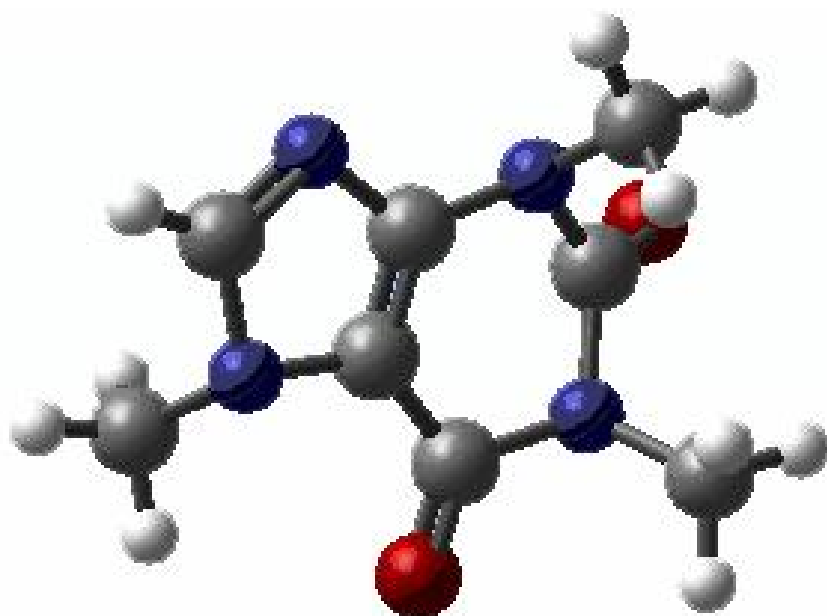


« () »

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2022

NANOENGINEER-1

:

Nanoengineer,

1.

Nanoengineer

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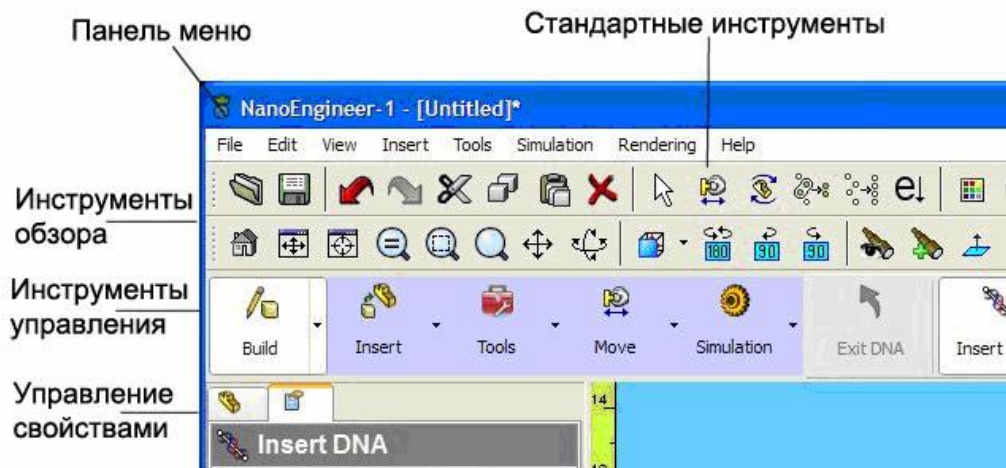
Nanoengineer

-

,

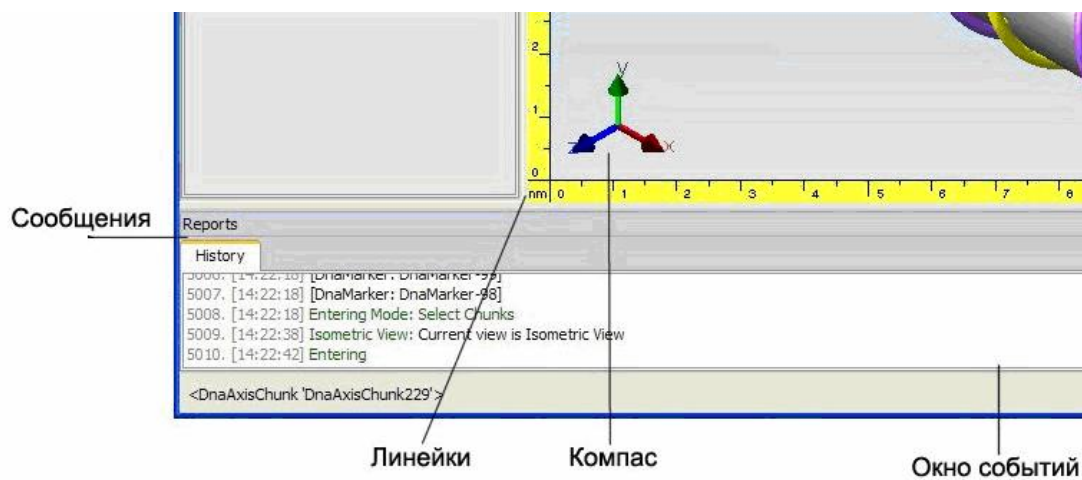
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.1.

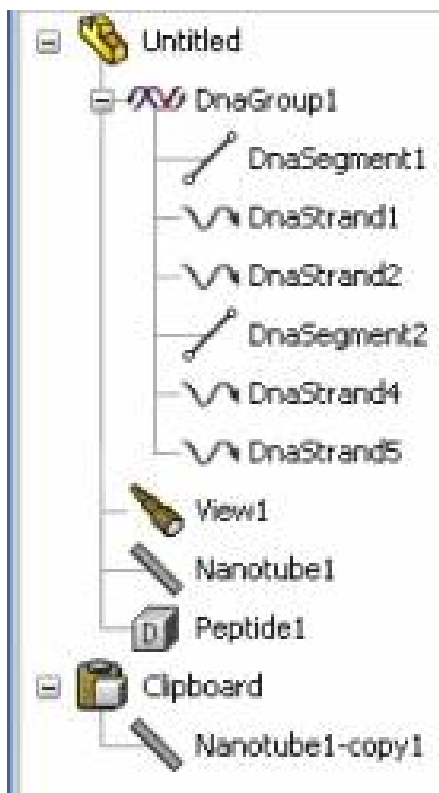
Nanoengineer ()



.2.



Nanoengineer ()

(Property Manager)











.3.

(File menu)

-  Open... (Ctrl+O)
- Insert...
- Close and begin new model
- Set Working Directory...
-  Save (Ctrl+S)
- Save As...
- Recent Files
- Export

- Import
- Exit

(Edit menu)

-  Undo (*Ctrl+Z*)
-  Redo (*Ctrl+Y*)
- Automatic Checkpointing
- Clear Undo Stack...
-  Cut (*Ctrl+X*)
-  Copy (*Ctrl+C*)
-  Paste (*Ctrl+V*)
-  Paste_From_Clipboard
-  Delete (*Del*)
-  Chunk Color...

