

## 特集：「イルクーツク技術フォーラム」概要

今号では、国庫補助事業の一環として昨年11月にロシア東欧貿易会がイルクーツクにおいて開催いたしました「技術フォーラム」の概要をご紹介します。フォーラム詳細につきましては、ロシア東欧貿易会発行「イルクーツク技術フォーラム報告書」をご参照ください。

1. [イルクーツク技術フォーラム開催概要](#)..... 1
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## トピック：2010年までのロシア連邦科学技術発展政策基本原則と 今後の見通し（英文）

トピックとして2002年3月にプーチン大統領により承認されました標記基本原則、優先方針、重要科学技術分野リストをお送りいたします

Basic principles of the Russian Federation Policy in the Field of Development of Science and Technological for the Period up to 2010 and Further Perspective..... 1 1

Priority Directions in Development of Science, Technologies and Engineering in the Russian Federation..... 2 7

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## 1. イルクーツク技術フォーラム開催概要

ロシア東欧貿易会は、2002年11月18日～11月21日にイルクーツクで「技術フォーラム」を開催した。フォーラムの開催趣旨は日口の貿易経済分野の協力と発展のため科学技術分野の交流を促進するもので、日本側の専門家がイルクーツク州を訪問して同州の技術研究・技術開発、製造企業の現状を把握するとともに、日本企業の技術開発の内容、ニーズを伝え、日本と協力の可能性を探った。日本側からは専門家3名の他、事務局、オブザーバーを含め総勢13名が参加した。一行はゴボリン知事との会談、科学アカデミー研究所他学術研究機関および企業とのフォーラム、研究所および企業の訪問を行った。

### 1. 日本側専門家：

近藤芳夫 団長・(株)日本製鋼所 顧問役・(社)ロシア東欧貿易会 理事  
北川正樹 石川島播磨重工業(株) 技術開発本部 主席技監  
阿部文隆 東洋エンジニアリング(株) 海外事業本部 参与

### 2. ロシア科学アカデミー他学術研究機関とのフォーラム

日時：2002年11月19日(火)9:30～15:00

会場：イルクーツク国立工科大学「コンファレンス・ホール」

参加者：日本側8名、ロシア側30名

挨拶：チェンスキフ イルクーツク州行政府科学・高等教育局長

近藤団長

報告：「イルクーツク科学センター所属研究所と活動概要」

「ロシア医学アカデミーシベリア支部東シベリア科学センターについて」

「イルクーツク国立工科大学の研究開発について」

「太陽発電用シリコン」(地球化学研究所)

「新薬」(化学研究所)

「ポリ塩化ビニル新素材」(化学研究所)

「健康維持のための新医療技術」(医学アカデミー東シベリア科学センター)

「浄水用炭素ソーベント(sorbent 吸収剤)」(国立工科大学)

「エアレーター(AERATOR)」(国立工科大学)

「エネルギー設備」(エネルギーシステム研究所)

「ロシアと北東アジア諸国のエネルギー協力戦略」(エネルギーシステム研究所)

「エコロジー問題解決のための触媒技術」(化学生産企業「KATALIZ」)

### 3. イルクーツク企業とのフォーラム

日時：2002年11月20日(水)9:30～13:35

会場：バイカル・ビジネス・センター「コンGRES・ホール」

参加者：日本側9名、ロシア側60名

挨拶：ソボリ・イルクーツク州副知事、近藤団長、シャブリン東シベリア商工会議所会頭、  
菅沼健一 在ロシア日本国大使館公使、トルストフ・イルクーツク州商品生産者  
非営利団体副会長

日本側報告：

「老朽化した施設をもつ企業の今後の安全操業」(IHI 北川)

「プラント・クリニック」(TEC 阿部)

「日本貿易振興会の活動について」(ジェトロ・中村)

ロシア側報告：

「タイシェットレス」(ニキチェヴィッチ社長)

「イルクーツクエネルゴ」(フィリシ副社長)

「イリムパルプ・エンタープライズ」(カニコフ副社長)

「イルクーツク・アルミニウム工場」(シチェグロフ副社長)

「ルシア・ペトロリアム」(ウトキン副社長)

「ウソリエ化学工場」(コテンコ社長)

「サヤンスク化学プラスチック工場」(ムバラコフ主任技師)

#### 4. 研究所訪問

地球化学研究所、化学研究所、エネルギーシステム研究所

#### 5. 工場視察

イルクーツク・ケーブル工場

イルクーツク・アルミニウム工場

バイカル紙パルプ工場

詳細は別冊「イルクーツク技術フォーラム報告書」をご参照ください。

## 2 . イルクーツク国立工科大学研究開発案件

(フォーラム時に国立工科大学より提出されました研究開発案件・全 14 件は以下のとおりです。)

### 1) Activated coal regeneration technology

**Purpose:** The technology belongs to hydrometallurgy and is intended for recovery of activated coal sorption properties in the process of coal sorption extraction of noble metals from solutions and pulps.

**Advantages:** Considerable reduction of activated coal losses, up to 0.4-1.1%, after performing 1-5 “sorption-regeneration” cycles, respectively, as a result of a reduction of burning, mechanic durability of coal being the same. Reduced regeneration time and energy expenditures.

**Specifications:** Treatment term – 10 minutes

**Price:** Agreed

The method of activated coal regeneration has been protected by R.F. Patent №2109828

### 2) An aerator

**Purpose:** An aerator can be used for treatment of ore, non-ore raw materials and enrichment of fossil fuels. It can also be used in fermentation apparatus for biological and floating cleaning of sewage, for aeratorion in aertanks, in pulp and paper industry, chemical, food industry and other industries.

**Advantages:**

- Reduces power consumption to introduce a unit of air volume and increases the extraction of valuable component.
- Allows to achieve the maximum ratio of gas fluid volume, which is 50:400:1, the diameter of bubbles of floatation size being preserved.
- Provides possibility to vary the size of gas bubbles from 0.2 to 5.0 mm.
- Improves the ejecting effectiveness of aerator, the bubbles of the floatation sizes being preserved, due to optimum parameters of the aerator units.
- Provides minimal consumption of water.
- Is safe in casual and aggressive environments.

**Specifications:**

Water expenditure for a nozzle: 2-4 liter/min

Air expenditure for a nozzle: 100-200 liter/min

Air and water pressure: 0.2-0.4 Mpa

Gabarit sizes are determined by aerator productivity

**Price:** Contractual

The aerator is protected by RF Patent

### **3) Automatically Controlled Device for Plastic Metal Working**

**Purpose:** The device is meant for calibration, reduction, pressing-out and other technological plastic metal working operations using universal press equipment.

**The advantages of the automatically controlled device allow:**

- Enlargement of technological potentialities with the use of plastic metal working operations
- Utilization of tearing machines or press equipment for a number of technological operations
- Automation of technological operations

**Specifications:**

Deformation effort: 50kN

Over-all dimensions of items under reduction:

- Length: 10-100 mm

- Diameter: 5- 60 mm

Deformation rate: 1-5 mm/s

Over-all dimensions of the device: 400 × 400 × 350 mm

Mass: 70 kg

**Contract:** The university is ready to give the technical documentation of the device to the party concerned in accordance with the license agreement offer consultation services and help in its introduction.

### **4) Calibration Automatic Device**

**Purpose:** The calibration automatic device is designed for mandrelling, drawing, calibration, reduction, extending and other technological operations when producing different details such as bushings, shafts, axles, rollers, cylinders and other in automatic mode.

