MACHINERY
DESIGN LTD

Turning and milling machines for educational institutions

Junior educational machines

Vocational training complexes. Each set of machines is accompanied by training materials and software.

Junior Turn

Real CNC turning machine

ROTATIONAL PARTS MACHINING

- **Compact** – can be placed on work table.
- **Heavy and reliable** – for aluminum machining.
- **Safe** – machining of the part will not startif the work area is open.

Junior Mill

Real CNC milling machine

MACHINING OF FLAT PARTS AND COMPLEX CONTOURS

- **Compact** – can be placed on work table.
- **Heavy and reliable** – for aluminum machining.
- **Safe** – machining of the part will not startif the work area is open.

Transformer 3in1

THREE MACHINES IN ONE TRAINING COMPLEX

- **Separate workplace.**
- **Possibility to assemble** a lathe, milling and drilling machine.
- **Safe** – machining of the part will not startif

What is a Junior educational machines?

– Fully equipped student workplace. It has all the materials and tools necessary for training.

Each Junior educational machines set compris-es a machine tool, a computer with a monitor, a mouse and a keyboard, a machine control cabinet, a set of workpieces and cutting tools,and a set of training materials.

What is this series for?

– The first stage in the voca- tional guidance of school- children

The complexes provide a safe introduction of students to ma- chine tools, help students learn the basics of programming in- dustrial equipment, and developpractical skills in the mechan- ical engineering technologies subject.

Working on machines promotesengineering thinking.

What you can learn when workingwith machines?

– Students will develop practical pro- gramming skills in ISO codes, learn how to interpret drawings and be able to independently manufacture parts on machine tools.

Parts made of aluminum

Parts made of fine wood shavings

If teachers do not know technology?

– Our company provides special training for teachers after purchasing the equipment.

In addition, you can contact our specialists at any time with any question about the operation of training complexes. The expe- rience of introducing machine tools in schools has shown that a lack of basic knowledge in metalworking is not an obstacle tomastering the skills of working on the machines of the Junior educational machines training series.

Are your Junior educational machinesmade of plastic?

– Our machines are a mini-copy of realturning and milling machines

Metal structure and bed, powerful spindle, metal guides and ballscrews from the market leaders make the Junior educationalmachines especially reliable and ready for 15 years or more of operation.

10-18

years old age of children who learned to program the Junior educational machine in our practice

You can find more answers to popular questions on page 18.

JUNIO
RTURN

PC-controlled two-axis tabletop CNC turning machine conforms to industry standard in terms of design and operation.

Designed for turning workpieces.

The machine is programmed by a student froma personal computer.

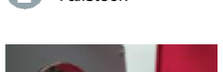
SPECIFICATIONS		Junior Turn
X- axis travel	mm	55
Z- axis travel	mm	140
Three-jaw chuck diameter	mm	80
Spindle speed range	rpm	300-2100
Spindle power	kW	0,55
Machined material		light alloys, plastic, wood
Maximum workpiece length	mm	160
Swing over slide	mm	35
Diameter of the internal jaws clamped in the chuck	mm	1-25
Diameter of the outside jaws clamped in the chuck	mm	22/45-45/67
Positioning accuracy	mm	0,05
Dimensions (LxWxH)	mm	730x410x470
Weight	kg	61

Turning machine operating principle

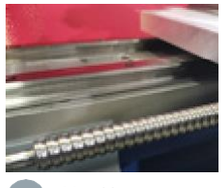
During turning, cutting occurs when the cutting tool (cutter) contacts the rotating workpiece. Spindle is rotated and at the end of it there is a jaw chuck with a workpiece clamped.