(View Menu)

(Display Menu)

 **Default** (). Default

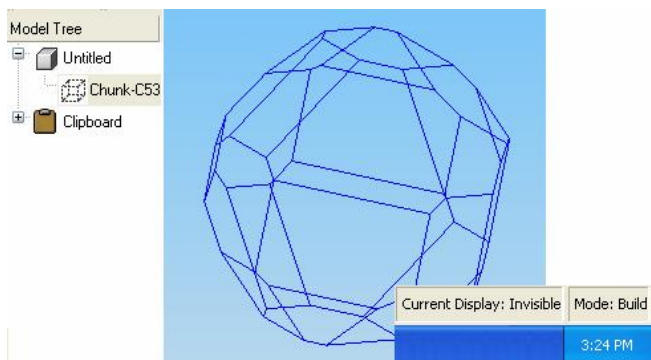
Edit => Preferences => Modes Tab.

() Default Display Mode,

 **Invisible** (). Invisible Display Menu

(.4).

(Model Display Status),



. 4.

(Model Tree)

, Model

Display Status

Invisible

,

.

(Model Tree)

(

-

-

)

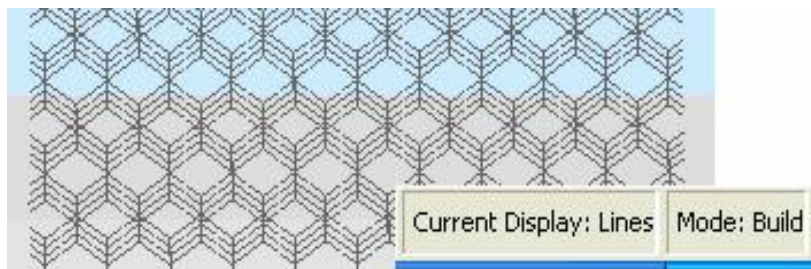
Properties

"Make Invisible Atoms Visible"

"OK";

(Menu Bar)

Display => Show Invisible Atoms.



.5.

Lines.

 **Lines ()**

Lines

Display Menu

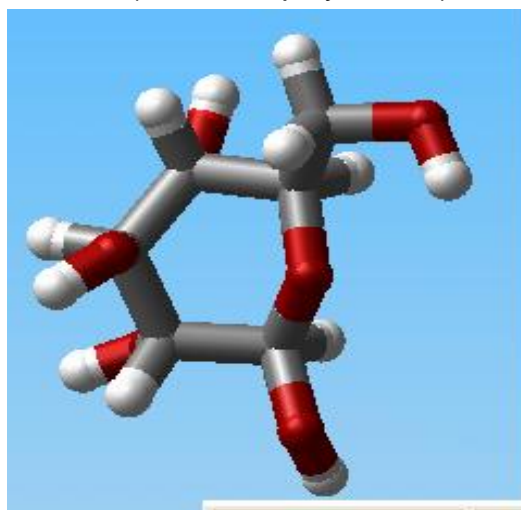
-

-

(.5).

(Model Display Status)

Lines.



.6.

Tubes.

Tubes ()
Display Menu

Tubes

-

-

(.6).

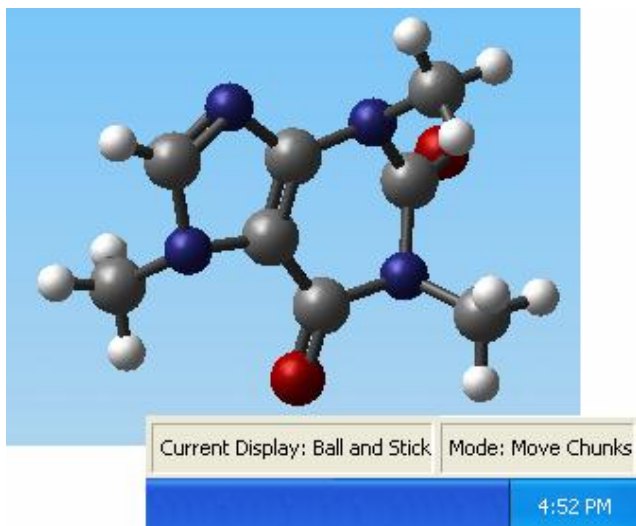
,

(Model Display

Status)

Tubes.

Tubes.



.7.

Ball and Stick.



Ball and Stick (

).

Ball and Stick

Display Menu

(.7).

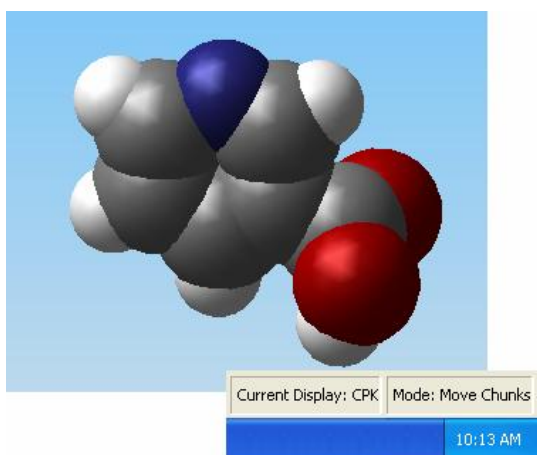
(Model Display

Ball and Stick.

(Menu Bar) *Edit => Preferences,*
Bonds Tab

Preferences

Atoms Tab



.8.

CPK



CPK.

(.8)

VdW

CPK

Display Menu

0,78

0,1 nN () c

CPK

(Model Display

Status)

CPK.

CPK.

Preferences
Tab

(Menu Bar) *Edit => Preferences,*

Atoms



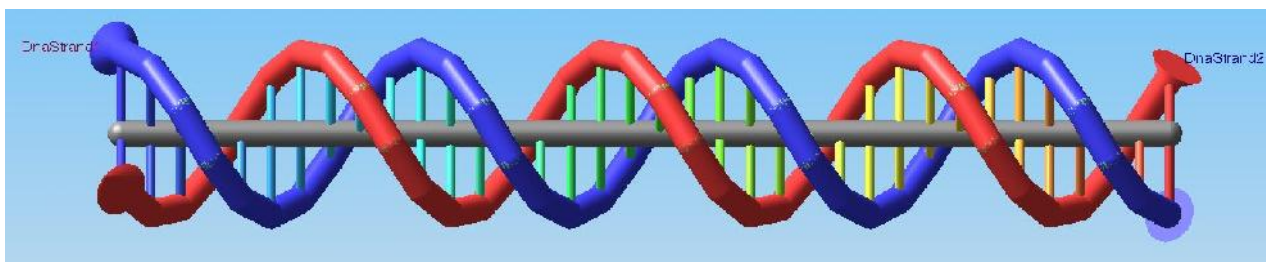
Cylinder (

).

Cylinder

(.9),

(User Preferences).



.9.

Cylinder

Perspective Projection () -

Orthographic Projection ()

 **QuteMol** -

 **POV-Ray (Persistence of Vision Raytracer) -**

() -

POV-Ray.

