Mendeleyev University of Chemical Technology of Russia (MUCTR)

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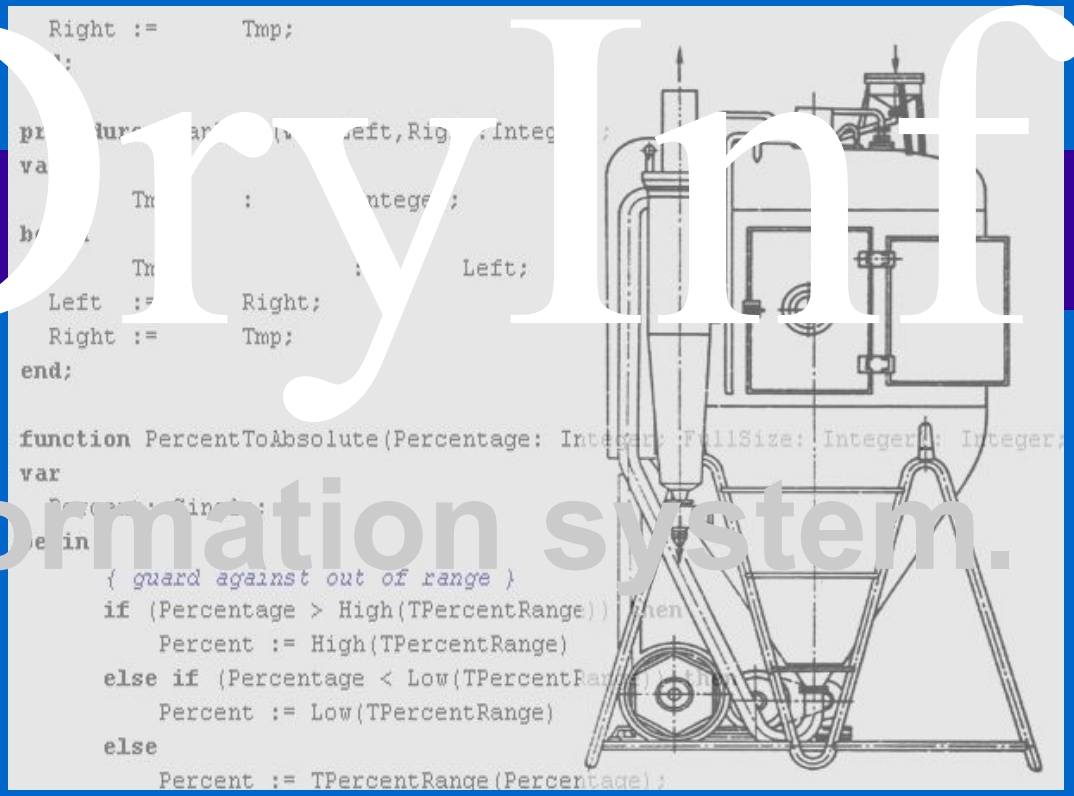
DryInf

Information system.



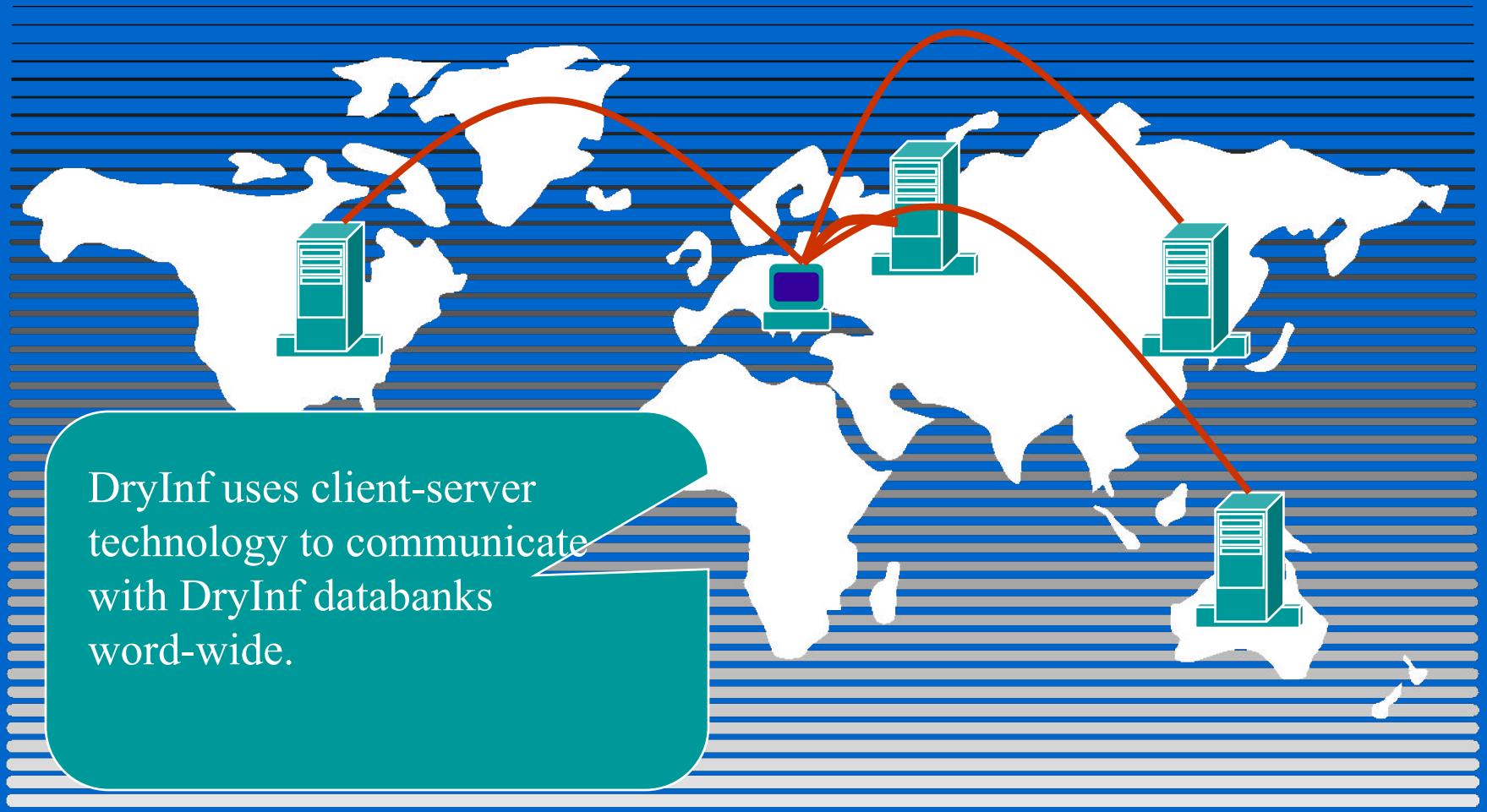
Aims…

- **Summarize and accumulate human experience**
- **Intelligent aid while design**
- **Knowledge and experience sharing**

“DryInf“ benefits…

- **Table of estimations**
  - 5 scale type of grades making transfer of knowledge from human to machine easy.
  - Upgrading databases allows knowledge to be accumulated and shared.
- **Information word-wide**
  - No more problem to download or upgrade database.
  - Get connected to one or more databases at one session!
  - Internet, local network or hard drive these all available.

Information world-wide



“DryInf” benefits...

- **Modular technology**
  - All functions of this system are “plug-in’s”, all of them user can enable or disable.
  - Application Program Interface (DryInf API) provides simple and fast mechanism to integrate other applications into DryInf.

- **“Wizard“ style of user interface**
  - User should not think likely “How to work with it?”, he just start to work immediately.
  - Highly understandable interface is very comfortable for beginners.