Turning machine structural members

1 Tailstock

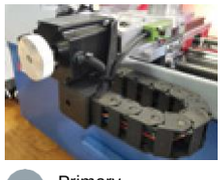


2 Headstock and jaw chuck



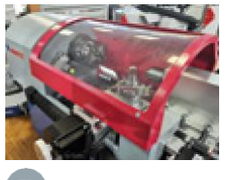
3 Metal base and steel frame

4 Cutter support



5 Primary motion drive

6 Feed motion drive

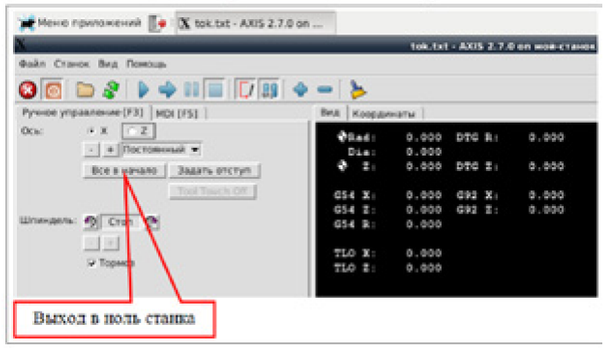


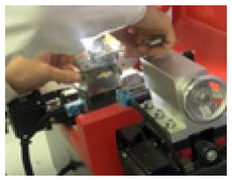
7 Guarding

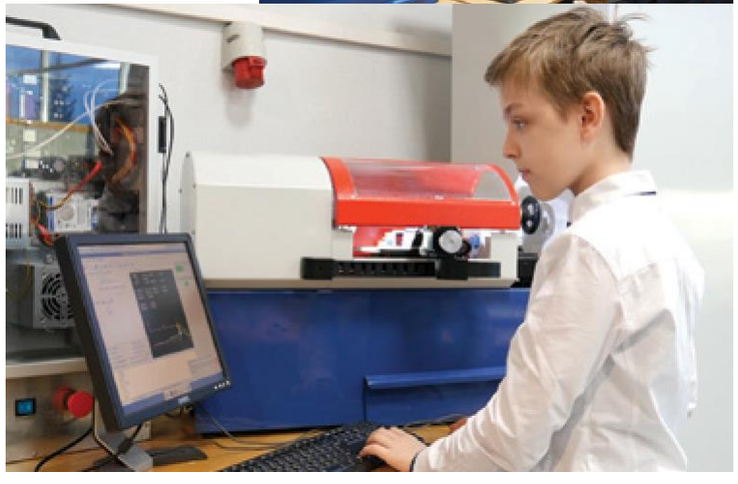
Junior Turn – training CNC turning machine – performs all standard operations used in real production

FOR EXAMPLE:

- setting up machine zero point;
- facing operation or longitudinal turning through linear interpolation;
- contouring;
- circular interpolation;







JUNIO RMILL

PC-controlled three-axis vertical CNC milling machine con- forms to industry standard in terms of design and operation.

Designed for milling and drilling of flat and formed surfaces of workpieces, parts, as well as for engraving.

The machine is programmed by a student from a personalcomputer.

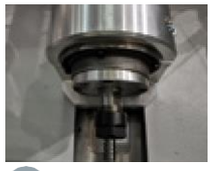
SPECIFICATIONS		Junior Mill
X- axis travel	mm	90
Y-axis travel	mm	90
Z- axis travel	mm	40
Spindle speed range	rpm	2 000–24 000
Spindle power	kW	0,8
Machined material		light alloys, plastic, wood
Max. workpiece size (LxWxH)	mm	80x70x40
Spindle position		vertical
Table length	mm	130
Table width	mm	90
Positioning accuracy	mm	0,05
Dimensions (LxWxH)	mm	385x440x415
Weight	kg	33

Milling machine structural members

5 Steel frame

1 Milling table

2 Drives of feed motion



3 Main motion drive power

4 Guarding

Milling machine operating principle

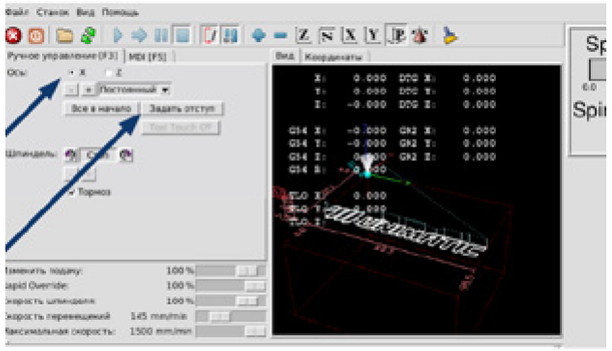
In milling, the workpiece is fixed on the machine table in aclamp fixture, and the cutting tool is mounted in a chuck placed in the spindle.

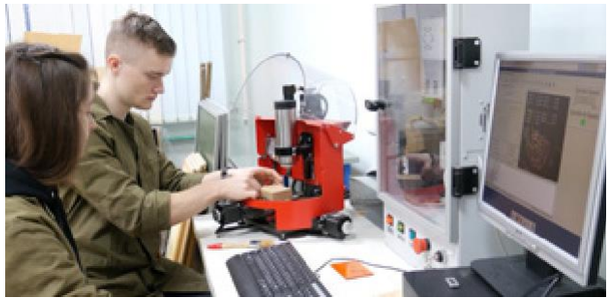
By rotating the cutter and moving the workpiece and thespindle along the X, Y, Z axes, chips are removed and the partshaped in accordance with therequirements of the drawing.