POV-Ray

.png, POV-Ray
(user's home directory) (~
POV-Ray

\Nanorex\POV-Ray\raytracescene.png).

Modify Menu ()




 **Set View Normal To**


()


(jig's axis).


 **Set View Parallel To**

 **Front View ()**

 **Back View ()**

 **Left View ()**

 **Right View ()**

 **Top View ()**


 *Bottom View* ()

 *Rotate View 180* (180)


 *Rotate View 90* (90)

 *Rotate View -90* (90)


 *Isometric* (, . .)


 *Zoom to Fit (Ctrl+F)* ().

, (Graphics Area).

 *Zoom to Selection* ()

Zoom About Screen Center ()

 *Zoom Tool (scrl up, scrl down OR "," / ".")* ().

 *Recenter (Ctrl+R)* ().

(Grapics Area),

 *Rotate Tool* (+) ()

 *Pan Tool* (Shift+) ()

 *Home* ("Home").

Home.


 *Save Named View* ().

Named View

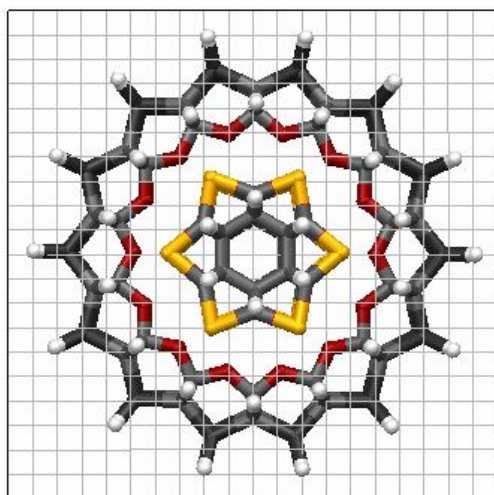
(Model Tree).

Insert Menu ()

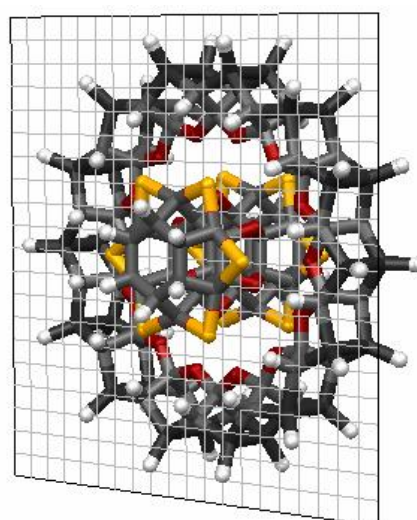
Reference Geometry ()

 *Plane* ()

 *Grid Plane* () 2- 3-
(.10).



.10.



(Grid Plane).

Jigs > Grid Plane.

Build,

3

(.11).

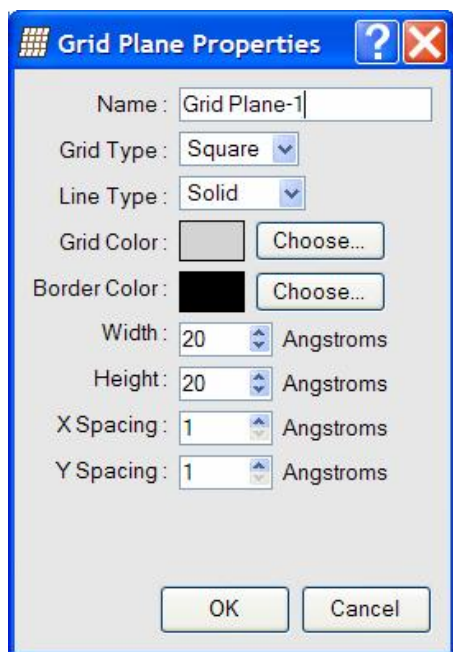
OK

(.12).

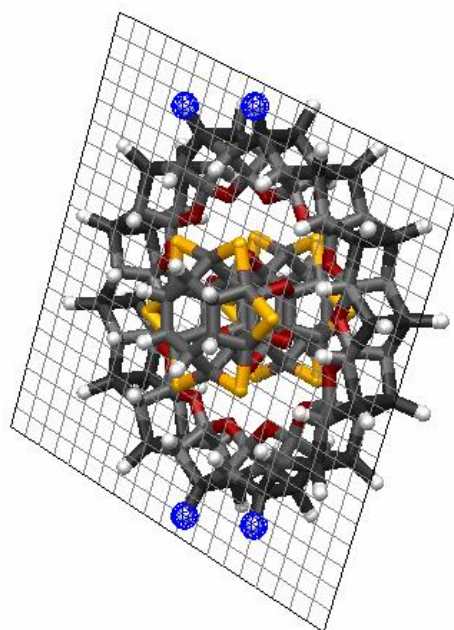
View > Normal To.

Move Chunks

Shift



.11.



.12.

Move Chunks,

Ctrl

Properties...



Atom Set

(

).

Build ,

Jigs => Atom Set Menu Bar (

). Atom Set

Atom Set-

(Model Tree).

"select this jig's x atoms"

x-

Tools Menu (


)



Adjust Selection

 *Adjust All*

Adjust Selection

 *Minimize Energy* (

).

(x, y, z),

Minimize Energy

2.

NanoEngineer-1.

NanoEngineer-1.

3.

NanoEngineer-1?

NanoEngineer-1?

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4.

1.

, 2006. – 592 .

2.

2005. – 416 .


3.

, 2006. – 424 .

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1.

Build Structures Menu () *Atoms ()***Build Atoms ("Build Mode")**

/

(C₂H₆):

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2.

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(bondpoints,

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3.

H MMKit (

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H

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(Hydrogen).

4.

*(bondpoints).***The Molecular Modeling Kit (MMKit) (**

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Molecular Modeling Kit (MMKit),

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. *MMKit***Elemental atoms**

(

), PAM3 Pseudo atoms PAM5 Pseudo atoms.

-

Atom Chooser.*MMKit***(3D thumbnail view)**

-

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(

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Periodic Table Elements (**)(.13)**

19

(15

4

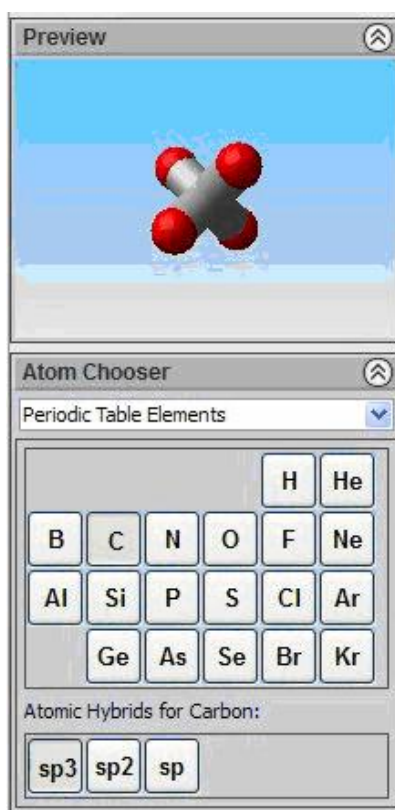
).