“DryInf” structure

DryInf works with databases. They could be local or remote. Each database includes one or more databank

Each databank consist of:

- **Apparatuses table**
- **Questionnaire table**
- **Sets of possible answers table**
- **Estimations table**

“DryInf” structure

Simply, the databank structure could be presented as follows:

Device name	Question 1		Question 2	
	Answer 1	Answer 2	Answer 1	Answer 2
Device 1	5	5	3	0
Device 2	4	3	3	5
...	...	...	...	...

There questions are in “questionnaire” table of databank, answers are in “sets of possible answers” table, devices are in apparatuses table and, finally, numbers are an expert estimations for each apparatus and stored in “estimations” table.

“DryInf” structure

Selection of estimations for each device as follows (rules):

For Device1:
If for Question1 **answer** Answer1 **then**
estimation = previous estimation + new estimation

If for Question2 **answer** Answer2 **then**
estimation = 0 and exit for Device1.

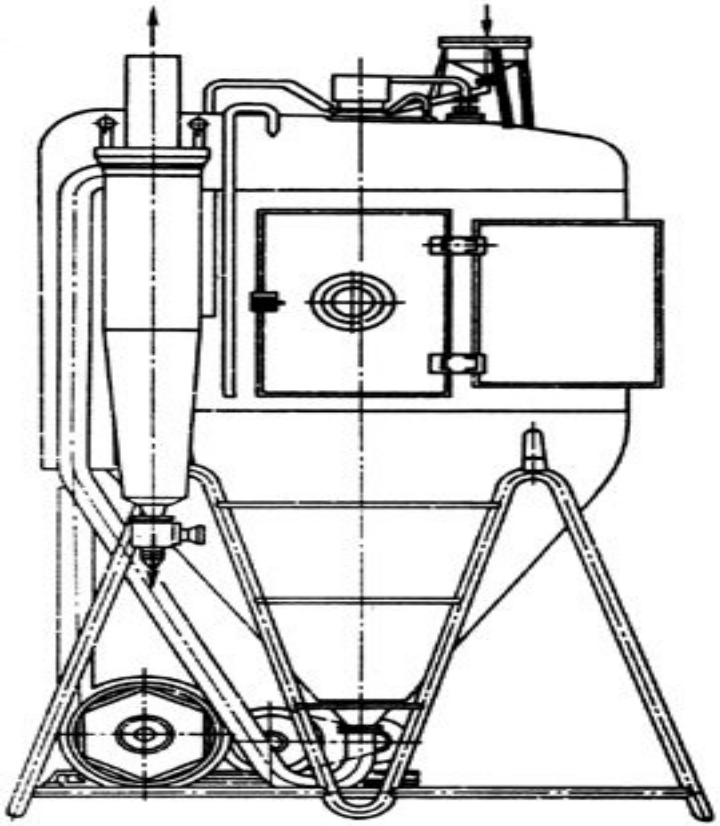
{Comments: if system get zero as new estimation it results to all previous estimation sum zeroed and device become marked “NOT USED”. If not, get continue to the end of questionnaire and get final sum as result of calculation}

Example of databank structure

Type of dryer	Dryer capacity			Drying time					
	low	middle	high	<3 sec	3-30 sec	0.5-2 min	2-20 min	10-60 min	> 1 hour
Shelf dryer	5	3	0	0	0	0	3	5	5
Spray dryer-granulator	5	3	0	0	0	0	3	5	0
……									
Cilinder dryer	3	5	5	0	5	3	0	0	0
Rotary vacuum dryer	5	5	0	0	0	0	3	5	5
Fluidized bed dryer	5	5	5	0	0	3	5	5	0
Batch fluidized bed dryer	5	5	0	0	0	0	3	5	5
Impinging stream dryer	5	5	3	5	3	0	0	0	0

About “32 dryers” databank

- This databank is shipped with DryInf as local database.
- It was developed with the aim to facilitate selection of the most appropriate dryer for a given material



Types of dryers used in databank "32 dryers"

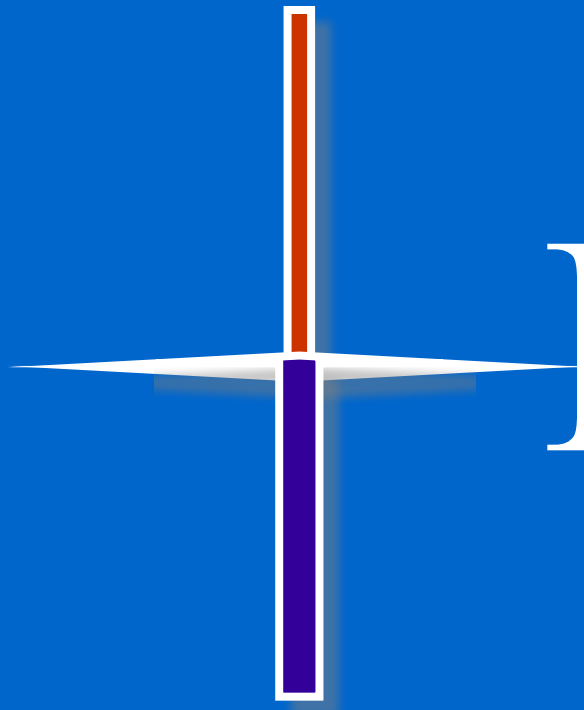
	Type of dryer		Type of dryer
1	Shelf dryer	17	Belt dryer
2	Vacuum shelf dryer	18	Multi-belt dryer
3	Spray dryer with disc atomizer	19	Combined cylinder-belt dryer
4	Spray dryer with nozzle atomizer	20	Vibrated bed dryer
5	Pulsed combustion spray dryer	21	Fluidized bed dryer
6	Spray dryer-granulator	22	Fluidized bed dryer with inert particles
7	Cylinder dryer	23	Batch fluidized bed dryer
8	Vacuum cylinder dryer	24	Spouted bed dryer
9	Rotary direct dryer	25	Vortex dryer
10	Rotary indirect dryer	26	Vortex dryer with disintegrator
11	Rotary dryer-granulator	27	Pneumatic dryer
12	Rotary vacuum dryer	28	Pneumatic dryer with disintegrator
13	Drum dryer with heated rotor	29	Cyclone dryer
14	Vacuum drum dryer with heated rotor	30	Spiral dryer
15	Tumbler dryer	31	Impingement dryer
16	Screw conveyor dryer	32	Impinging stream dryer

DIDE

DIDE is DryInf data editor.