**The advantages of the calibration machine-tool:**

- Technological universality
- Automatic mode of operation
- Simplicity in design
- Operate reliability
- Operation safety

**Specifications:**

Maximum diameter of surface worked: 50mm

Deformation effort: 60 kN

Grip effort: 1.4 kN

Travel speed of auto-operator: 5.4 m/min

Maximum travel of auto-operator: 250 mm

Linear speed of pusher: 50 mm/min

Dimensions of machine-tool: 1,500 × 1,200 × 770 mm

Mass: 280 kg

**Contract:** The exclusive rights of the Irkutsk State Technical University to the “Calibration Automatic Device” are guaranteed by the RF patent.

The technical documentation for the manufacturing of the calibration automatic device is offered in accordance with the license agreement. We are able to develop for you a machine-tool structure to work concrete metal articles.

## **5) Calibration Machine-Tool**

**Purpose:** The calibration machine-tool is designed for finishing-hardening and shaping treatment of metallic products under conditions of individual and full-scale production.

**The machine-tool possesses a number of important advantages:**

Universality, Simplicity of design, Reliability, Durability, Low cost, Compactness, Low-level noise

**Specifications:**

Crosshead speed: 50 mm/min

Maximum tractive force: 8,000 kg

Blank size - Length: 10-500 mm, Hole diameter: 1-50 mm

External diameter: 10-50 mm

Electric motor - Power: 3 kw, Rotation frequency: 900 rev/min

Machine-tool over-all size: 1,800-850-480 mm

Machine-tool mass: 285 kg

**Contract:** The university is ready to give the technological documentation for the manufacture of the calibration machine-tool to the party concerned on the license bases, render consultation services and help in mastering its production and operation.

## **6) Carbon sorbent**

**Purpose:** The carbon sorbent is meant for water purification from organic impurities and heavy metals at mining, chemical, metallurgical, light industry works.

The sorbent is produced on the basis of modified activated carbon and possesses a number of obvious advantages:

- Simple technology of production in usual type adsorbers from available cheap natural coals from any region
- High exchange capacity
- High degree of sewage water purification from metal ions and organic matter up to the maximum concentration value
- Ease of regeneration

- Possibility of repeated use of the recovered sorbent in the “sorption-desorption” cycle

**Sorbent Specifications:**

Bulk density: 410g/dm<sup>3</sup>

Abrasion resistance of granules: not less than 60-65 %

Total volume of pores in moisture: 0.5 cm<sup>3</sup>/g

Drop in chemical oxygen absorption: 3-4 mg/ dm<sup>3</sup>

Ion exchange capacity of copper, zinc, iron, chromium, molybdenum, tungsten, vanadium, cobalt, nickel: 5-30 mg/g

Absorption activity in iodine: not less than 55 %

**Contract:** The university is ready to give the file of technical documents for the way of sorbent production to the party concerned on the license basis, to render consultation services and assistance in bringing the process to a commercial level.

## 7) Centrifugal Roller

**The centrifugal roller is designed for:**

- Hardening and improving the quality of workable surfaces of different details such as pipes, shafts, axles, rods, bars, etc.
- Regulating residual stresses in calibrated rods
- Cleaning cylindrical surfaces from scale and rust
- Grinding and Polishing of cylindrical articles
- Application of lubricating coatings

**The advantages of the roller:**

- Possibility of working low rigidity articles
- Provision of blank self-feed
- High productivity of hardening
- Utilization of universal machine-tool equipment
- Possibility of working contour rotating surfaces
- Absence of centrifugal force effort on blank deformation

**Specifications:**

Dimensions of items worked - diameter: 5-50 mm, length: 100-1,000 mm

Mass of changeable loads: 1-5 kg

Rotation frequency of the roller: 100-1,000 rev/min

Maximum radial effort: 1,500 kg

Over-all dimensions: 480 × 480 × 150mm

Mass: 12 kg

**Contract:** The university is ready to pass the technical documentation for the centrifugal roller to the party concerned in accordance with the license agreement, provide consultation services and useful guide to learn to handle its production and operation.

## **8) Development of a resource-saving technology in treatment of Hydro-mineral raw materials**

**Purpose:** Concentrating mills, industries where profound cleaning of sewage is required.

The key points of the technology offered are ion-exchange processes based on the methodology of elution desorption and chromatography.

### **Advantages:**

The developed sorption technology allows

- to extract selectively micro components (of strontium and rubidium) in the conditions of a strong competition with concomitant macro components (of calcium and sodium)
- to obtain addition products (salts of rare metals)

to lower the pollution level of a regional environment

### **Specifications:**

The efficiency of the device: 1,050,000m<sup>3</sup> per year

Duration of one cycle: 6 hours

The amount of cationite (KU-2x8) per one cycle: 262 kg

Extraction of strontium: up to 72 %

that of rubidium: up to 97 %

**Price:** Agreed

## **9) Flotation column apparatus with descending pulp and air flow**

**Purpose:** Flotation dressing of ores with different substance composition and technogenous raw materials.

**Advantages:** Unlike flotation cell agitators of mechanical and pneumomechanical type which can be referred to as apparatus of ideal agitation in view of their construction when 98-99% of energy supplied is used directly to agitate and only the remaining 1-2% are spend on flotation itself. Flotation column apparatus with descending movement along the hydrodynamics structures of flows are nearing in their efficiency the apparatus of ideal displacement, their energy expenditures being lower by an order than those of sell agitators.

### **Specifications:**

Sizes - height: 4-7 m, diameter: 0.6-1 m, pulp efficiency: 50-100 m<sup>3</sup>/hour

air expenditure ratio: 0.2-0.6m<sup>3</sup>/ m<sup>3</sup>

**Price:** Agreed

Flotation column apparatus is protected by RF Patent.



## **10) Installation for Shot-Impact Aircraft Panel Shaping and Trimming**

**Purpose:** The installation is intended for utilization in an integrated technological process of shaping-trimming-hardening long-size aircraft panels. The shaping and trimming control is exercised manually and automatically.

The following parameters of working are programmed: rotation frequency of the shot-blaster wheel and tab circles, length-wise and vertical feed rate, lengthwise and vertical travel rate of the operating parts.

**The advantages of the installation assure:**

- Enhancement in the accuracy of the panel form
- Gain in the productivity of the process
- Extension of the service life of the details

**Specifications:**

Length of the detail worked: 15,000 mm

Width of the detail worked: 1,500 mm

Accuracy of shaping: 0.1 mm

Diameter of the shot used: 2-5 mm

Height of the short working zone: 100 mm, 200 mm, 300 mm, 400 mm

Width of the trimming zone: 200 mm

Total power of electrical motors: 10 kW

Overall dimensions of the installation: 24,000 × 4,900 × 3,300 mm

**Contract:** The university is ready to offer services in manufacturing and introducing the installation for shaping, trimming and developing the technology for producing aircraft panels and casings.

## **11) Lightweight brickwork**

**Purpose:** The brickwork is supposed to be used in erection of residential, civil, agricultural, an industrial buildings and constructions as supporting and self supporting walls and walls with floor cutting.

**Advantages:**

- Provides for the connection between vertical layers of brickworks, which makes the construction more solid.
- The bonding system provides for greater resistance of mutual vertical brickwork layers deformations caused by temperature.
- Brickwork is of increased rigidity and tolerance to horizontal implications, thermal resistance of frame structures increasing too.
- Processibility index of brickwork increases.
- Material consumption decreases.
- Brickwork adapts well to implication of arrangements aimed at earthquake – proof construction.