,

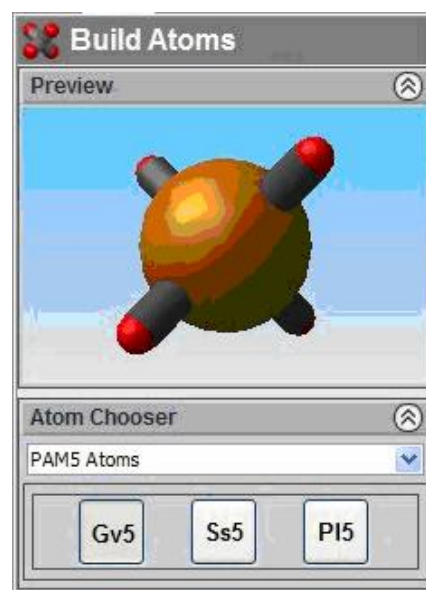
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"S"



.13. Periodic Table Elements



. 14. PAM5

PAM5 Pseudo atoms (. 14)

PAM5.

PAM5 -

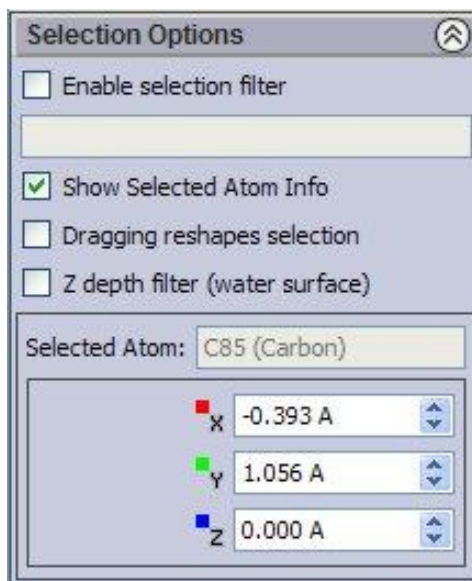
B-DNA

. PAM5

5

PAM3 Pseudo atoms.

PAM3 (PAM5).



.15.

Atom Selection Filter (
) (.16)

(Atom Selection Filter List).

Shift
MMKit.

Ctrl,
MMKit.

Show Selected Atom's Info (

(.16)

Transmute Button (

)

(Command Toolbar). Transmute

button

MMKit.

'Force to Keep Bonds' Checkbox (

)

Autobond Checkbox (

)

(Autobonding).

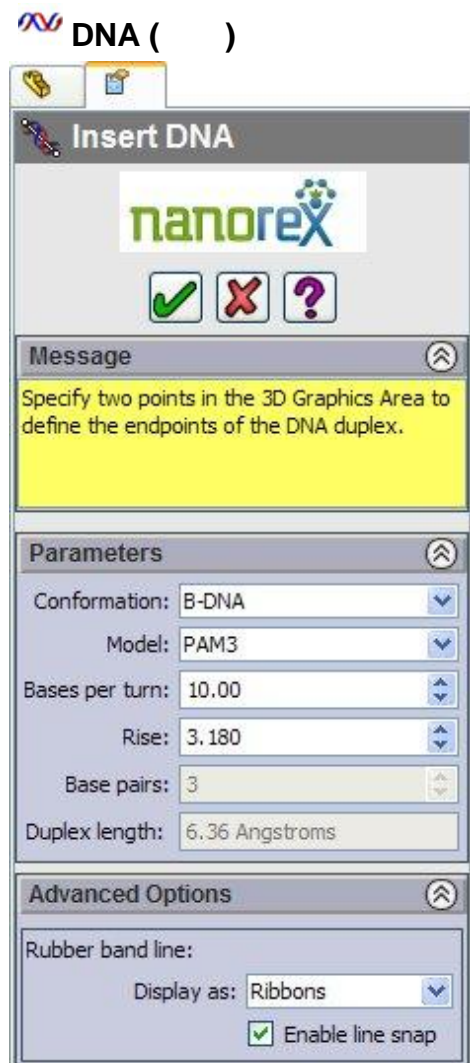
Highlighting Checkbox (

)

Water Checkbox

(Water Surface).

Shift+Control



.16.

Build DNA

- **Conformation** (): B-DNA.
- **Model:** PAM3, PAM3+5 PAM5
- **Bases per turn:**

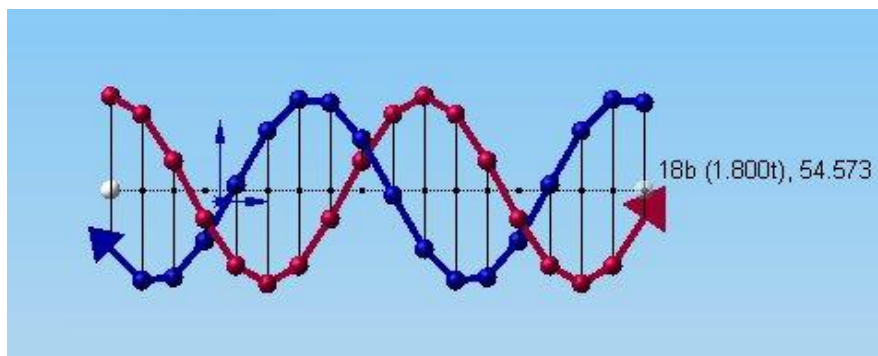
- **Rise:**

(Ladder).

(Ribbons)

Build Atoms:

A - , B - , C - , F - , H - , L - , N - , O -
 , P - , Q - , S - , 1 - *sp*
 (, ,), 2 - *sp*² (-
 , ,), 3 - *sp*³ (-
 , ,), 4 -
 (, ,).





.17.

.17

(Ribbons)

PAM3.

 Nanotube ()



☒ ☐ ☐ ☐ ☐

Nanotube Parameters

Type : Carbon

Length (Å) :

Chirality (n) :

Chirality (m) :

Bond Length (Å) :

Endings : None

Nanotube Distortions

Z-distortion (Å) :

XY-distortion (Å) :

Twist :

Bend :

Multi-Walled Nanotubes

Number of Nanotubes :

Spacing (Å) :

(Nanotube)
(m, n)



.18.

(Insert Nanotube)



Nanotube Parameters (

+ Type () -

), Boron Nitride ().

+ *Length* () - (-) .
 + *Chirality* (n) (m) () - "n" "m" .
 + *Bond Length* () - () -
 + *Endings* () - , : None (),

Hydrogen (), Nitrogen ().

Nanotube Distortions (),

+ *Z-distortion* - Z.
 + *XY-distortion* - XY- .
 + *Twist* () - .
 + *Bend* () - .

Multi-Walled Nanotubes ().

+ *Number of Nanotubes* - .
 + *Spacing* - () .