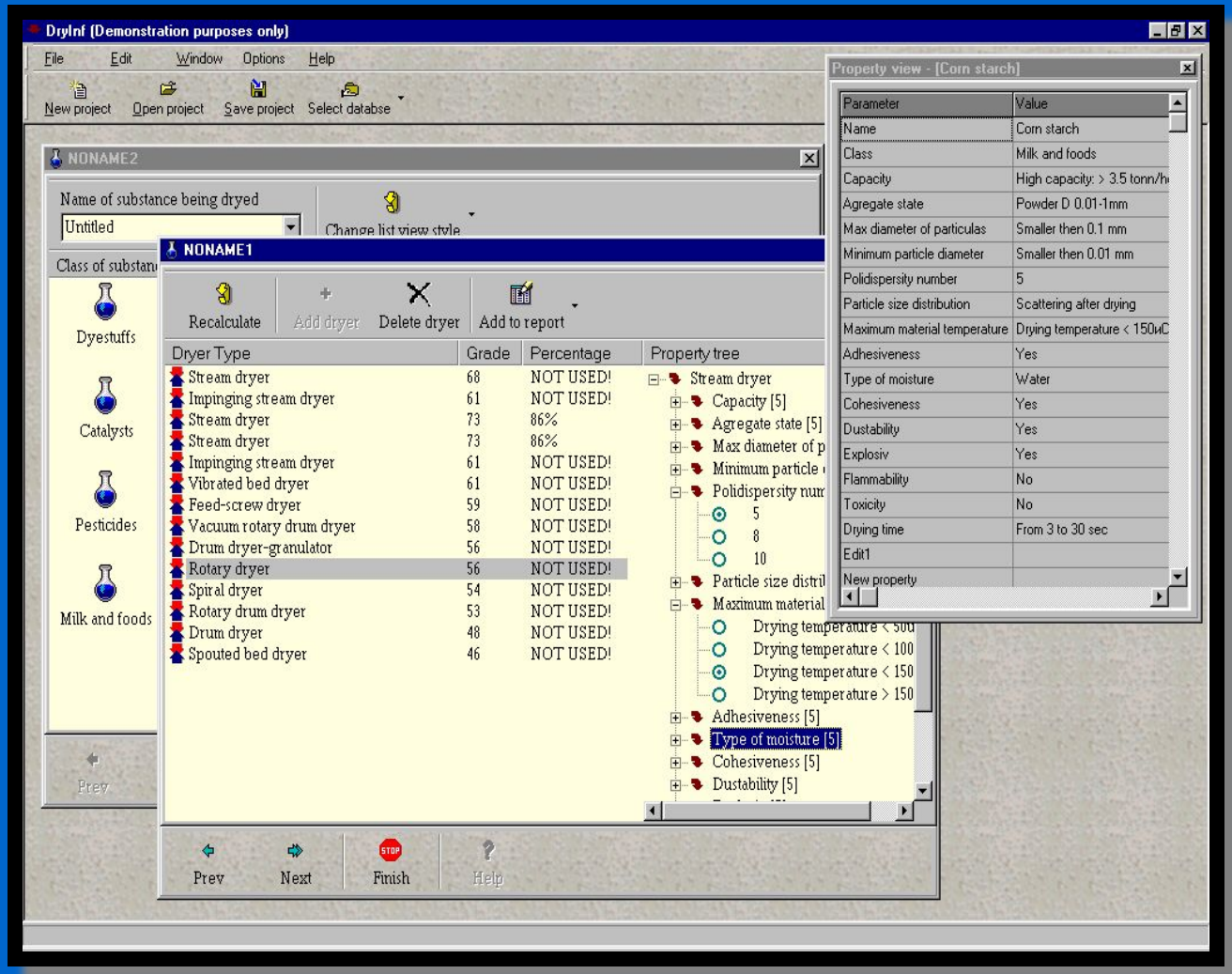
DIDE allows user to change data in databank or create another. To work with **DIDE** user have to be an expert and have permission to write in databank.

Have a look on this system...