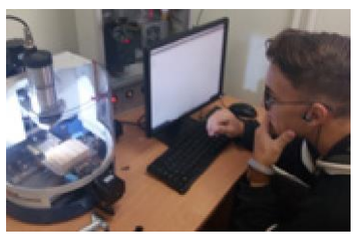
Junior Mill – training CNC turning machine – performs all standard operations used in real production

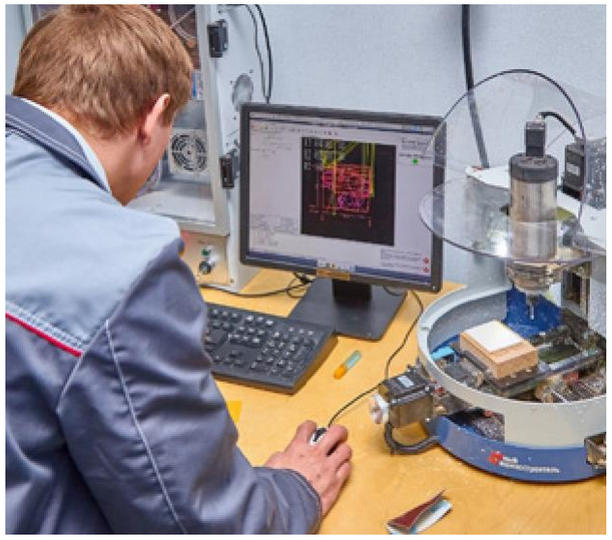
FOR EXAMPLE:

- setting up machine zero point;
- linear interpolation;
- circular interpolationby circle or arc;
- drilling cycles;
- milling of grooves and contours.









TRAINING VOCATIONAL COMPLEX

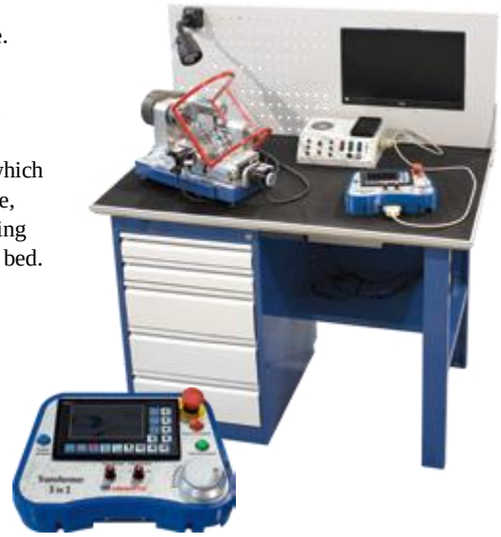
TRANSFORMER 3in1

Using the training complex, it is possible to:

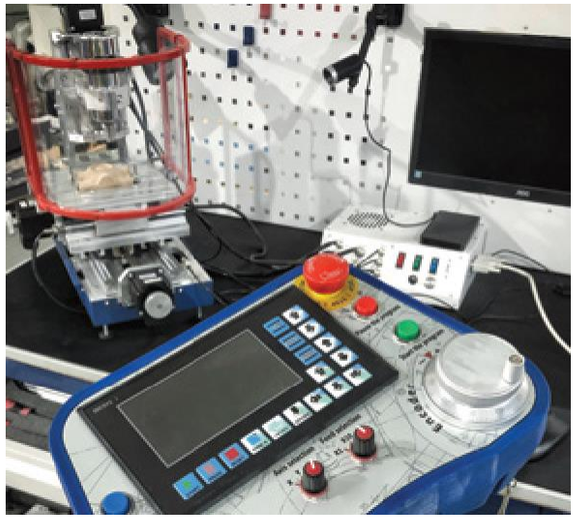
1. Teach the basics of designing and assemblingCNC machines.
2. Introduce students to the principles of CNC systems design.
3. Introduce students to the operating principlesof the machine electromechanical components.
4. Teach the basics of processing technologiesfor various materials.
5. Teach how to write control programs for CNC machines and master the skills of programming-industrial equipment.

The scope of supply includes:

- Machine bed.
- Remote control.
- Programming software.
- Personal computer.
- Learning and teaching recommendations.
- A set of components which allows to assemblea lathe, milling machine or drilling machine on the machine bed.



When you order the complex Transformer 3-in-1 you get a ready-to use training place, methodological support from our specialists and training of your teaching staff to work with the machine.



Working Principle of the Transformer

The training complex is one ready-to-use training place.

Using the same components, the student can assemble three different types of machines on one base:

- milling machine,
- turning machine,
- drilling machine.

SPECIFICATIONS

Milling machine

SPECIFICATIONS		VALUE
X- axis travel	mm	100
Y-axis travel	mm	140
Z- axis travel	mm	70
Spindle speed range	rpm	0–12 000
Work table size (LxW)	mm	190x180
Positioning accuracy	mm	0,05
Dimensions (LxWxH)	mm	520x300x480
Weight	kg	15

Turning machine

SPECIFICATIONS		VALUE
X- axis travel	mm	40
Z-axis travel	mm	100
Diameter of the self-centering3- or 4-jaws chuck	mm	80
Spindle speed range	rpm	300–4 000
Maximum part length	mm	130
Machining diameter	mm	25
Positioning accuracy	mm	0,05
Dimensions (LxWxH)	mm	560x370x305
Weight	kg	15

Drilling machine

SPECIFICATIONS		VALUE
Maximum spindle stroke	mm	80
Distance from the lower surface of the spindle to the work table	mm	100
Work table size (LxW)	mm	190x180
Spindle speed range	rpm	0–12 000
Positioning accuracy	mm	0,05
Dimensions (LxWxH)	mm	520x300x480
Weight	kg	15

FREQUENTLY ASKED QUESTIONS

– Is this equipment completely safe for children?