Graphene

sp2-

Crystal

Build Crystal Mode () - ().

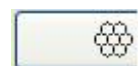
Build Crystal Mode:



Lattice Type ()

"Lattice Type"

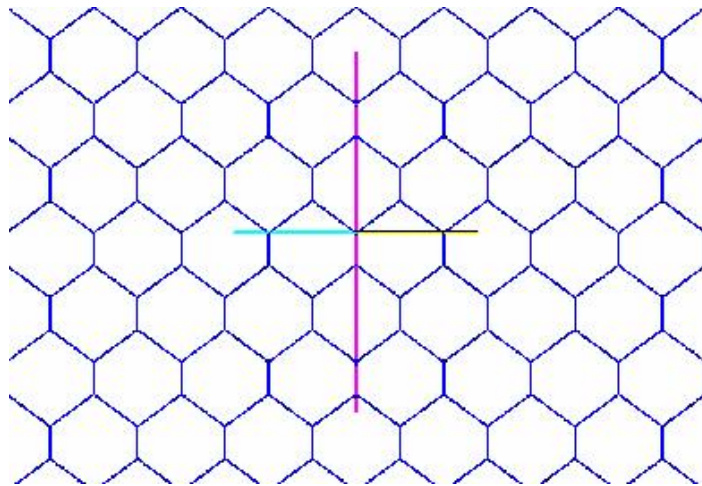
:



Surface 110

(110). -

.19.



.19.

(110)



Surface 100

(100).



Surface 111

(111).



Rotation ()

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Add Layer

2

▼

Layers ()

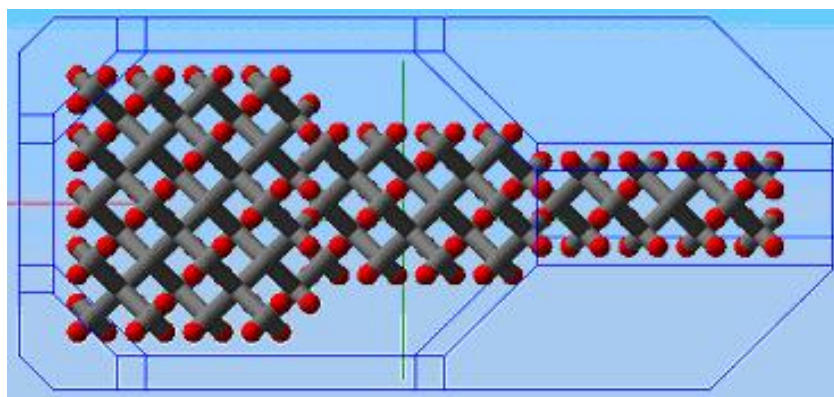
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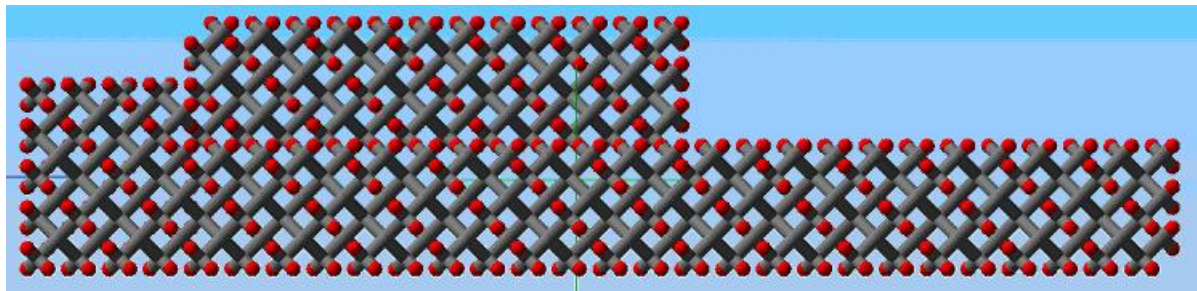
Thickness:

of cells:

Thickness ()

.
 - "Thickness"
 .
 - "# of cells"

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NanoEngineer-1.

"Flash movie player",

NanoEngineer-1.

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NanoEngineer-1?

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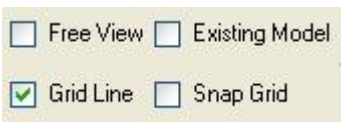
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- "Free View" ()

, -

- "Existing Model"

- "Grid Line"

/

- "Snap Grid"



Display Format (

- "Tubes"

- "Spheres"



- "Back Up"



- "Start Over"



- "Done"
(Graphics Area)



- "Cancel"

Build Mode



(Esc)



(Build Tools)



(Hydrogenate)(Ctrl+Shift+H)



(Dehydrogenate)

P

(Passivate) (Ctrl+P)



(Cut Bonds)



(Separate).

(Separate)



(Combine)



(Align To Common Axis)

Center On Common Axis ()



(Extrude)



(Fuse Chunks)



(Mirror)



(Invert)



(Stretch)

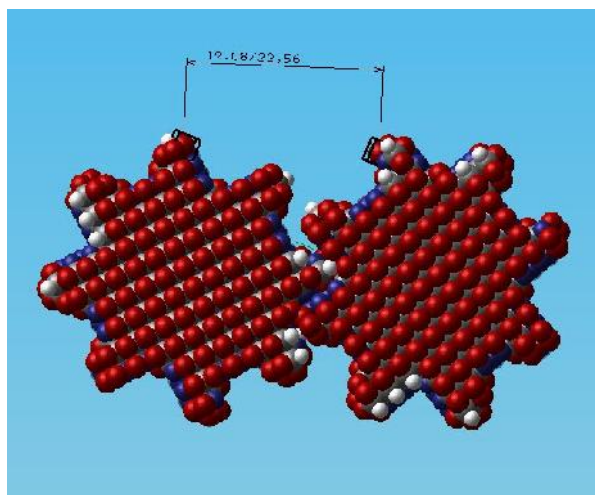
Dimensions Menu ()



Measure Distance ()

).

Measure Distance (. .22).




. 22.

VdW () -

(
).

Plot

Tool.

 **Measure Angle ()**


 **Measure Dihedral ()**

Selection Menu ()


 **Select All () (Ctrl+A)**

 **Select None () (Ctrl+N)**

 **Select Invert () (Ctrl+Shift+I)**

 **Select Connected () (Ctrl+Shift+C)**

. *Select Connected*

 **Select Doubly ()**



Expand Selection () (Ctrl+D)

,
(). , ().



Contract Selection () (Ctrl+Shift+D)

(),
(). ,

Simulation Menu ()



Run Dynamics ()

Run Dynamics,



Play Movie ()



.23. -



Rotary Motor ()

,
Rotary Motor .

Properties. ,

Name () -

$$(10^{-18}).$$




- *Initial speed* () - ,
- *Final speed* () -
- *Enable in minimize* -
- *Motor length, Motor radius* () -
- *Spoke radius* () -
- *Color* () -

 Linear Motor ()

Linear Motor
Linear Motor.