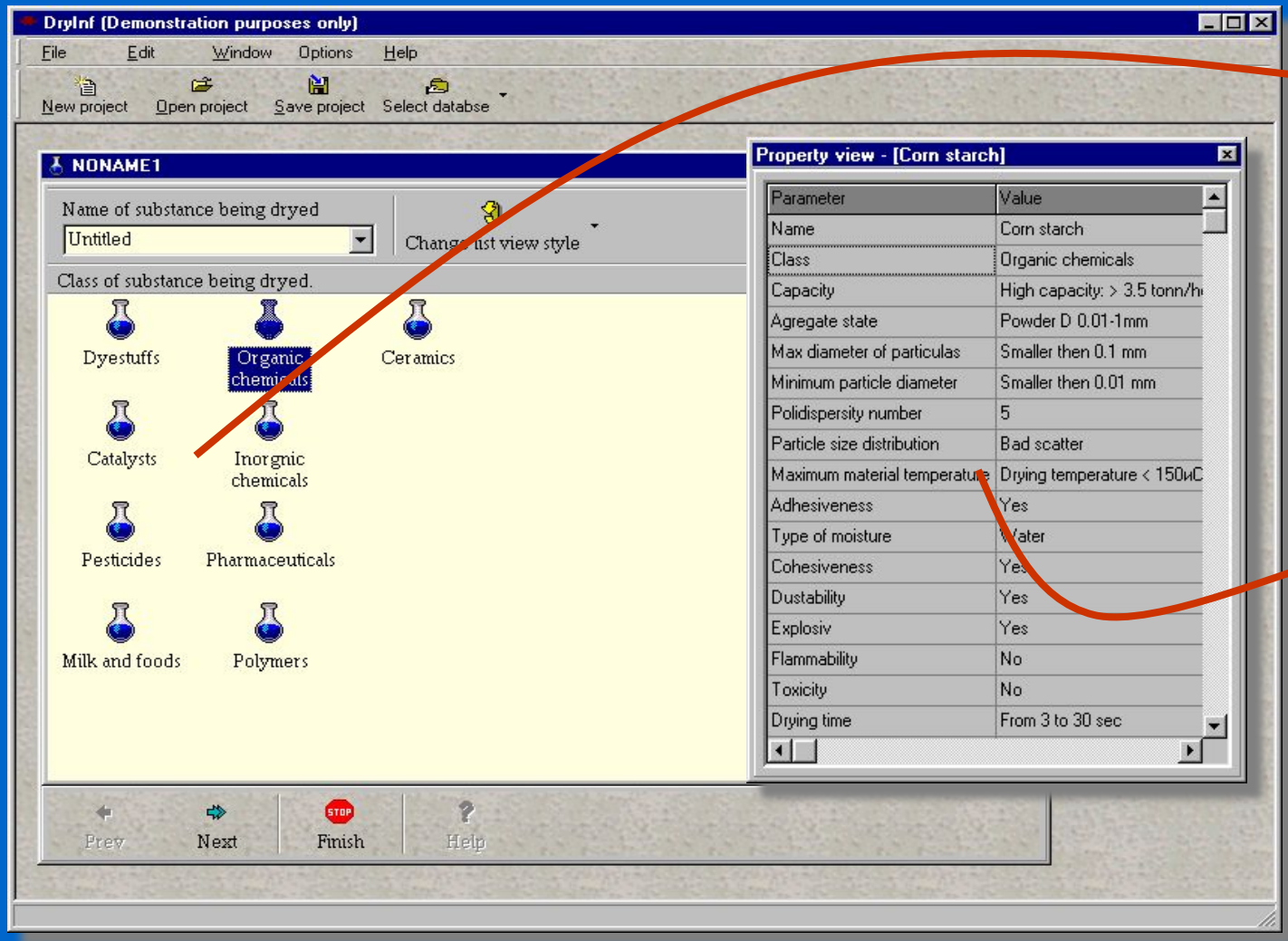
DryInf

Main window



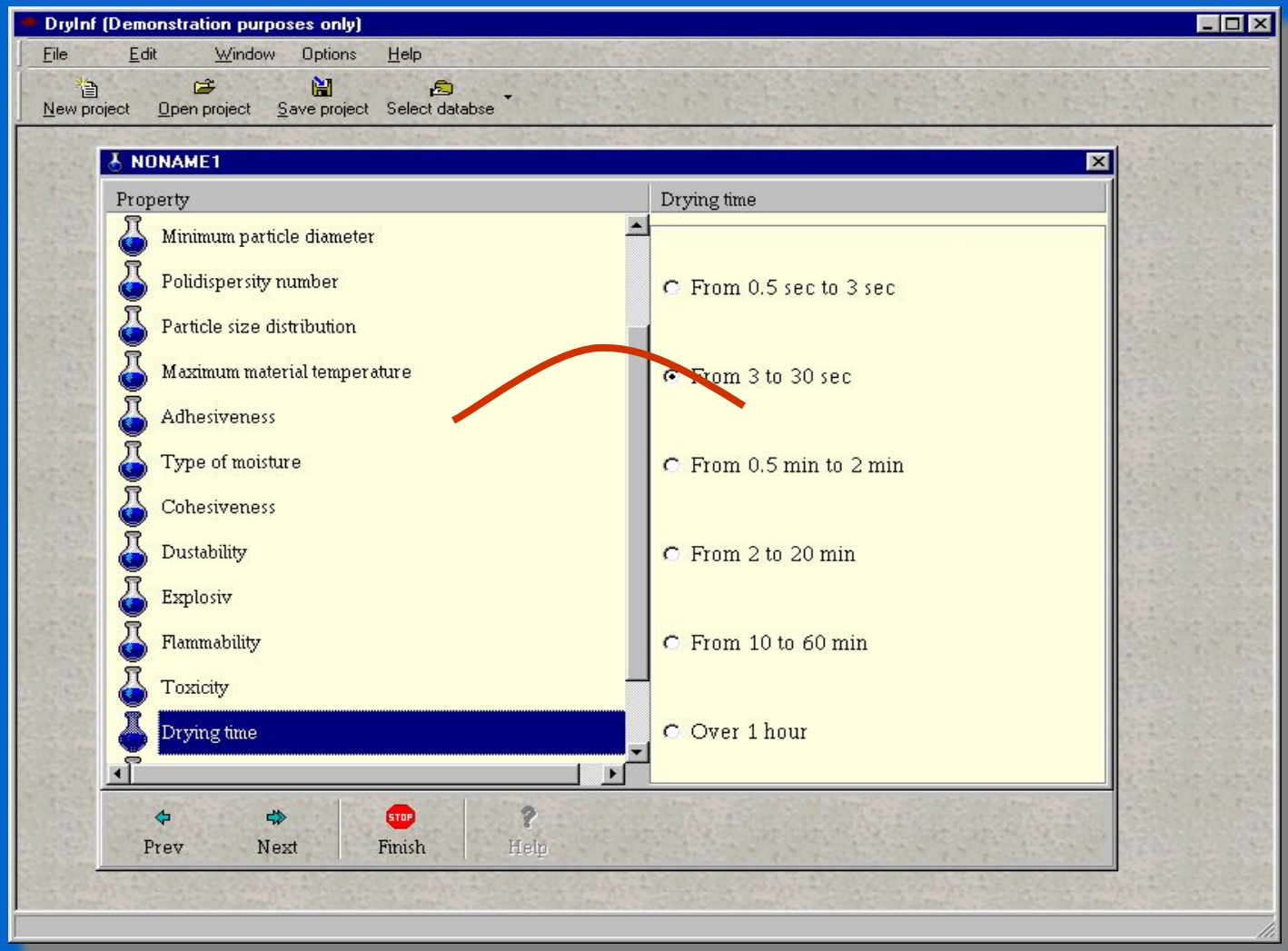
By using main menu or toolbuttons user can start new project or open existent

Class and name



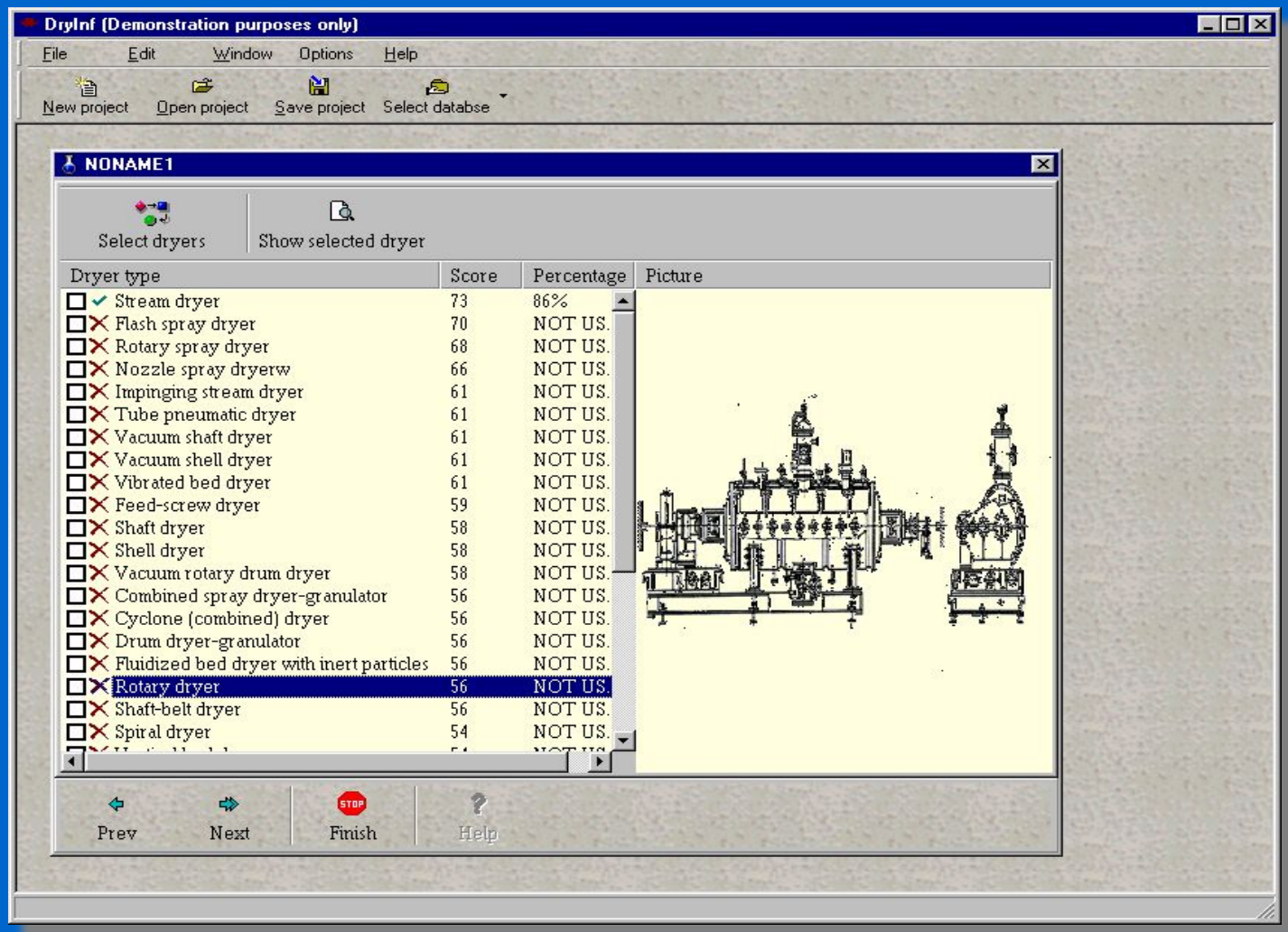
- In this first wizard window user have to select a class of substance being processed and enter name or id of this one.
- At the right side of window all entered properties will be dynamically updated.