**Specifications:**

*Material consumption per 1 m<sup>3</sup> Brickwork, 640 mm thick:*

Number of conventional bricks: 175 peaces

Masonry mortar: 45 L

Foamed concrete: 690 L

Construction weight: 820 kg

*Heat engineering indices*

Given thermal resistance: 3.84 m<sup>2</sup> °C/Bt

Homogeneity ratio: 0.75

Inner wall surface temperature at - 37°C outside: 18-20

Given construction expenditures, relatively solid brickwork: 73 %

**Price:** Agreed

Lightweight brickwork is protected by RF Patent “Kirpichnaya stena” №2137889

## **12) Production technology of carbon sorbents and activated carbons intended for special purposes**

**Purpose:** Production of carbon and carbonaceous materials based on coals, polymers and plastics, and oil residues.

**Advantages:** The production can be organized aiming at any volumes of resulting materials according to local raw materials and conditions of work.

**Specifications:** The technologies have been provided with technical regulations and requirements for conditions to be met by products.

**Price:** The authentic technology papers are assessed worth 6 million rubles which is US \$20,000.

## **13) Program unit to optimize predefined milling limit, OptiMILL**

**Purpose:** The program unit OptiMILL is applied in calculations of refined milling treatment limits of demi-relievoes with a toll of a given type-size pattern.

**Advantages:**

- Millability analysis of demi-relievoes of any geometrical pattern
- Use of end and circular milling cutters
- Simple and clear user’s interface
- Possible graphic presentation of the models on computer screen
- Program use optimization of the processor calculation resources
- Connection provision between different commercial CAD and CAM systems
- Provision with considerable increase in efficiency of refined milling

**Specifications:**

Formats of entrance data: \*.asc, \*.bmp

Formats of exit data: \*.asc, \*.bmp, \*.dxf, \*.pic

PC configuration: Pentium /128Mb RAM/Video 8Mb

Operation systems: Windows NT, 2000, XP

Program size: 684 Kb

**Price:** 10,000 roubles

Program registration certificate

#### **14) Staged fuel combustion in coaldust steam generating units with Undergrate blast system (UBS)**

**Purpose:** Energy steam generating units for heat power stations.

**Advantages:**

- Reduction of heat loss under incomplete burning in the pit
- Lowering gas temperatures on the exit from the furnace and the torch resulting from increased heat acquisition by cold slopes
- Prevention from slagging furnace and steam superheater
- Range increase of boiler load reduction without torch lighting at the expense of gas temperature increase in a cold funnel
- Lowering of nitrogen oxide thrusts in smoke gases by 20-30% in HES.

**Specifications:** The ratio of excessive air in main burners is below 1.

**Price:** 250-300 thousand roubles

上記案件についての問い合わせ先

Dr. EVSTAF'EV Sergei N.

Vice-Rector (scientific work), Professor

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## **Activated coal regeneration technology**

### **Purpose:**

The technology belongs to hydrometallurgy and is intended for recovery of activated coal sorption properties in the process of coal sorption extraction of noble metals from solutions and pulps.

### **Advantages:**

Considerable reduction of activated coal losses, up to 0.4-1.1%, after performing 1-5 "sorption-regeneration" cycles, respectively, as a result of a reduction of burning, mechanic durability of coal being the same. Reduced regeneration time and energy expenditures.

### **Specifications:**

Treatment term – 10 minutes

### **Price:**

Agreed

The method of activated coal regeneration has been protected by R.F. Patent №2109828

## An aerator

### **Purpose:**

An aerator can be used for treatment of ore, non-ore raw materials and enrichment of fossil fuels. It can also be used in fermentation apparatus for biological and floating cleaning of sewage, for aeratorion in aertanks, in pulp and paper industry, chemical, food industry and other industries.

### **Advantages:**

- Reduces power consumption to introduce a unit of air volume and increases the extraction of valuable component.
- Allows to achieve the maximum ratio of gas fluid volume, which is 50:400:1, the diameter of bubbles of floatation size being preserved.
- Provides possibility to vary the size of gas bubbles from 0.2 to 5.0 mm.
- Improves the ejecting effectiveness of aerator, the bubbles of the floatation sizes being preserved, due to optimum parameters of the aerator units.
- Provides minimal consumption of water.
- Is safe in casual and aggressive environments.

### **Specifications:**

Water expenditure for a nozzle, liter/min	2-4
Air expenditure for a nozzle, liter/min	100-200
Air and water pressure, Mpa	0,2-0,4

Gabarit sizes are determined by aerator productivity

### **Price:**

Contractual

The aerator is protected by RF Patent

## Automatically Controlled Device for Plastic Metal Working

### Purpose:

The device is meant for calibration, reduction, pressing-out and other technological plastic metal working operations using universal press equipment.

### The advantages of the automatically controlled device allow:

- Enlargement of technological potentialities with the use of plastic metal working operations
- Utilization of tearing machines or press equipment for a number of technological operations
- Automation of technological operations

### Specifications:

- Deformation effort, kN 50
- Over-all dimensions of items under reduction:
  - Length, mm 10-100
  - Diameter, mm 5- 60
- Deformation rate, mm/s 1-5
- Over-all dimensions of the device, mm 400x400x350
- Mass, kg 70

### Contract:

The university is ready to give the technical documentation of the device to the party concerned in accordance with the license agreement offer consultation services and help in its introduction.

## Calibration Automatic Device

### Purpose:

The calibration automatic device is designed for mandrelling, drawing, calibration, reduction, extending and other technological operations when producing different details such as bushings, shafts, axles, rollers, cylinders and other in automatic mode.

### The advantages of the calibration machine-tool:

- Technological universality
- Automatic mode of operation
- Simplicity in design
- Operate reliability
- Operation safety

### Specifications:

- Maximum diameter of surface worked, mm 50
- Deformation effort, kN 60
- Grip effort, kN 1.4
- Travel speed of auto-operator, m/min 5.4
- Maximum travel of auto-operator, mm 250
- Linear speed of pusher, mm/min 50
- Dimensions of machine-tool, mm  
1500x1200x770
- Mass, kg 280

### Contract:

The exclusive rights of the Irkutsk State Technical University to the "Calibration Automatic Device" are guaranteed by the RF patent.

The technical documentation for the manufacturing of the calibration automatic device is offered in accordance with the license agreement. We are able to develop for you a machine-tool structure to work concrete metal articles.

## Calibration Machine-Tool

### Purpose:

The calibration machine-tool is designed for finishing-hardening and shaping treatment of metallic products under conditions of individual and full-scale production.

### The machine-tool possesses a number of important advantages:

- Universality
- Simplicity of design
- Reliability
- Durability
- Low cost
- Compactness
- Low-level noise

### Specifications:

Crosshead speed, mm/min	50
Maximum tractive force, kg	8000
Blank size	
Length, mm	10-500
Hole diameter, mm	1-50
External diameter, mm	10-50
Electric motor	
Power, kwt	3
Rotation frequency, rev/min	900
Machine-tool over-all size, mm	1800-850-480
Machine-tool mass, kg	285

### Contract:

The university is ready to give the technological documentation for the manufacture of the calibration machine-tool to the party concerned on the license bases, render consultation services and help in mastering its production and operation.



## Carbon sorbent

### Purpose:

The carbon sorbent is meant for water purification from organic impurities and heavy metals at mining, chemical, metallurgical, light industry works.