Yes, it is, which is confirmed by the followingcertificates:

• OST 12.2.009-99 Interstate Standard. Metal- working Machines. General Safety Requirements;

• Voluntary certificate of the Customs Union TR CU 004/2011: Safety of Low-voltage Equipment.

• Voluntary certificate of the Customs TR CU 010/2011: On the Safety of Machinery and Equip-ment;

• Voluntary certificate of the Customs Union TR CU 020/2011: Electromagnetic Compatibility of Techni- cal Equipment.

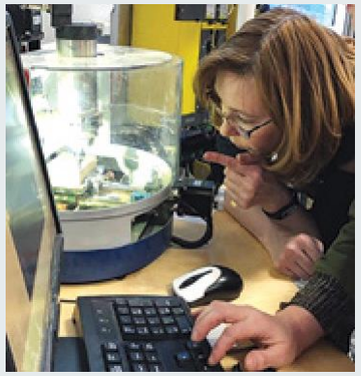
In addition, all machines are equipped with safety en-closures that stops work in the event of unauthorizedaccess and prevents emergencies.

– What are the main topics covered in the educational materials 10 Steps to a Profession?

Basics of milling and lathe equipment design, typesof work performed on machines, software interface,basics of numerical control (NC), control program, basics of drafting, circular interpolation.

– Are instructions for use includedwith the equipment?

Yes, of course. The equipment is supplied withassembly instructions and training materials.
Moreover, we can provide video tutorialson request.



– Do you provide warranty or post-warranty service?

We are interested in long and failure-free operation of our equipment, so we provide a 1-year warranty on the vocation-al training equipment, followed by post-warranty service.

We also have a service hotline, where we answer all questions quickly.

– What can schoolchildren do after machine training?

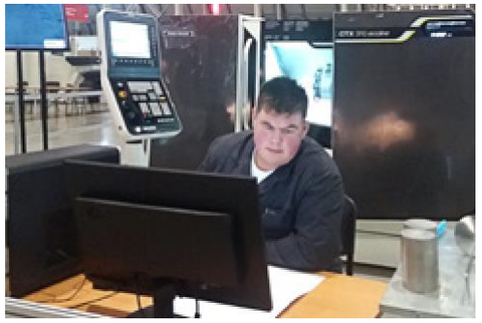
With our machines, students will already be able to process a part on the machine by themselves in the first lesson.

In the Learning Puzzles project, school-children practice the skill of writing control programs and review school curriculum. Thetask is that the children need to make severalpuzzle elements that are securely fastened together, and engrave a formula or teaching assignment on them.

Our collection already includes more than fifty versions of puzzles, and they can all be used for consolidation of difficult topics from a variety of area of knowledge (physics, chemistry, geometry, solid geometry, drafting, foreign languages, etc.).

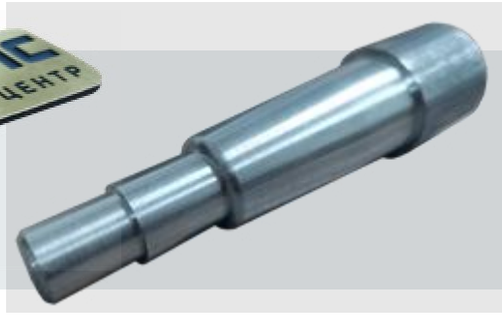
– What competitions can one participate with your equipment?

Junior Mill and Junior Turn machines are ideal equipment for basic training
for Worldskills in CNC turning and milling.



EXAMPLES OF FINISHED PRODUCTS

Teachers share photos of parts machined using our machines.Such products can be made using Junior Turn and Junior Mill machines.



LETTER OF APPRECIATIONS

(The reviews contain excerpts from letter of appreciations)

We thank you for your significant personal contribution to the development of education and upbringing of children and youth, for your cooperation in the training of skilled workers (em- ployees) and mid-level specialists for the enterprises and cooperation within the framework of the national project Education.

With the advent of the most modern, high-precision machines, we have organized leisure ca-reer guidance classes for people with disabilities, their professional development and retrain- ing, as well as preparation for professional skill champion-ships Abilimpiks.

The complex helps to prepare schoolchildren for various competitions, including the World Skills professional championship.

MACHINERY DESIGN LTD

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