Specify properties of substance



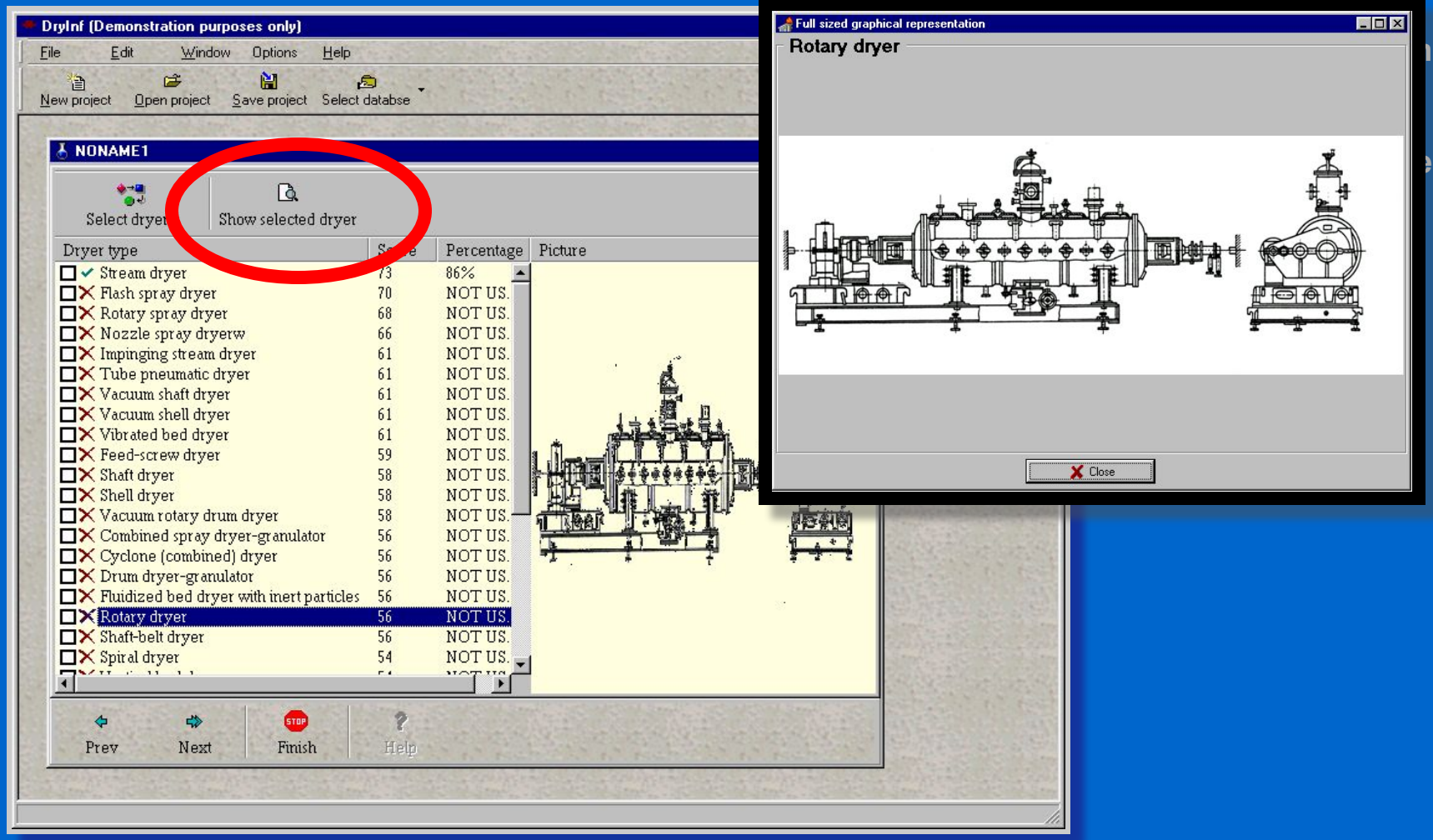
At this window all substance properties must be specified.

See the result

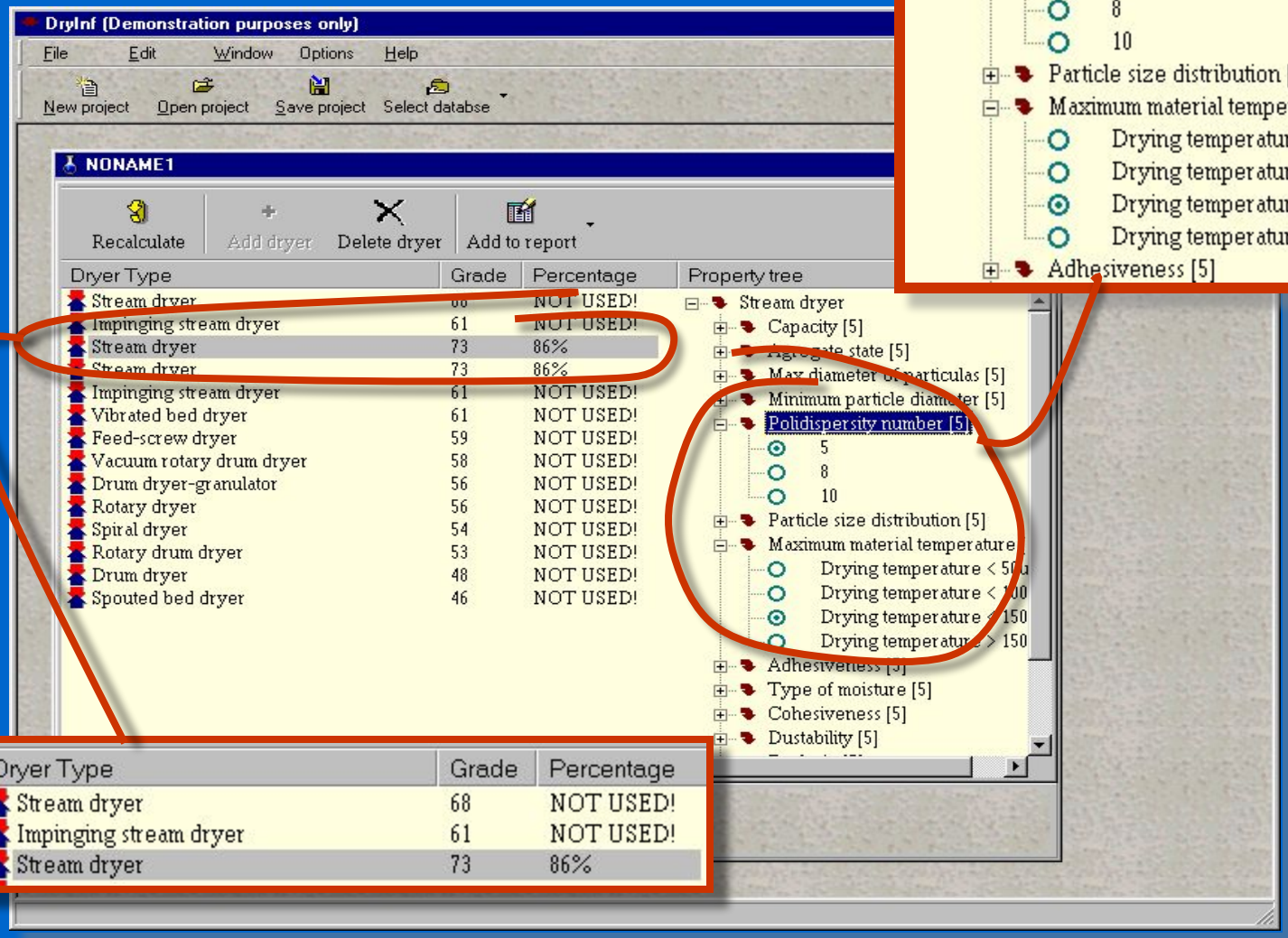


Here the list of all selected apparatuses will be displayed. Apparatuses sorted in order “best dryer first“. Percentage of adequacy is shown.