Properties.

- *Name* () - ,
- *Force* () -
(10^{-9}).
- *Stiffness* () - , -
().
- *Motor length, Motor width* () -
- *Spoke radius* () - ,
- *Color* () -

	(Stiffness)	(Force):	
Stiffness = 0,	,		-
Stiffness	,		-
,	,	:	-
(x) = - (F) /	(k).	,	-
" "	" "		
" "	" "		
" "	" "		
:			
Force = 1, Stiffness = 0:			;
Force = 1, Stiffness = 0.01:			
2	(Stiffness = Force		-
0,02);			
Force = 0, Stiffness = 1:			-
 Anchor ()			-
()	Anchor.		-
 Thermostat ()			-
			-
			-
	Thermostat.		-
 Thermometer ()			-
			-
What's This Help Button (?)			
What's This,			
,	,		-

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NanoEngineer-1.

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NanoEngineer-1.

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NanoEngineer-1?

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Simulation?

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2005. – 416 .

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NanoTest - 600

CPS DC24000.

NANOTEST 600

Nanotest Platform 3

Micromaterials (. 1).

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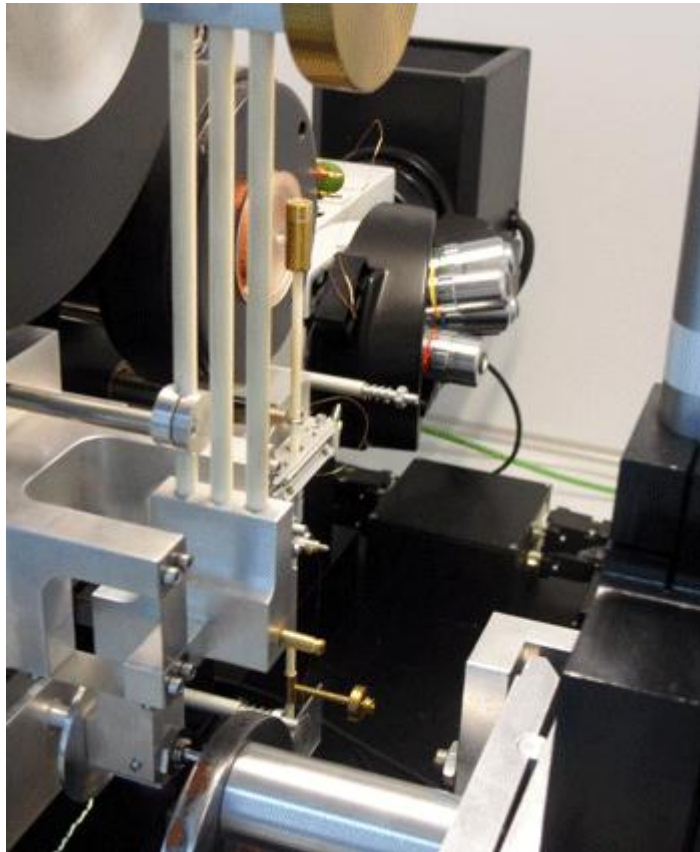
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(Oliver and

Pharr).



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100-500 .

2. (Vickers) - , -

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3. (Spherical) - 0.5 .

4. " " (Corner cube) -

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Nanotest -

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MAGELLAN Q8

Qantron Magellan (Magellan Q8) - -

Bruker (. 2).

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Perkin Optoelectronic ()

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 - 10.5 .
 - 110-850 .
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 - > 165
 36.
 - < 165
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. 2. Magellan Q8

CPS Disk Centrifuge DC24000

CPS

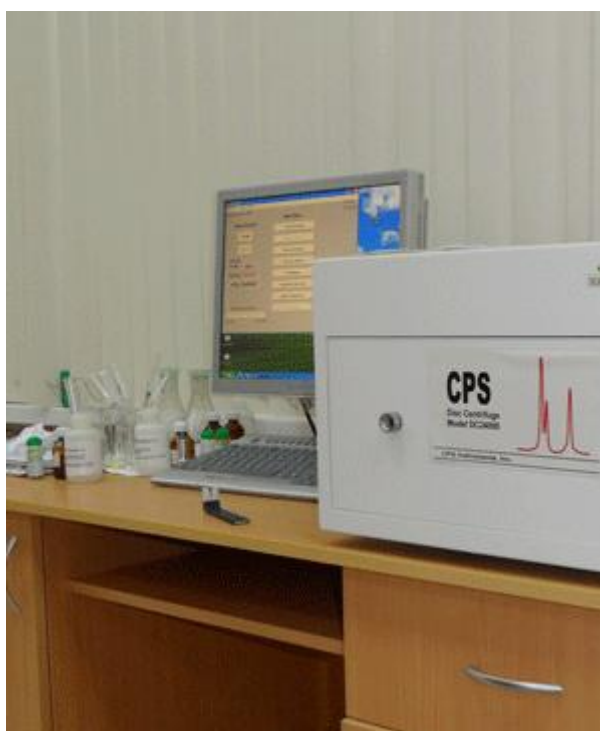
(. 3).

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- c. 24000 / ;
- 600 / ;
- 40 ;
- 10 ;
- 5%;
- +/-0.5%;
- +/-0.5%;
- ;
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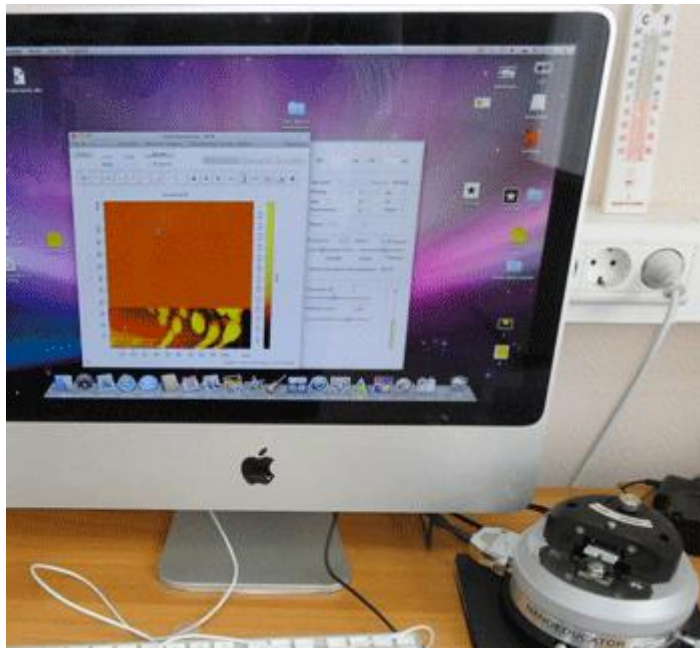


. 3. CPS Disk Centrifuge DC24000

CPS

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CPS (



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NANOEDUCATOR

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Nanotest Platform 3

Micromaterials?

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Qantron Magellan?

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CPS Disk Centrifuge

DC24000?

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Nanoeducator?