The sorbent is produced on the basis of modified activated carbon and possesses a number of obvious advantages:

- Simple technology of production in usual type adsorbers from available cheap natural coals from any region
- High exchange capacity
- High degree of sewage water purification from metal ions and organic matter up to the maximum concentration value
- Ease of regeneration
- Possibility of repeated use of the recovered sorbent in the "sorption-desorption" cycle

### Sorbent Specifications:

Bulk density, g/dm <sup>3</sup>	410
Abrasion resistance of granules, not less than, %	60-65
Total volume of pores in moisture, cm <sup>3</sup> /g	0.5
Drop in chemical oxygen absorption, mg/ dm <sup>3</sup>	3-4
Ion exchange capacity of copper, zinc, iron, chromium, molybdenum, tungsten, vanadium, cobalt, nickel, mg/g	5-30
Absorption activity in iodine, not less than, %	55

### Contract:

The university is ready to give the file of technical documents for the way of sorbent production to the party concerned on the license basis, to render consultation services and assistance in bringing the process to a commercial level.

## Centrifugal Roller

### The centrifugal roller is designed for:

- Hardening and improving the quality of workable surfaces of different details such as pipes, shafts, axles, rods, bars, etc.
- Regulating residual stresses in calibrated rods
- Cleaning cylindrical surfaces from scale and rust
- Grinding and Polishing of cylindrical articles
- Application of lubricating coatings

### The advantages of the roller:

- Possibility of working low rigidity articles
- Provision of blank self-feed
- High productivity of hardening
- Utilization of universal machine-tool equipment
- Possibility of working contour rotating surfaces
- Absence of centrifugal force effort on blank deformation

### Specifications:

- Dimensions of items worked:

diameter, mm	5-50
length, mm	100-1000
- Mass of changeable loads, kg 1-5
- Rotation frequency of the roller,

rev/min	100-1000
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- Maximum radial effort, kg 1500
- Over-all dimensions, mm 480x480x150
- Mass, kg 12

### Contract:

The university is ready to pass the technical documentation for the centrifugal roller to the party concerned in accordance with the license agreement, provide consultation services and useful guide to learn to handle its production and operation.

## Development of a resource-saving technology in treatment of Hydro-mineral raw materials

### Purpose:

Concentrating mills, industries where profound cleaning of sewage is required.

The key points of the technology offered are ion-exchange processes based on the methodology of elution desorption and chromatography.

### Advantages:

The developed sorption technology allows

- to extract selectively micro components (of strontium and rubidium) in the conditions of a strong competition with concomitant macro components (of calcium and sodium)
- to obtain addition products (salts of rare metals)

to lower the pollution level of a regional environment

### Specifications:

The efficiency of the device, m <sup>3</sup> per year	1050 000
Duration of one cycle, hours	6
The amount of cationite (KU-2x8) per one cycle, kg	262
Extraction of strontium, % up to	72
that of rubidium, % up to	97

### Price:

Agreed

## Flotation column apparatus with descending pulp and air flow

### Purpose:

Flotation dressing of ores with different substance composition and technogenous raw materials.

### Advantages:

Unlike flotation cell agitators of mechanical and pneumomechanical type which can be referred to as apparatus of ideal agitation in view of their construction when 98-99% of energy supplied is used directly to agitate and only the remaining 1-2% are spent on flotation itself. Flotation column apparatus with descending movement along the hydrodynamics structures of flows are nearing in their efficiency the apparatus of ideal displacement, their energy expenditures being lower by an order than those of cell agitators.

### Specifications:

Sizes:

- height, m	4-7
- diameter, m	0.6-1
- pulp efficiency, m <sup>3</sup> /hour	50-100
air expenditure ratio, m <sup>3</sup> / m <sup>3</sup>	0.2-0.6

### Price:

Agreed

Flotation column apparatus is protected by RF Patent.

## **Installation for Shot-Impact Aircraft Panel Shaping and Trimming**

### **Purpose:**

The installation is intended for utilization in an integrated technological process of shaping-trimming-hardening long-size aircraft panels. The shaping and trimming control is exercised manually and automatically.

The following parameters of working are programmed: rotation frequency of the shot-blaster wheel and tab circles, length-wise and vertical feed rate, lengthwise and vertical travel rate of the operating parts.

### **The advantages of the installation assure:**

- Enhancement in the accuracy of the panel form
- Gain in the productivity of the process
- Extension of the service life of the details

### **Specifications:**

Length of the detail worked, mm	15000
Width of the detail worked, mm	1500
Accuracy of shaping, mm	0.1
Diameter of the shot used, mm	2-5
Height of the short working zone, mm	100,200 300,400
Width of the trimming zone, mm	200
Total power of electrical motors, kwt	10
Overall dimensions of the installation, mm	24000x4900x3300

### **Contract:**

The university is ready to offer services in manufacturing and introducing the installation for shaping, trimming and developing the technology for producing aircraft panels and casings.

## Lightweight brickwork

### Purpose:

The brickwork is supposed to be used in erection of residential, civil, agricultural, an industrial buildings and constructions as supporting and self supporting walls and walls with floor cutting.

### Advantages:

- Provides for the connection between vertical layers of brickworks, which makes the construction more solid.
- The bonding system provides for greater resistance of mutual vertical brickwork layers deformations caused by temperature.
- Brickwork is of increased rigidity and tolerance to horizontal implications, thermal resistance of frame structures increasing too.
- Processibility index of brickwork increases.
- Material consumption decreases.
- Brickwork adapts well to implication of arrangements aimed at earthquake – proof construction.

### Specifications:

Material consumption per 1 m<sup>3</sup>

Brickwork, 640 mm thick:

Number of conventional bricks, peaces	175
Masonry mortar, L	45
Foamed concrete, L	690
Construction weight, kg	820

Heat engineering indices

Given thermal resistance, m <sup>2</sup> °C/Bt	3.84
Homogeneity ratio	0.75

Inner wall surface temperature at - 37°C  
outside

18-20

Given construction expenditures,  
relatively solid brickwork, %

73

### Price:

Agreed

Lightweight brickwork is protected by RF Patent “Kirpichnaya stena” №2137889

## **Production technology of carbon sorbents and activated carbons intended for special purposes**

### **Purpose:**

Production of carbon and carbonaceous materials based on coals, polymers and plastics, and oil residues.

### **Advantages:**

The production can be organized aiming at any volumes of resulting materials according to local raw materials and conditions of work.

### **Specifications:**

The technologies have been provided with technical regulations and requirements for conditions to be met by products.

### **Price:**

The authentic technology papers are assessed worth 6 million rubles which is US \$20000.

## Program unit to optimize predefined milling limit, OptiMILL

### Purpose:

The program unit OptiMILL is applied in calculations of refined milling treatment limits of demi-relievs with a toll of a given type-size pattern.

### Advantages:

- Millability analysis of demi-relievs of any geometrical pattern
- Use of end and circular milling cutters
- Simple and clear user's interface
- Possible graphic presentation of the models on computer screen
- Program use optimization of the processor calculation resources
- Connection provision between different commercial CAD and CAM systems
- Provision with considerable increase in efficiency of refined milling

### Specifications:

Formats of entrance data	*.asc, *.bmp
Formats of exit data	*.asc, *.bmp, *.dxf, *.pic
PC configuration	
Pentium	/128Mb RAM/Video 8Mb
Operation systems	Windows NT, 2000, XP
Program size, Kb	684

### Price:

10 000 roubles

Program registration certificate



## **Staged fuel combustion in coaldust steam generating units with Undergrate blast system (UBS)**

### **Purpose:**

Energy steam generating units for heat power stations.

### **Advantages:**

- Reduction of heat loss under incomplete burning in the pit
- Lowering gas temperatures on the exit from the furnace and the torch resulting from increased heat acquisition by cold slopes
- Prevention from slagging furnace and steam superheater
- Range increase of boiler load reduction without torch lighting at the expense of gas temperature increase in a cold funnel
- Lowering of nitrogen oxide thrusts in smoke gases by 20-30% in HES.