Full-sized dryer image



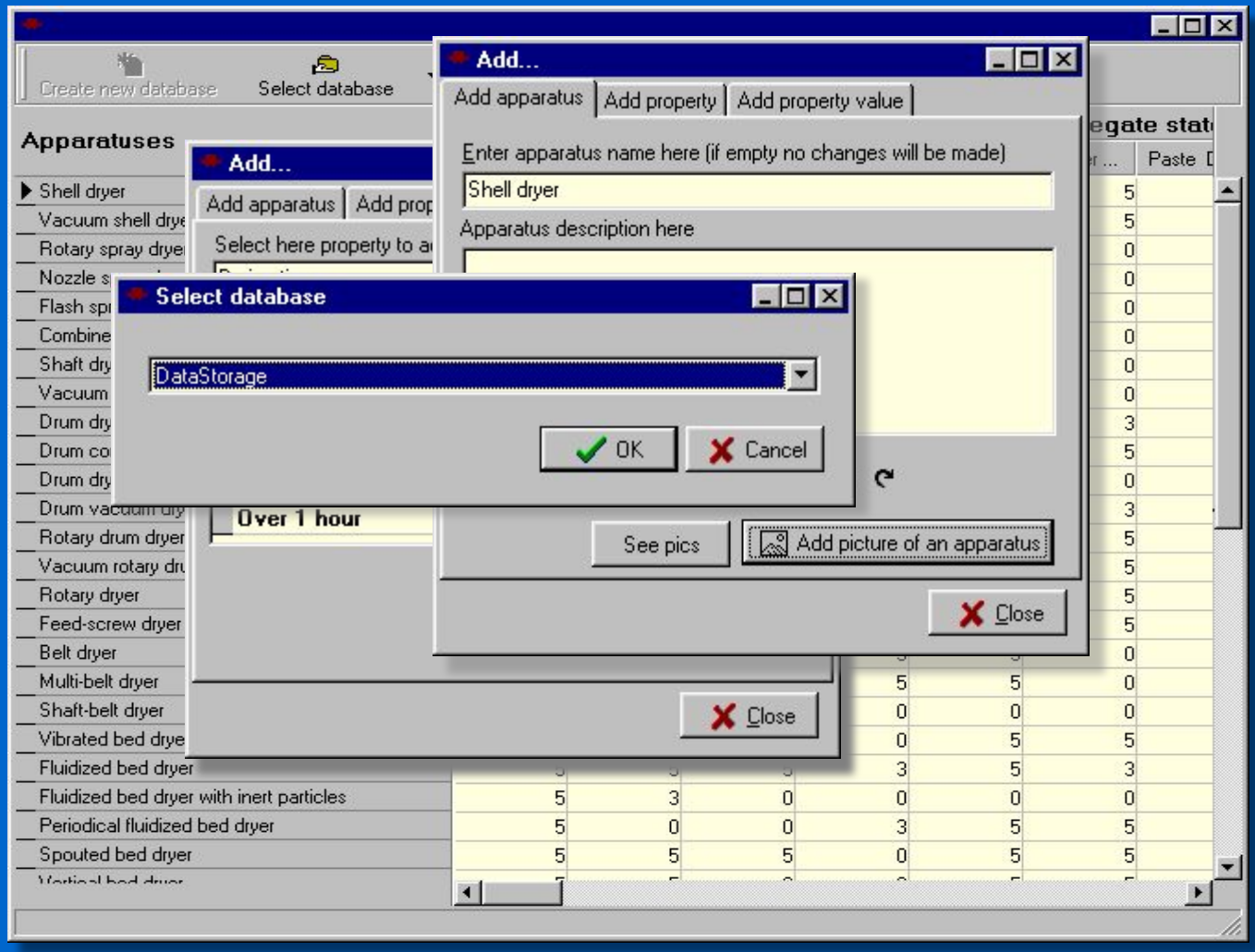
“Back step“ mode



In this window user can see property tree for each selected earlier device. Property tree displays estimation for each property and allows property adjustment (back step).