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PHYWE?

5.

1. . . , , . – ∴ ,
2005. – 416 .

2. . . - -
. – ∴ , 2006. – 424 .

3. . . , . . . – ∴ . . , 1988. – 496 .

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-20-75.

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3000 1200° $1 \cdot 10^{-5} \div 5 \cdot 10^{-6}$.

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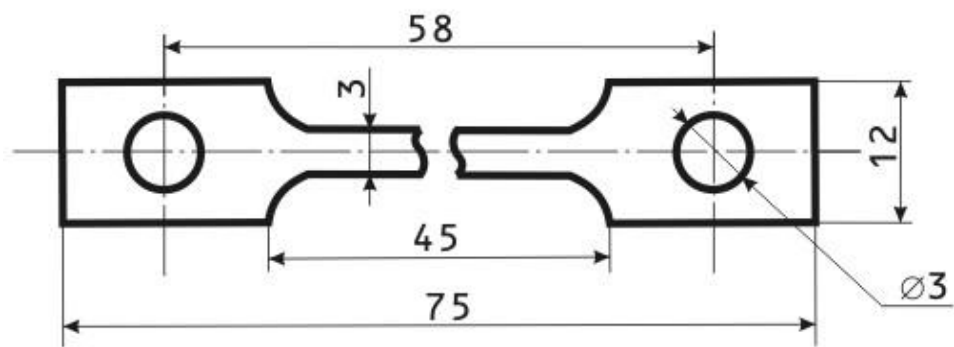
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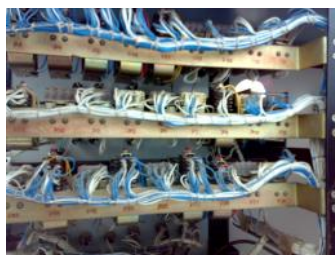
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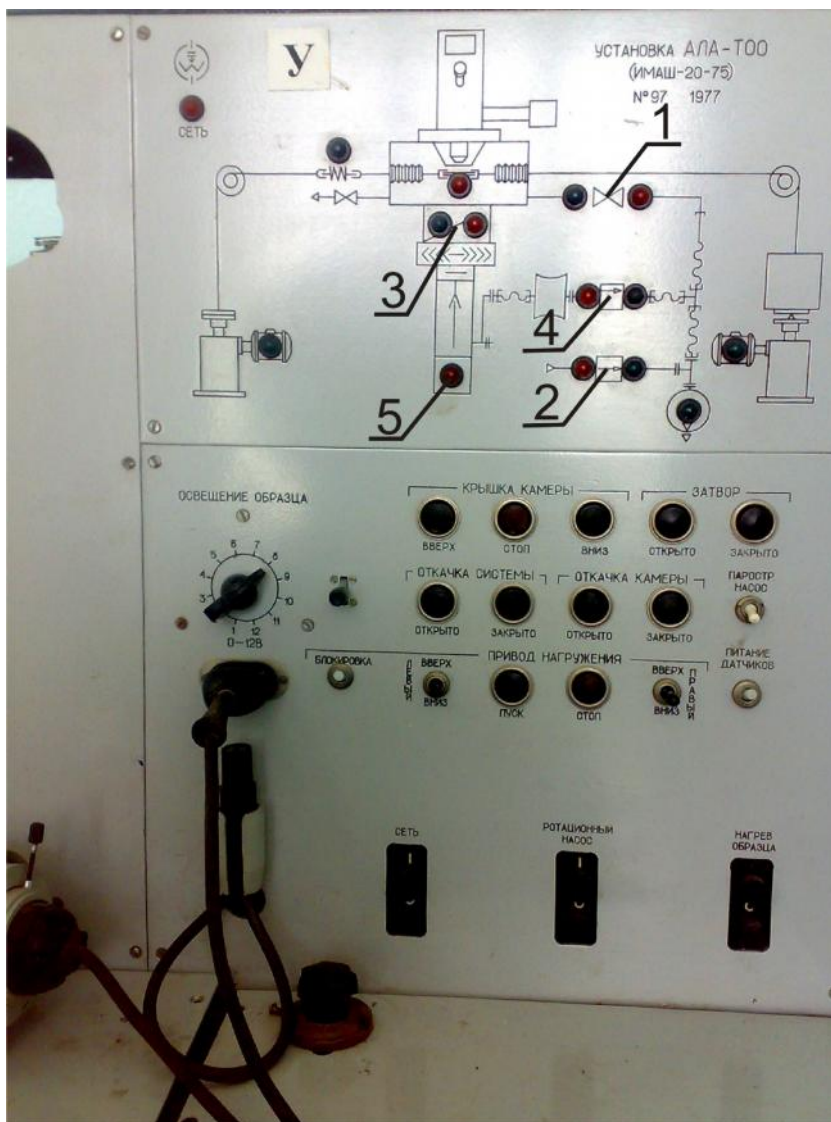
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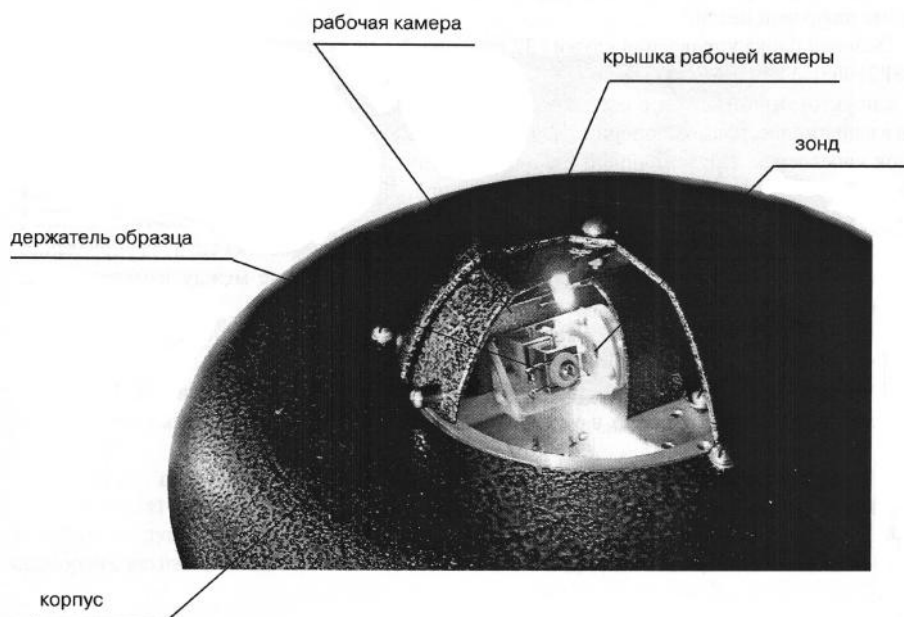
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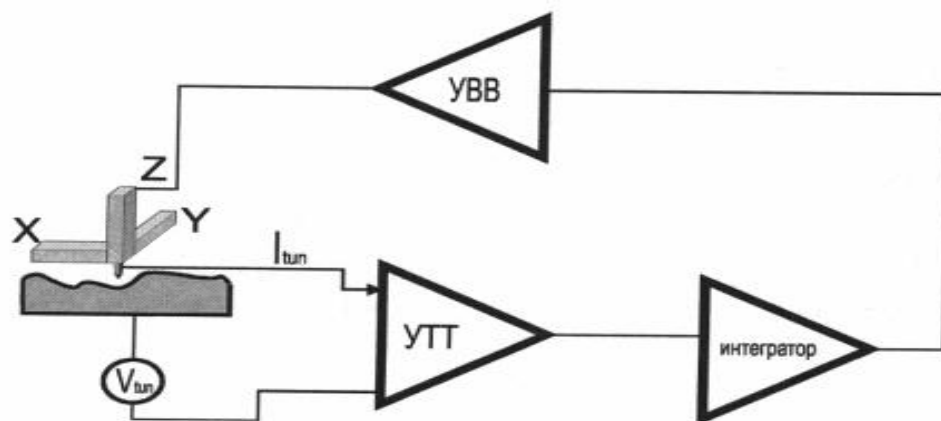
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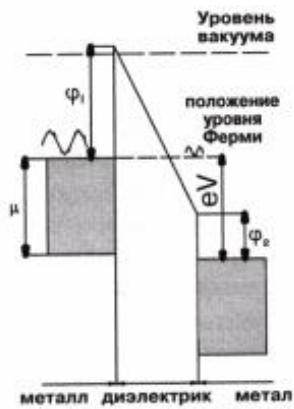
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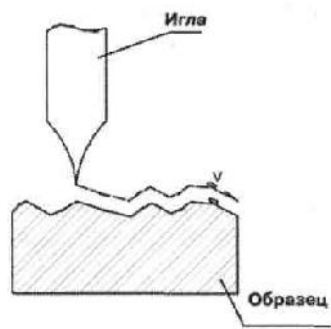