### **Specifications:**

The ratio of excessive air in main burners is below 1.

### **Price:**

250-300 thousand roubles

# **BASIC PRINCIPLES OF THE RUSSIAN FEDERATION POLICY IN THE FIELD OF DEVELOPMENT OF SCIENCE AND TECHNOLOGIES FOR THE PERIOD UP TO 2010 AND FURTHER PERSPECTIVE**

Approved by the President of the Russian Federation V. Putin  
March 30, 2002

## **I. GENERAL PROVISIONS**

1. Basic principles of the Russian Federation Policy in the Field of Development of Science and Technologies for the Period up to 2010 and Further Perspective (hereinafter-Basic principles) define the most important directions of the state policy in the field of development of science and technologies, aims, tasks and ways of their implementation, and also a system of economic and other measures, stimulating scientific and scientific-technological activity.
2. The legal basis of the Basic principles comprises the Constitution of the Russian Federation, the federal laws «On science and state scientific-technical policy», «On state forecasting and programs of social-economic development of the Russian Federation» .
3. Implementation of the Basic principles is aimed to ensure the following strategic national priorities of the Russian Federation: improvement of the quality of life of the population, achievement of economic growth, development of fundamental science, education and culture, and to ensure defense and security of the country.
4. The Basic principles are formed and implemented with account of the federal interests and the interests of the subjects of the Russian Federation.

## **II. PURPOSE AND TASKS OF THE STATE POLICY IN THE FIELD OF DEVELOPMENT OF SCIENCE AND TECHNOLOGIES**

5. Development of science and technologies is aimed to solve the tasks of the social-economic progress of the country and belongs to the highest priorities of the Russian Federation.
6. Science and technologies are developed on the following basis:
  - 1) Scientific-technical complex representing a sum total of the organizations of different

organizational-legal forms and forms of property, which are involved in scientific, scientific-technical activity and training of scientific workers, including personnel of the highest qualifications;

- 2) Fundamental science, which has recognized scientific schools and achievements of the world level, and also a developed system of higher education;
  - 3) Most important applied research and development, industrial potential, unique production and other technologies, scientific-technical reserve;
  - 4) Highly-qualified scientific personnel and specialists, information infrastructure, material-technical and experimental base;
  - 5) Experience of concentration of efforts on solving complex scientific-technical and technological problems of a national scale;
  - 6) Rich natural resources, developed transport and communication infrastructure.
7. The aim of the state policy in the field of development of science and technologies is transition to an innovative way of development of the country on the basis of selected priorities.
8. In order to reach the aims of the state policy in the field of development of science and technologies the following main tasks have to be solved:
- 1) Establishment of organizational and economic mechanisms for enhancing demand of the domestic producers for innovations, advanced development of fundamental science and most important kinds of applied research and development;
  - 2) Improvement of the normative-legal basis for scientific, technological and innovative activities;
  - 3) Adaptation of the scientific-technical complex to the conditions of a market economy, interaction between state and private capital with the purpose of development of science, technologies and engineering;
  - 4) Rational combination of the state regulation and market mechanisms, measures of direct and indirect stimulation of scientific, scientific-technical and innovation activity for achievement of the priorities in development of science, technologies and engineering;
  - 5) Improvement of the system of training of scientific and engineering personnel of the highest qualifications in the field of science and technologies;
  - 6) Support for scientific research and experimental development in the priority fields of development of science, technologies and engineering with account of the world tendencies in this sphere;
  - 7) Strengthening of the research and development sector of the Higher School;
  - 8) More active exchange of knowledge and technologies between the defense and civil sectors of the economy, development of technologies of dual usage and their wider application;

- 9) Accelerated realization of the scientific and technological achievements, which can help prevent military conflicts, technogenic and ecological disasters and reduce damage caused by them;
- 10) Development and modernization of arms, military and special equipment, encouragement of development of the defense-industrial complex;
- 11) Improvement of the technical means, forms and methods of struggle against terrorism, including international terrorism.

### **III. MAIN DIRECTIONS OF THE STATE POLICY IN THE FIELD OF DEVELOPMENT OF SCIENCE AND TECHNOLOGIES, AND WAYS OF THEIR REALIZATION**

9. Main directions of the state policy in the field of development of science and technologies are the following:
  - 1) Development of the fundamental science, and main kinds of applied research and development;
  - 2) Improvement of the state regulation in the field of development of science and technologies;
  - 3) Formation of a national innovation system;
  - 4) Raising the efficiency of the use of the results of scientific and scientific-technical activity;
  - 5) Preservation and development of the personnel potential of the scientific-technical complex;
  - 6) Integration of science and education;
  - 7) Development of the international scientific-technical cooperation.

#### **DEVELOPMENT OF FUNDAMENTAL SCIENCE AND MAIN KINDS OF APPLIED RESEARCH AND DEVELOPMENT**

10. Fundamental science is one of the strategic elements essential for the progress of the society. The results of fundamental research and main kinds of applied research and development provide the basis for the economic growth of the state, its steady development, and are the factors, which determine the role of Russia in the modern world.
  11. The priority fields in development of fundamental research are determined by the scientific community on the basis of the national interests of Russia and with account of the world trends in development of science, technologies and engineering.
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12. Most important kinds of applied research and development are carried out in the priority fields of development of science, technologies and engineering; they should be aimed at solving complex scientific-technical and technological problems and be oriented on the final result, capable to become an innovative product.
13. The main tasks of development of the fundamental science and most important kinds of applied research and development are the following:
- 1) Elaboration of measures of first-priority state support for the fundamental researches, which can ensure technological breakthroughs and subsequent formation of technological structures;
  - 2) Conducting of forecast studies for determination of perspective directions in scientific-technical and technological development, evaluation of the consequences of the adopted administrative decisions;
  - 3) Raising of the role of social and humanitarian studies;
  - 4) Preservation of and support for scientific and scientific-technical schools, and succession of the scientific knowledge;
  - 5) Stimulation of the scientific research and experimental development of a military-applied character in order to reveal and prevent military threats, develop qualitatively new types of arms, military and special equipment, improve the forms and ways of waging armed struggle;
  - 6) Development of research, design and experimental-design basis for scientific instrument making;
  - 7) Establishment of and provision of resources for unique scientific plants, a network of centers for a collective use of unique scientific and experimental equipment, including the use of the principle of leasing;
  - 8) Improvement of the information and information-telecommunication infrastructure in the field of science, education and technologies, development of a unified system of codification of scientific knowledge and technologies, system of scientific-technical and military-technical information.

#### IMPROVEMENT OF THE STATE REGULATION IN THE FIELD OF DEVELOPMENT OF SCIENCE AND TECHNOLOGIES

14. The state policy in the field of development of science and technologies proceeds from the necessity to form and implement the following:
- 1) Most important Innovative projects of state value, for implementation of which resources

are concentrated and provided with state support (hereinafter - innovative projects of state value);

- 2) Priority directions in development of science, technologies and engineering, both at the federal level and at the level of the subjects of the Russian Federation;
- 3) Lists of crucial technologies of federal, regional and branch importance.

15. The priority directions in development of science, technologies and engineering of federal importance, List of crucial technologies of federal importance and task-oriented programs of scientific research and experimental development are formed with the purpose to ensure implementation of the most important innovative projects of state value in the priority directions in development of science, technologies and engineering.

The priority directions in development of science, technologies and engineering, and the lists of crucial technologies are to be periodically adjusted.