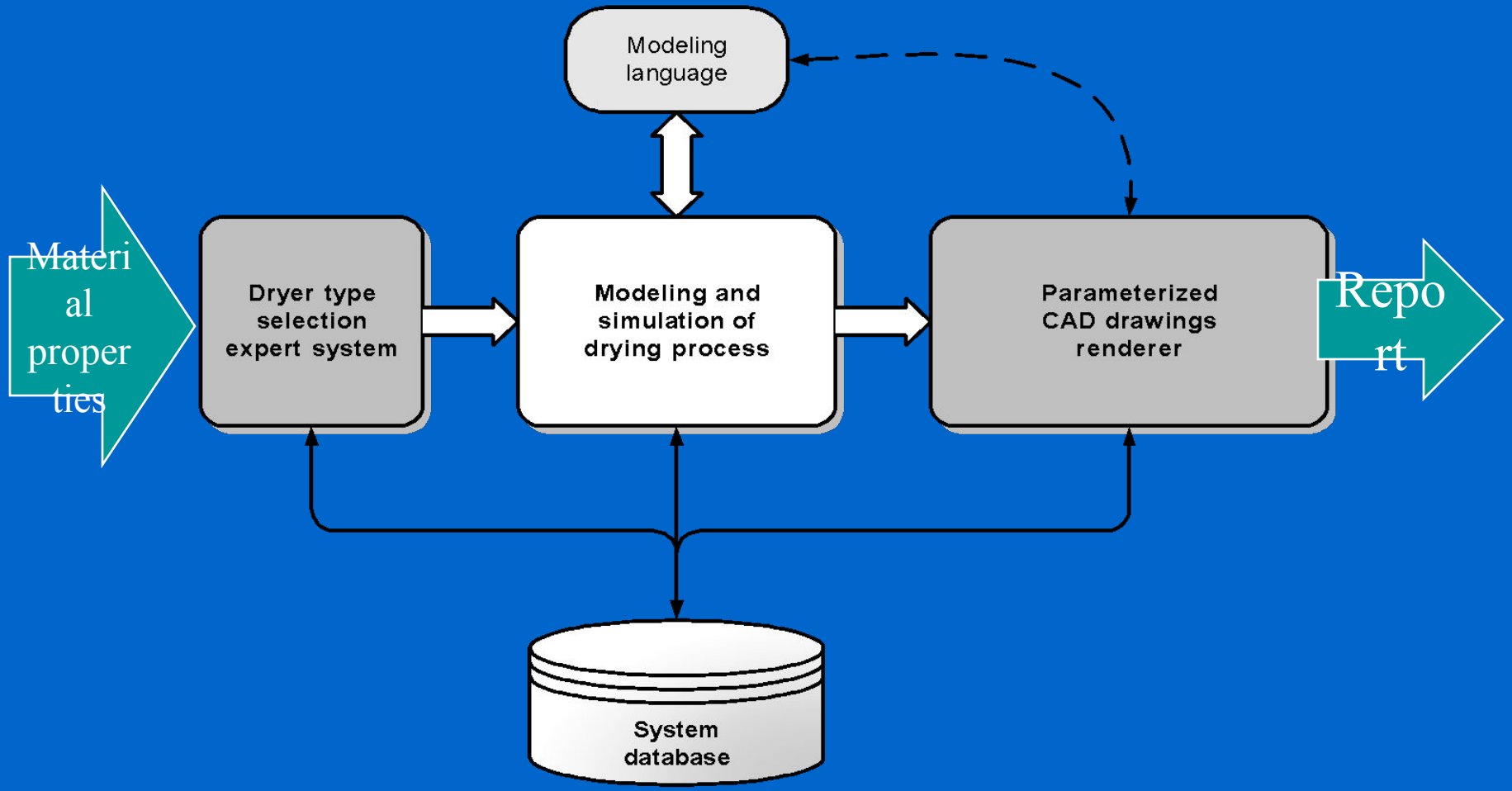
DIDE-DryInf Databank Editor

Add new dryers or properties

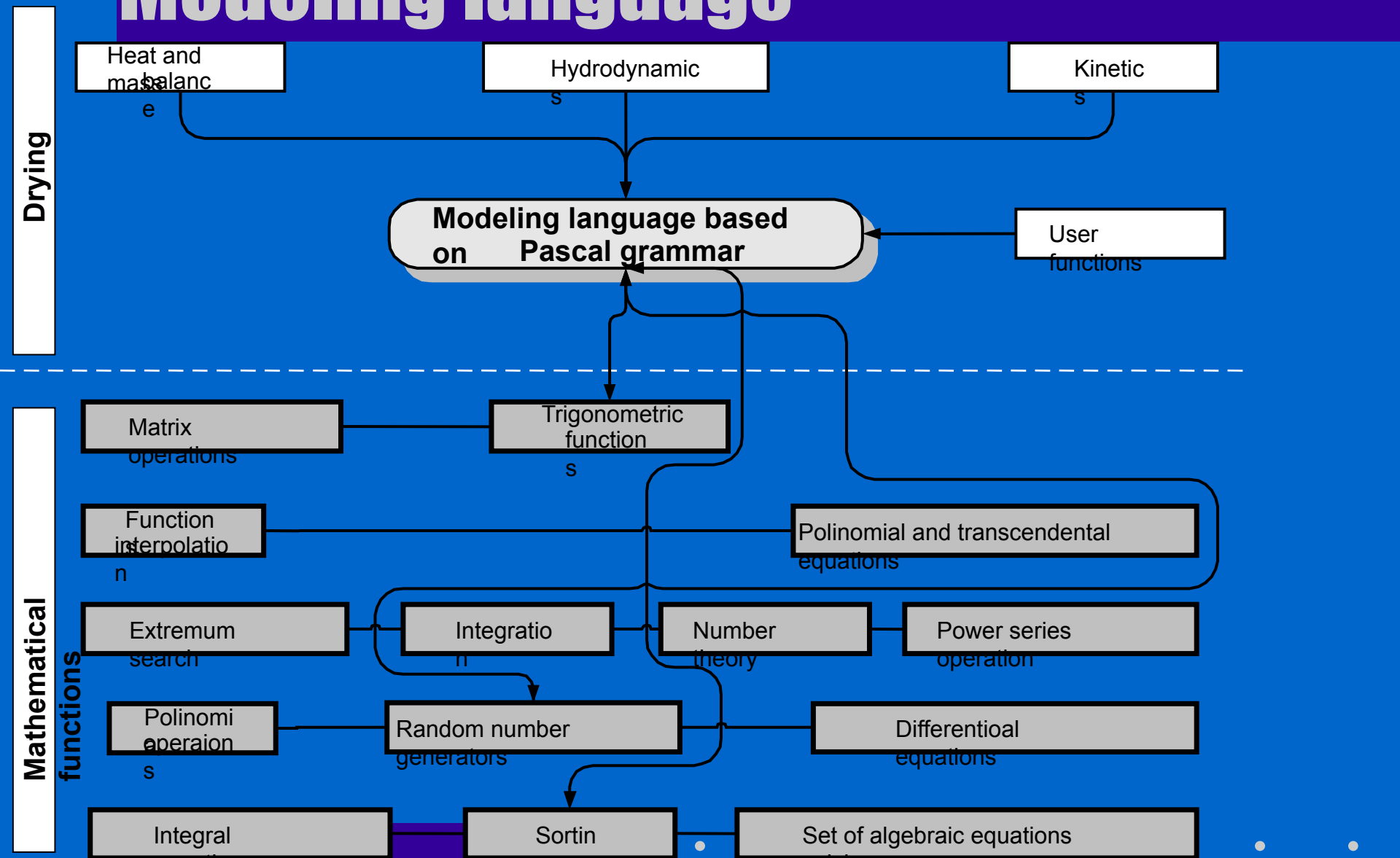


- **DryInf allows user to act as expert. User can add new apparatuses or properties to databank he connected to.**