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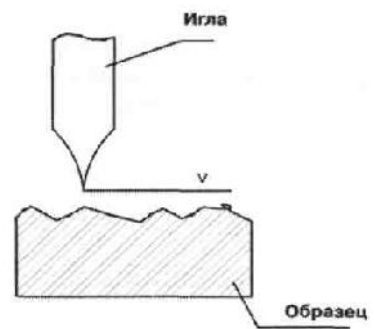
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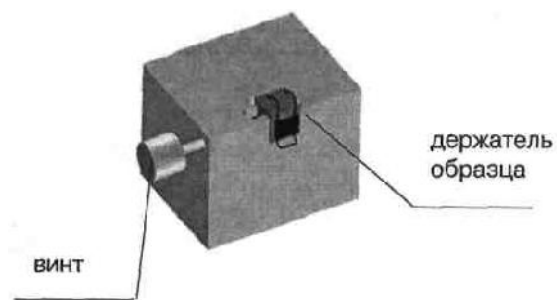
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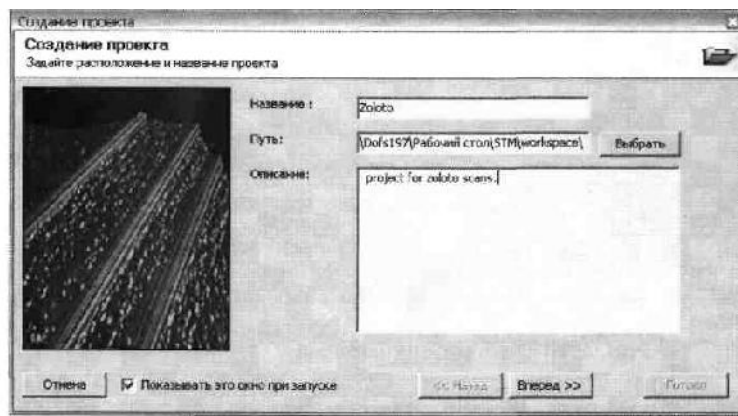
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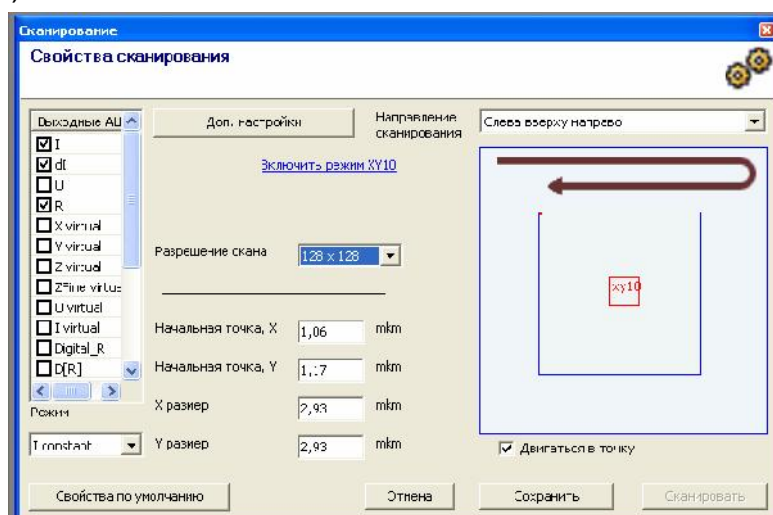
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Дополнительные настройки сканирования

Кол-во измерений в точке, раз

Скорость сканирования

☐ Синхронизация в промежуточных точках

Скорость перемещения между точками

Рельеф : [Грубый](#) [Нормальный](#) [Гладкий](#)

☐ Автоподстройка времени ожидания

Время ожидания в точке x100 мкс

☐ Периодическое сканирование

Параметры

Кол-во сканирований

Задержка между сканами, сек

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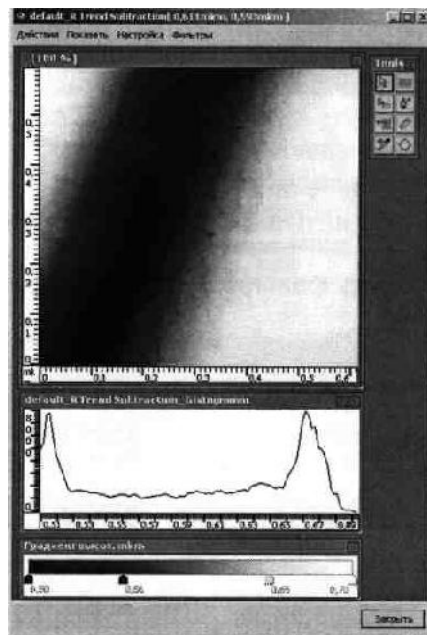
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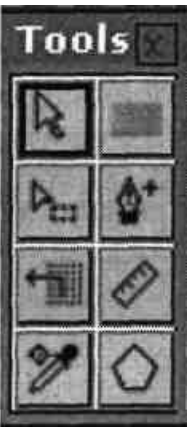
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