16. State order for scientific-technical products is to ensure a complex combination of the organization of research and development at federal, regional and branch levels with efficient management of the state property, including intellectual property.

The bulk of the state order for scientific-technical products is task-oriented programs of scientific research and experimental development, and also major innovation projects of state importance.

17. Improvement of the state regulation in the field of development of science and technologies envisions:

- 1) Formation of mechanisms of state support for priority directions in development of science and crucial technologies of federal, regional and branch importance;
  - 2) Reforming of the state sector of science and high technologies with account of the available financial, personnel and other resources;
  - 3) Enhancement of the efficiency of operation of the state sector of science and high technologies, development of directions of non-state sector of science and high technologies, which are aimed at solving major social- economic and defense tasks of the country;
  - 4) Creation of conditions for adaptation of the academic sector of science to market conditions with account of the specific features of organization of fundamental research in the country;
  - 5) Establishment of modern corporations (holdings, federal centers of sciences and high technologies, inter-branch scientific centers), which will solve major problems of development of high-technology sectors of the economy and penetrate into the sectors of
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- science intensive products of the world market;
- 6) Improvement of the activity of the state scientific centers on the basis of integration of the academic and high school sectors of science and production for development of competitive science intensive products;
  - 7) Improvement of the financing of the state sector of science and high technologies predominantly due to a bigger scale of transition on a competitive basis to an address financing of the scientific research and experimental development implemented by the state scientific organizations;
  - 8) Development of the Russian Foundation of Fundamental Research, Russian Humanitarian Foundation, Foundation of Assistance to Development of Small Forms of Enterprises in the Scientific-technical Sphere, and also off-budget funds for support of scientific and scientific-technical activity;
  - 9) Enhancement of the efficiency of management of the property of the state sector of science and high technologies;
  - 10) Stimulation of scientific, technological and innovative activities in the subjects of the Russian Federation, assistance to integration of their scientific potentials in the priority directions of development of science, technologies and engineering, development of municipal formations with a high technological potential and status of scientific towns, and also administrative-territorial formations characterized by intensive scientific-technical and innovative development; establishment of special scientific - technological zones;
  - 11) Strengthening of the role of the leading research and development organizations of industries and chief designers of the strategically important systems (models) of civil, military and dual usage, responsible for the formation and implementation of scientific-technical policy in the field of realization of their respective directions of development of science, technologies and engineering;
  - 12) Maintaining of the necessary level of financing for development and modernization of arms, military and special equipment, development of the defense-industrial complex, strengthening of the positions of the domestic producers in the world market of arms and military equipment;
  - 13) Perfecting of the program-target method of planning of development of science, technologies and engineering, first of all for medium-term periods;
  - 14) Formation of a system of propagation of the achievements of domestic science, technologies and engineering, informing the public about the measures taken by the state to encourage the development of science and education;
  - 15) Formation a climate favorable for development of innovation activity, for introduction of technological innovations in production and for attracting private investments in the high-technology sector of the economy.

## FORMATION OF A NATIONAL INNOVATION SYSTEM

18. Formation of a national innovation system is a major task and an integral part of the state economic policy.

The national innovation system should ensure joining of efforts of the state administration bodies of all levels, organizations of the scientific-technical sphere and business sector of the economy in the interests of an accelerated application of the achievements of science and technologies for the purpose of implementation of the strategic national priorities.

19. Formation of the national innovation system envisions:

- 1) Creation of favorable economic and legal environment;
- 2) Establishment of innovation infrastructure;
- 3) Improvement of the state mechanisms for assistance to commercialization of the results of scientific research and experimental development.

20. Formation of a national innovation system will require the following major tasks to be solved:

- 1) Improvement of the mechanisms of interaction between the participants in the innovation process, including organization of interaction of the state scientific organizations and state higher educational establishments with industrial enterprises, for promotion of new technologies in production and raising qualifications of production personnel;
- 2) Implementation of an efficient economic policy in respect of the participants in the innovation process, encouragement of the off-budget financing, development of Institutional and legal conditions for development of venture investments in science-intensive projects;
- 3) Establishment and development of objects of innovation infrastructure (innovative-technological centers, technoparks, etc.), network of organizations for rendering consulting services in the field of innovative activity, assistance to establishment and development in the scientific-technical sphere of small innovative enterprises and special exchanges of intellectual property and scientific-technical services.

## IMPROVEMENT OF THE EFFICIENCY OF APPLICATION OF THE RESULTS OF SCIENTIFIC AND TECHNOLOGICAL ACTIVITY

21. Introduction of the results of scientific and scientific-technical activity in the economy by means of managing intellectual property, a special aspect of incorporeal assets, acquires



special importance in the period of transition to a wider use of innovations in the economy,

22. The primary tasks for increasing efficiency of the use of the results of scientific and scientific-technical activity are the following:

- 1) Development of a system of registration of information about the results of scientific research and technological development obtained by the organizations of different organizational-legal forms and forms of property, provision of access to this information;
- 2) State stimulation of the development, legal protection and use of the results of scientific and scientific-technical activities;
- 3) Norms and laws fixing the state's right to the objects of intellectual property and other results of the scientific and scientific-technical activities created at the expense of the federal budget, first of all, the results connected with the interests of national defense and security;
- 4) Normative-legal adjustment of the mechanism for transfer to the organizations-developers, investors or other economic subjects, of the right of the state to the results of scientific and scientific-technical activities for their introduction in the economy;
- 5) Normative-legal support for introduction in the economy of the results of scientific and scientific-technical activity (including use of economic incentives), regulation of the system of registration, inventory, amortization, and taxation of the objects of intellectual property, regulation of the estimation of the costs of the results of scientific and scientific-technical activity;
- 6) Formation of the market of intellectual property;
- 7) Improvement of the patent and licensing system.

## PRESERVATION AND DEVELOPMENT OF THE PERSONNEL POTENTIAL OF THE SCIENTIFIC-TECHNICAL COMPLEX

23. An indispensable prerequisite for preservation and development of the personnel potential of the scientific-technical complex is formation of conditions for raising prestige of the labor of scientists and engineers.

24. The main tasks of preservation and development of the personnel potential of the scientific-technical complex are the following:

- 1) Creation of conditions, which can help attract and keep young people in the sphere of science and technologies;

- 2) Assurance of correlation by nomenclature and volume between the training level of the scientific personnel of highest qualifications and the requirements of the priorities in development of science, technologies and engineering, major innovative projects of state importance; improvement of the contract form of employment of scientific workers, specialists in the field of training of qualified scientific and engineering personnel of highest qualifications;
- 3) Improvement of the legal basis regulating the improvement of the status, social warranties and higher incomes of scientific workers;
- 4) Improvement of the quality of training of the scientific personnel of highest qualifications in the post-graduate studies and doctor's degree studies of the Higher School, institutes of state-status academies and state research centers;
- 5) Creation of conditions for a return to the country of the leading Russian scientists and specialists, who now work abroad, and their employment in the scientific-technical complex;
- 6) Formation of a system of continuous training of the personnel of highest qualifications in the field of innovation business, provision of conditions for their rotation in the scientific, scientific-technical and innovation spheres.

## INTEGRATION OF SCIENCE AND EDUCATION

25. Integration of science and education is a major factor for preservation and training of scientific personnel, and use of the scientific - experimental base in the educational process and in scientific research in the organizations of the Higher School.
26. The main tasks in the field of integration of science and education are the following:
  - 1) Establishment and support for the activities of the integrated scientific-educational structures, university inter-university complexes, scientific-industrial production centers (including innovation centers) for consolidation of efforts and resources, development of international cooperation and for international cooperation in the interests of training of qualified personnel in the scientific, technological and innovation spheres;
  - 2) Development of modern information-telecommunication and other science-intensive technologies, and their introduction in the scientific, scientific-technical activity and educational process;
  - 3) Joint usage of the scientific, experimental and instrument base of the academic, high school and branch sectors of science in the research and educational processes.

