptance of a researcher of RTU in KU

KU accepted Dr. VEIDE from 10th to 22nd Mar. to promote cooperative activities between RTU and KU. Within 13 days stay, Dr. VEIDE participated following activities.

- Courtesy visit on Dr. Matsuo OGAWA, dean of graduate school of engineering.
- Courtesy visit on Dr. Ryuji KURODA, chairman of department of architecture.
- Lecture meeting at headquarters of Japan society for graphic science in the University of Tokyo Komaba campus (See Fig. 17).
- Gathering of information about relationship between geometry and Japanese culture at Tokyo National Museum.
- Study tour to Osaka University to learn high resolution huge display (See Fig. 18).
- International seminar on algorithm design held at Kyoto University.
- Exercise of paper folding to craft Andon in KU (See Fig. 19).
- Lecture meeting at KU (See Fig. 20).



Fig. 17. Lecture meeting at headquarters of Japan

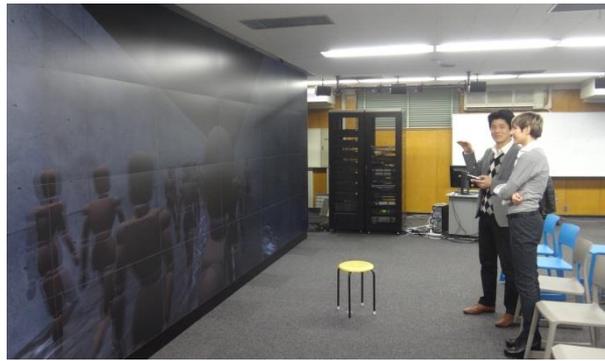


Fig. 18. Study tour to Osaka University society for graphic science



Fig. 19. Exercise of paper folding to craft Andon



Fig. 20. Lecture meeting at KU

As a series of cooperative activities between RTU and KU were evaluated by each University, agreement of academic exchange was decided to be promoted from faculty level to University level on 25th Feb. 2015, Dr. VEIDE received the document of academic exchange agreement at courtesy visit on Dr. OGAWA as shown in Fig. 21.



Fig. 21. Courtesy visit on Dr. Matsuto OGAWA to receive document of academic exchange agreement between RTU and KU.

In the lecture meeting at the University of Tokyo and KU, Dr. VEIDE made two lectures titled 'Engineering Graphics Education in Riga Technical University' and 'Latvian Culture and Geometry'. In the first lecture, transition of engineering graphics education including hand writing education was explained as shown in Fig. 22 and Fig. 23. And in the second lecture, geometric pattern in traditional belts design in Latvia (see Fig. 24), project about new design method making use of binary system and description of Puzurs (see Fig. 25) were explained.

### Milestones of EG Change in Curricula – Contact hours

Faculties or	1977-1979	1993	1997/98	From 2002
Study Programs	Pure PAD	PAD & CAD	PAD, CAD and BIM	PAD, CAD and BIM
Mechanical Engineering	177 h = 34 L + 143 P	32 h 16 L + 16 P	32 h = 2 CP	32 h = 2 CP
Civil Engineering	170 h = 34 L + 136 P	32 h = 16 L + 16 P	32 h = 2 CP	64 h = 4 CP
Architecture and Urban Planning	180 h	80 h	64 h = 4 CP	64 h = 4 CP
Chemical Engineering	85 h = 17 L + 68 P	32 h	32 h = 2 CP	32 h = 2 CP
Telecommunication Engineering	85 h = 17 L + 68 P	32 h	32 h = 2 CP	-
Electrical Engineering	85 h = 17 L + 68 P	32 h	32 h = 2 CP	-
Engineering Economics	85 h = 17 L + 68 P	32 h	32 h = 2 CP	-
Computer Science	85 h = 17 L + 68 P	32 h	32 h = 2 CP	-

L – Lecture, P – Practical Session  
Plus the same amount hours for homework

CP - Credit Point, 1 CP=1 contact hour/week  
1 CP = 40 hours total

### University Textbooks

Two major “engineering graphics” players in Latvia:

- Riga Technical University (RTU)
- Latvia University of Agriculture (LUA)

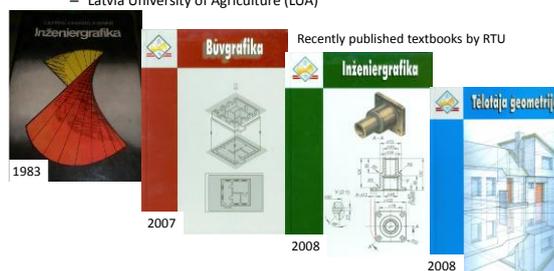


Fig. 22. Transition of engineering graphics education in RTU Fig. 23. Course textbook of engineering graphics education in RTU

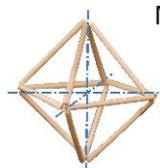
### 2D Geometry in Ornaments

What message they convey?



Fig. 24. Geometric pattern in traditional belts design in Latvia

### Historical Story and Symbolic Meaning



- vertical axis signifies the time line - past, present and future
- horizontal axes define four angles which symbolize summer, autumn, winter and spring time
- intersection point of axes- present
- one module of "Puzurs" is made from 12 elements - one year consisted of twelve months.



Fig. 25. Description of Puzurs

### 3. Cooperative activities between Baltic universities and KU at now and in future

From 25th to 26th June 2015, SUZUKI will visit VGTU to join BALTGRAF. In the conference, SUZUKI will make two presentations titled ‘SKEW QUADRILATERAL MEMBRANE FOLDING FOR LAMPSHADE DESIGN’ and ‘ACADEMIC EXCHANGE BETWEEN BALTIC UNIVERSITIES AND KOBE UNIVERSITY’. In the second presentation, history and detailed content of cooperative activities between Baltic Universities and KU will be explained.

And Dr. MAKUTĒNIENĒ and SUZUKI will discuss practical method of lecture exchange at the time. Lecture exchange was one of future cooperative activities which were discussed when SUZUKI visited VGTU in 2013. As liberal arts education, lecture of relationship between culture and shape by native lecturers should be attractive and useful for University students. At first, online class was considered as method of lecture exchange. However, exchange of movie lecture was adopted later considering unexpected troubles of network and information devices. As shown in Fig. 26, movie recorded at KU is already completed with the help of KU School of Languages and Communication (SOLAC). The educational material is composed by two movies. The first movie is about 10 minutes long including history of cooperative activities between VGTU and KU, history of light source and Andon, and basis of illuminance calculation method. The second movie is about 15 minutes long including explanation of basic differential geometry and exercise of Andon crafting. Bilateral network of graphic science education between VGTU and KU must be expanded multilateral network in the world in future.



Fig. 26. Movie for lecture exchange

### **Conclusions**

In this paper, authors explained history and starting/restarting chance of relationship between Baltic universities and KU, cooperative activities in recent years, and cooperative activities at now and in future. Authors would like to keep current strong relationship in future and transfer it to younger generation.

### **Acknowledgements**

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