## DEVELOPMENT OF INTERNATIONAL SCIENTIFIC-TECHNICAL COOPERATION

27. The most important task in this field is development of favorable conditions and mechanisms for development of mutually beneficial and equal international cooperation in the scientific, technological and innovation spheres.

Implementation of the above task will require the following:

- 1) State support for the international cooperation with the purpose of implementation of major innovation projects of state importance, priorities in the development of science, technologies and engineering, extension of fundamental research;
- 2) Development of a normative-legal base stimulating the inflow of foreign investments in the domestic scientific, scientific-technical and innovation spheres, adjustment of the legislation of the Russian Federation in the field of science, technologies and engineering with the norms of the international law in this sphere;
- 3) Stimulation of establishment of international scientific labs, centers, scientific-educational and research-and-production integrated structures, including by means of promotion of the domestic scientific and scientific-technical products in the world market;
- 4) Improvement of the systems of export and customs control, of the order of transfer of the results of scientific and scientific-technical activity, including dualpurpose technologies;
- 5) Stimulation of interaction with the compatriots engaged in the scientific, scientific-technical and innovative activities abroad, active involvement of them in the implementation of the Russian segments of the international scientific programs and projects;
- 6) Use of international cooperation for training of personnel for the domestic scientific-technical complex;
- 7) Development of scientific and scientific-technical links with the states-members of the Commonwealth of Independent States, development of uniformed technological and information space within the framework of the Union of Belarus and Russia;
- 8) Commercialization of Russian technologies, extension of the practice of training and retraining of foreign specialists in the state higher educational establishments and leading scientific organizations, including with the use of the mechanism of amortization of the foreign debt of the Russian Federation.

## **IV. MAIN MEASURES OF STATE STIMULATION OF SCIENTIFIC, SCIENTIFIC-TECHNICAL AND INNOVATION ACTIVITY**

28. Main measures of state stimulation of scientific, scientific-technical and innovation activity

in the priority fields of development of science, technologies and engineering are the following:

1) In the field of finances:

- Financing from the federal budget of scientific research and experimental development at the level, which ensures implementation of the aims and tasks of the present Basic principles;
- Provision of the annual increase of the appropriation title of the federal budget «Fundamental research and stimulation of the scientific-technical progress» to the fundamental research and scientific support for the most important projects of state value;
- Efficient use of the means from the federal budget allocated for financing of the fundamental research and encouragement of the scientific- technical progress;
- Target allocation of the budgetary funds for implementation of scientific support for the most important projects of state value, concentration of the budgetary resources on the implementation of the priority tasks in the development of science and crucial technologies of federal importance;
- Search and efficient use of off-budget sources for financing research and development efforts conducted to the orders of the federal bodies of executive power and administrations of the subjects of the Russian Federation, and also for introduction in the economy of the results of scientific and scientific-technical activity, obtained due to financing from the budgets of all levels;
- Encouragement of the activity of charitable organizations and other economic entities, aimed at financing of fundamental research;
- Provision of state support for scientific towns from the budgets of all levels;
- Stimulation of development of small scientific-technical and innovative business, including support from the budgets of all levels for the infrastructure of the small business, stimulation of development of venture investments, leasing, crediting and risk insurance of the science-intensive projects, training of specialists in innovation management, and also provision of support on a competitive basis for scientific-technical and innovative projects;

2) In the field of preservation and training of the scientific personnel:

- Raising of the prestige and attractiveness of research professions;
- Changing of the system of remuneration for the work of the employees of the budgetary scientific organizations, including provision to the heads of the state research organizations of the right to raise without maximum limit the wages of the employees, who make considerable contribution to the development of Russian science, development and mastering of high technologies and engineering;
- Revision of the system of state incentives, including a considerable increase of the size of bonuses for out-standing achievements in the field of science and engineering;
- Increase of additional payments to the candidates and doctors of sciences employed in

the state scientific organizations and state higher educational establishments for their scientific degrees;

- Creation of conditions, which can help attract and keep young people in the sphere of science and technologies, including training of young specialists in the priority fields of development of science, technologies and engineering;
  - Increase up to three percent of the volume of the funds allocated from the federal budget for fundamental research and stimulation of the scientific-technical progress, for target support of scientific schools, and also research and development in the priority fields of development of science, technologies and engineering realized by young scientists and students;
  - Increase of the volume of housing construction for young scientists, including with the use of mortgage crediting;
  - Improvement of pensions for scientists of highest qualifications (candidates and doctors of sciences) by establishment of non-state pension funds;
  - Personal support for the scientists-veterans, who made an outstanding contribution to the development of the priority fields in science, new engineering and technologies;
- 3) In the field of improvement of the structure of the state sector of science and high technologies, strengthening of the material and technical base of science, improvement of the efficiency of the use of the state-owned property:
- Undertaking of an inventory of the scientific-technical complex, including scientific towns, and changing (if necessary) the organizational-legal form and the form of property of scientific organizations;
  - Improvement of the academic sector of science due to concentration of the resources on fundamental scientific problems, optimization of the system of management of the scientific and scientific-technical activity, specification of the number of the subordinated scientific organizations and number of the employees;
  - Granting to the state research centers of the Russian Federation of the functions of the leading organizations in the priority fields of development of technologies and engineering;
  - Realization of the redundant property and unfinished constructions, released during the restructuring of the scientific technical complex, and use of thus obtained funds for additional financing of measures aimed at strengthening of the material and technical base of the scientific organizations;
  - Usage in accordance with due order of some of the fixed assets of scientific organizations released during the restructuring of the scientific-technical complex, for support of small scientific and innovative business, establishment of scientific and technological parks, innovative-technological centers and other objects of innovation activity;
  - Improvement of the existing system of accreditation of the scientific organizations, transition to their attestation and certification with account of the international standards of
-

quality;

- Increase of the target development financing of the instrument base, content of unique stands and plants used for research and development in the priority fields of development of science, technologies and engineering, up to five percent of the volume of the funds allocated from the federal budget for fundamental research and stimulation of the scientific-technical progress;
  - Provision of budgetary compensations to the state scientific organizations and state higher educational establishments in the form of property tax rebates (the property is unique scientific equipment, stands, plants and installations) in accordance with the list approved by the Government of the Russian Federation;
  - Lowering of the customs duties on imported specialized scientific equipment, which has no domestic analogs (within the framework of the general strategy of lowering of customs on imported equipment);
  - Increase of the budgetary allocations for the civil-purpose research and experimental development in connection with the transfer to the federal budget of the profits of scientific organizations from leasing of the federal property;
  - Compensation from the budgets of all levels for the expenses of the state scientific organizations - state unitary enterprises for the rent of land (within the limits of the land lots recognized by the results of inventories as indispensable for scientific and scientific-technical activity);
- 4) In the field of efficient application of the results of scientific and scientific-technical activity and creation of conditions for their commercialization:
- Completion of the formation of a normative-legal base necessary for involvement in the economic circulation of the objects of intellectual property and other results of scientific and scientific-technical activity, ensuring of balance of interests of all the subjects of legal relations, involved in this process;
  - Assurance of an efficient realization by the state buyers of the scientific-technical products of the rights of the Russian Federation to the objects of intellectual property and other results of scientific and scientific-technical activity;
  - Coordination of the activities of the federal bodies of executive power concerning exposure and suppression of the violations of rights of the Russian Federation to the objects of intellectual property and other results of scientific and scientific-technical activity;
  - Determination of the procedure for assignation of rights of the Russian Federation to the objects of intellectual property and other results of scientific and scientific-technical activity obtained due to the funds from the federal budget, to Russian and other investors realizing these results in the territory of the Russian Federation due to the off-budget funds;
  - Regulation of the transfer to other countries of the rights of the Russian Federation to
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objects of intellectual property and other results of scientific and scientific-technical activity obtained due to the funds from the federal budget;

- Regulation of the procedure for registration, evaluation, inventory, amortization and taxation of objects of intellectual property and other results of scientific and scientific-technical activity;
- Improvement of the procedure for registration and usage of secret inventions, improvement of the mechanism for stimulation of mutual exchange of technologies in the military and civil spheres.

## **V. MAIN MECHANISMS AND STAGES OF IMPLEMENTATION OF THE PRESENT BASIC PRINCIPLES**

29. Main mechanisms for implementation of the present Basic principles are the following:

- 1) Development and implementation of the basic financial-economic and program documents of:
  - The federal budget and budgets of the subjects of the Russian Federation;
  - Federal purpose-oriented programs, first of all «Research and development in the priority fields of science and technology» for the period 2002-2006, «Integration of science and higher education in Russia In 2002-2006» , «National technological base» in the period 2002-2006;
  - State arms program for the period 2001-2010;
  - State defense order;
- 2) Development and implementation of major innovative projects of state importance;
- 3) Development, implementation and periodic adjustment of the documents, which determine the level of scientific and technological development of the country, including:
  - Priority directions in development of science, technologies and engineering in the Russian Federation and subjects of the Russian Federation;
  - List of crucial technologies of the Russian Federation, including the list of basic and crucial military technologies;
  - List of crucial technologies of the subjects of the Russian Federation.

30. Basic principles will be realized stage by stage.

At the first stage (2002-2006) it is necessary:

- 1) To specify the normative-legal base of scientific, scientific-technical and innovative activity, with special attention to the development of the system of measures of economic and other incentives of this activity, and also to protection of the rights of the Russian Federation to objects of intellectual property and other results of scientific and

scientific-technical activity;

- 2) To create mechanisms for development, implementation and adjustment of program documents in scientific and scientific-technical spheres;
- 3) To ensure introduction of a system of state order for scientific-technical products, to elaborate the procedure for its formation, implementation, financing, control and acceptance of the finished work, and also usage of the obtained results;
- 4) To orient innovations on structural modification and modernization of the available productions, first of all in the interests of introduction of resource-saving technologies and improvement of consumer properties of products;
- 5) To realize mechanisms of consolidated and multi-channel financing of purpose-oriented program of research and development, major innovative projects of state value with the use of the budgets of all levels, and also of off-budget sources;
- 6) To determine the procedure for formation and operation of the system of standardization, which will ensure unified standards of measures and certification in the scientific-technical sphere with account of the world standards;
- 7) To elaborate drafts of the concept of scientific-technological security of the Russian Federation and basic principles of the innovation policy of the Russian Federation for the period 2002-2006;
- 8) To elaborate mechanisms for raising economic interests in the use of the results of research and development for solving social-economic tasks, and the tasks of restructuring and technological modernization of productions with the purpose to improve competitiveness of the domestic products and services;
- 9) To define the order of conducting research and development, the results of which can undermine security of the Russian Federation, health of the citizens and ecological situation in the country;
- 10) To re-orient the existing purpose-oriented program of research and development to the priority directions in development of science, technologies and engineering with account of a range of major innovation projects of state value, to elaborate and approve federal purpose-oriented program «Scientific personnel» ;
- 11) To form an integrated system of the bodies of state administration for managing scientific, scientific-technical and innovative activity;
- 12) To create a system of comparative analysis of the level of development of domestic and foreign perspective research and development; to form a system of scientific-technical and military-technical information;
- 13) To optimize the composition of the scientific-technical complex, including establishment of integrated scientific, scientific-technical and scientific-educational structures;
- 14) To form a network of centers for a joint use of unique scientific equipment.

At the second stage (up to year 2010) it is necessary:

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- 1) To finish formation of the national innovation system and integrated structure of the scientific-technical complex capable to operate efficiently in the conditions of a market economy;
- 2) To ensure stable positions of the Russian Federation in the sphere of science and high technologies;
- 3) To work out mutually beneficial mechanisms of international integration and division of labor, including with the states-participants in the Commonwealth of Independent States.

After the year 2010 it will be necessary to ensure the further development of the scientific-technological complex as an integral part of social-economic, defense and cultural potentials of the country, to realize measures for improvement of the efficiency of its use in the interests of development of the internal and world markets of high-technology products.

# **PRIORITY DIRECTIONS IN DEVELOPMENT OF SCIENCE, TECHNOLOGIES AND ENGINEERING IN THE RUSSIAN FEDERATION**

Information-telecommunication technologies and electronics

Space and air technologies

New materials and chemical technologies

New transport technologies

Perspective arms, military and special engineering

Production technologies

Technologies of living systems

Ecology and rational nature management

Energy-saving technologies

## **LIST OF CRUCIAL TECHNOLOGIES OF THE RUSSIAN FEDERATION**

Air and space-rocket technologies employing new engineering solutions

Nuclear power safety

Traffic safety, transport control, intermodal transportation and logistics systems

Safety and quality control of agricultural raw materials and food products

Biological protection of plants and animals

Rapid construction and transformation of housing

High-performance computers

Gene-diagnostics and gene-therapy

Coal mining and processing

Information integration and system support for products' lifecycle (CALS-, CAD-CAM-, CAE-technologies)

Information-telecommunication systems

Artificial intelligence

Catalytic systems and technologies

Ceramic and glass materials

Computer simulation

Laser and electron-ion plasma technologies

Materials for micro- and nano-electronics

Membrane technologies

Metals and alloys with special properties

Mechanotronic technologies

Microsystem technologies

Monitoring of the environment

Nonconventional renewable ecologically clean sources of energy and new methods of its transformation and accumulation

Decontamination of technogenic environments

Handling of radioactive wastes and irradiated nuclear fuel

Optical-, radio- and acousto-electronics, optical and super-high frequency communication

Evaluation, complex exploration of deposits of raw materials and deep processing of strategically important raw materials

Processing and reproduction of wood resources

Exploration, extraction, refining and pipeline transportation of oil and gas

Polymers and composites

Precision and nano-metric technologies for processing, assembly and control

Nature protection technologies, processing and waste-handling of technogenic formations and wastes

Prediction of biological and mineral resources

Production and processing of agricultural raw materials

Generation of electric power and heat from organic fuel

Pattern recognition and image analysis

Synthesis of pharmaceuticals and food additives

Synthetic superhard materials

Personal life support and protection systems

Lowering of hazards and consequences of natural and technogenic catastrophes

Conservation and recovery of damaged lands, landscapes and biovariety

Technologies of bioengineering

Technologies of high-precision navigation and traffic control

Technologies of deep processing of domestic raw materials in light industry

Immune-correction technologies

Superconductivity- based technologies

Technologically compatible modules for metallurgical mini-productions

Transport and ship-building technologies for exploration of the space and resources of the World Ocean

Ecologically clean and high-speed ground transport

Element base of microelectronics, nano-electronics and quantum computers

Energy saving

Basic and crucial military and special technologies