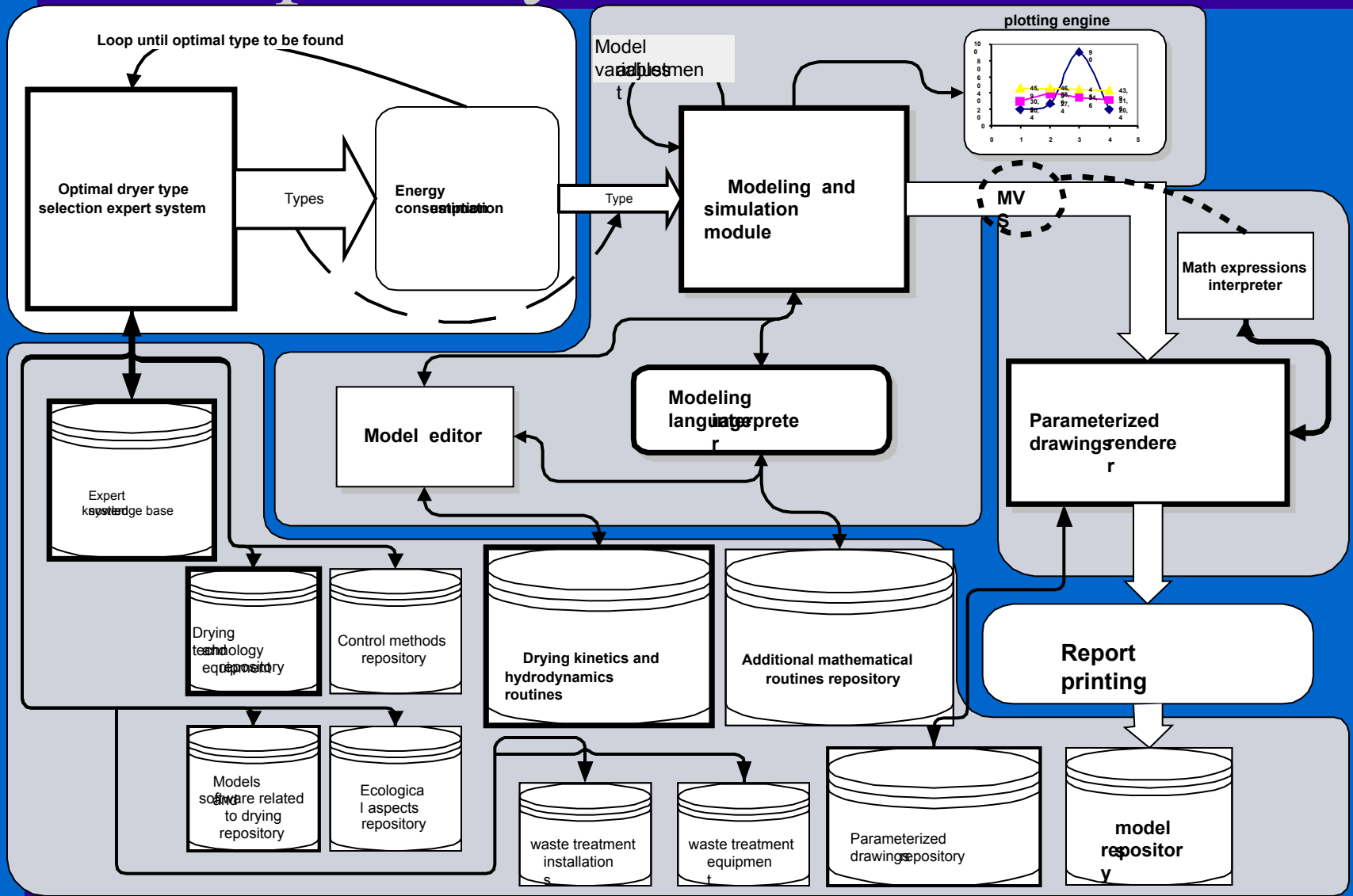
Further developments…



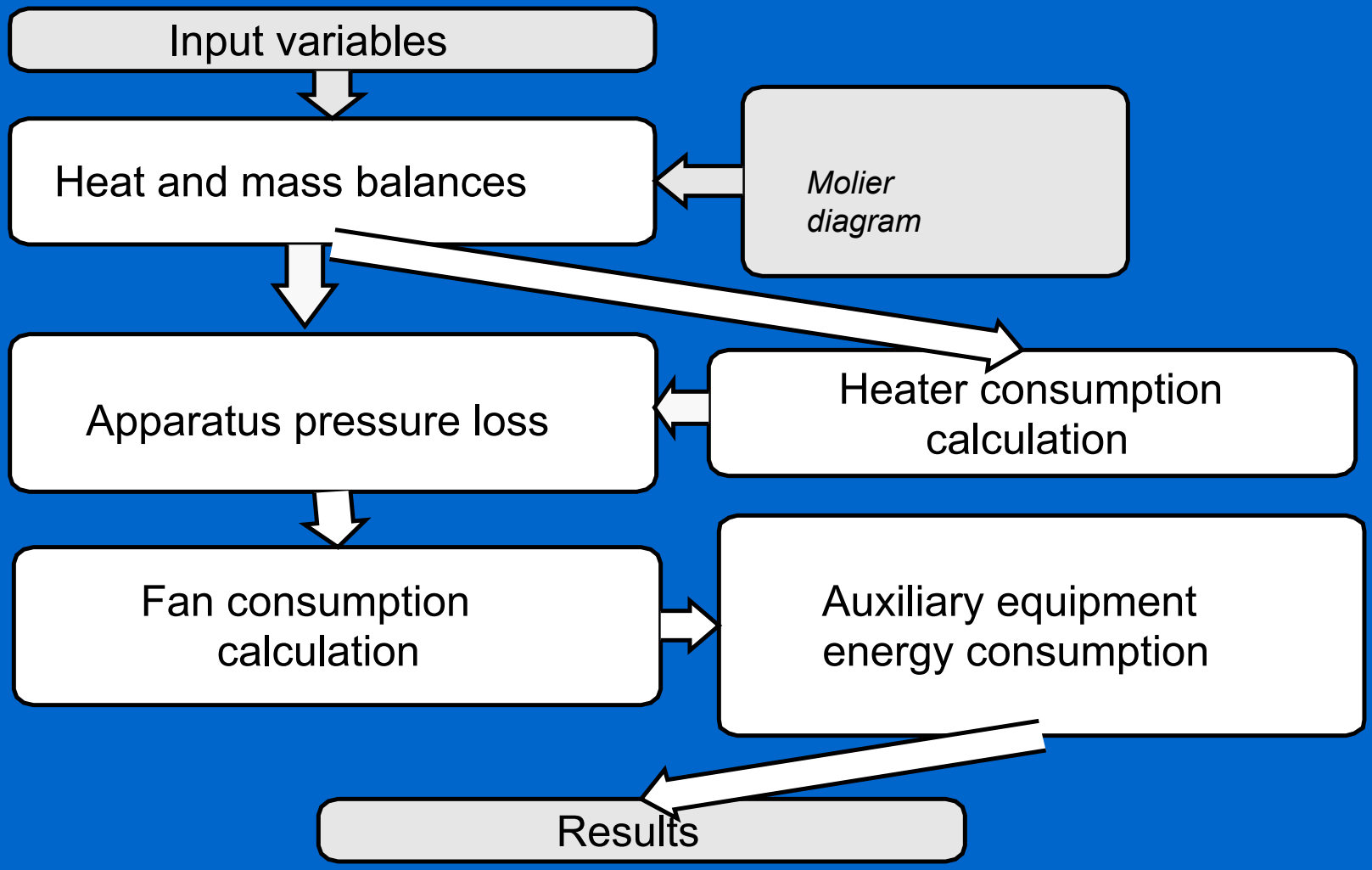
Modeling language



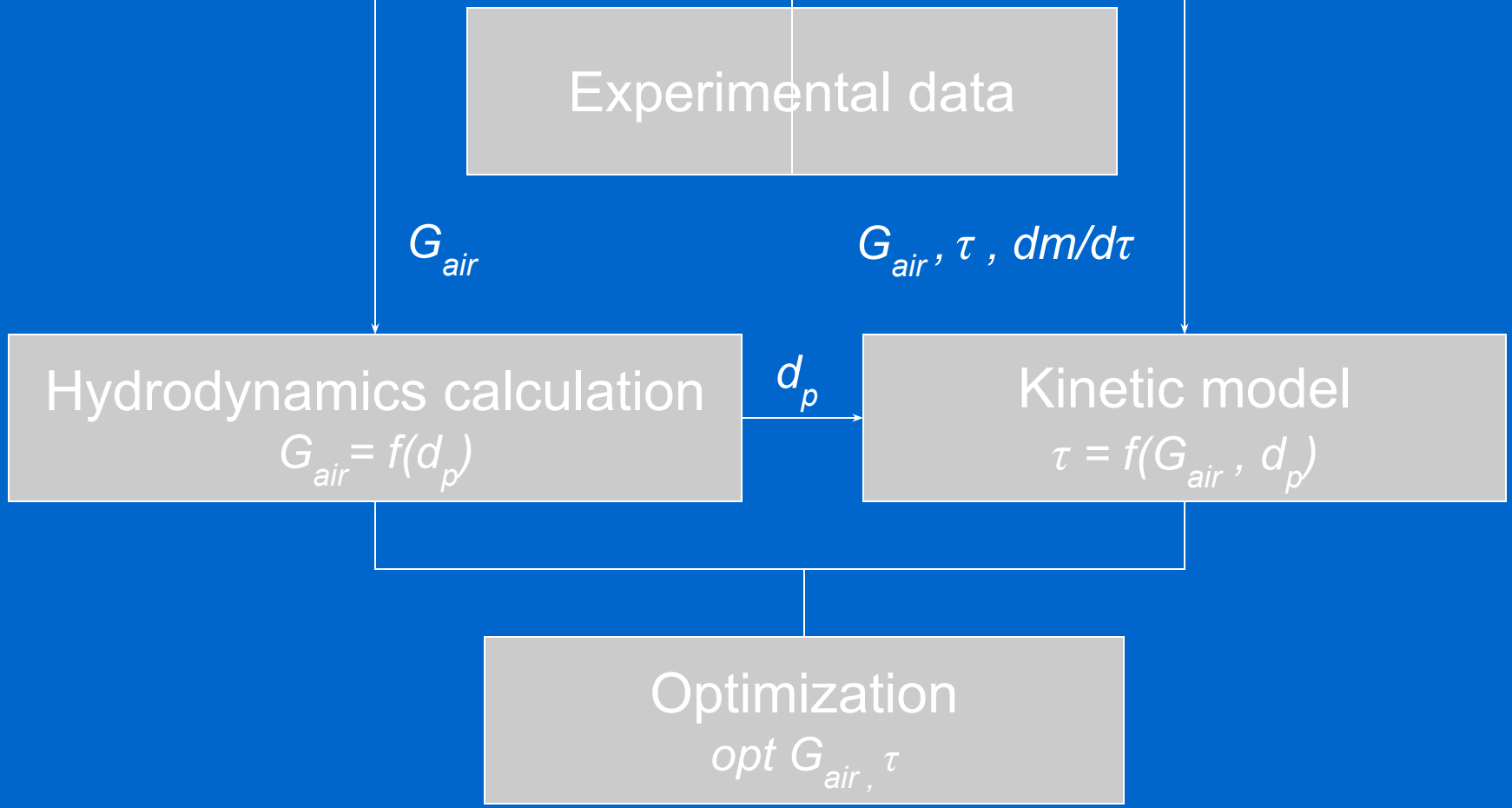
Conceptual system structure



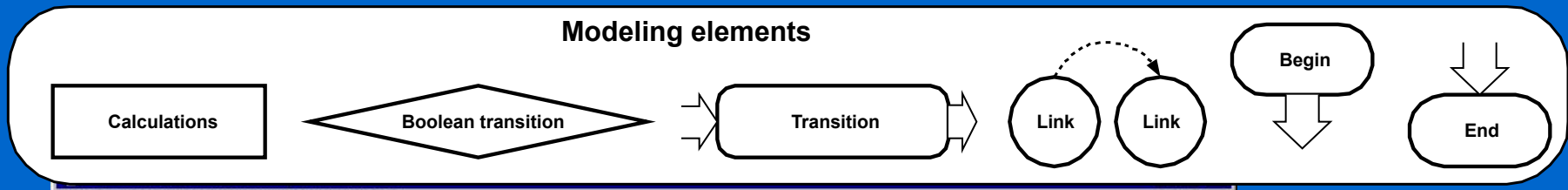
Energy consumption calculation

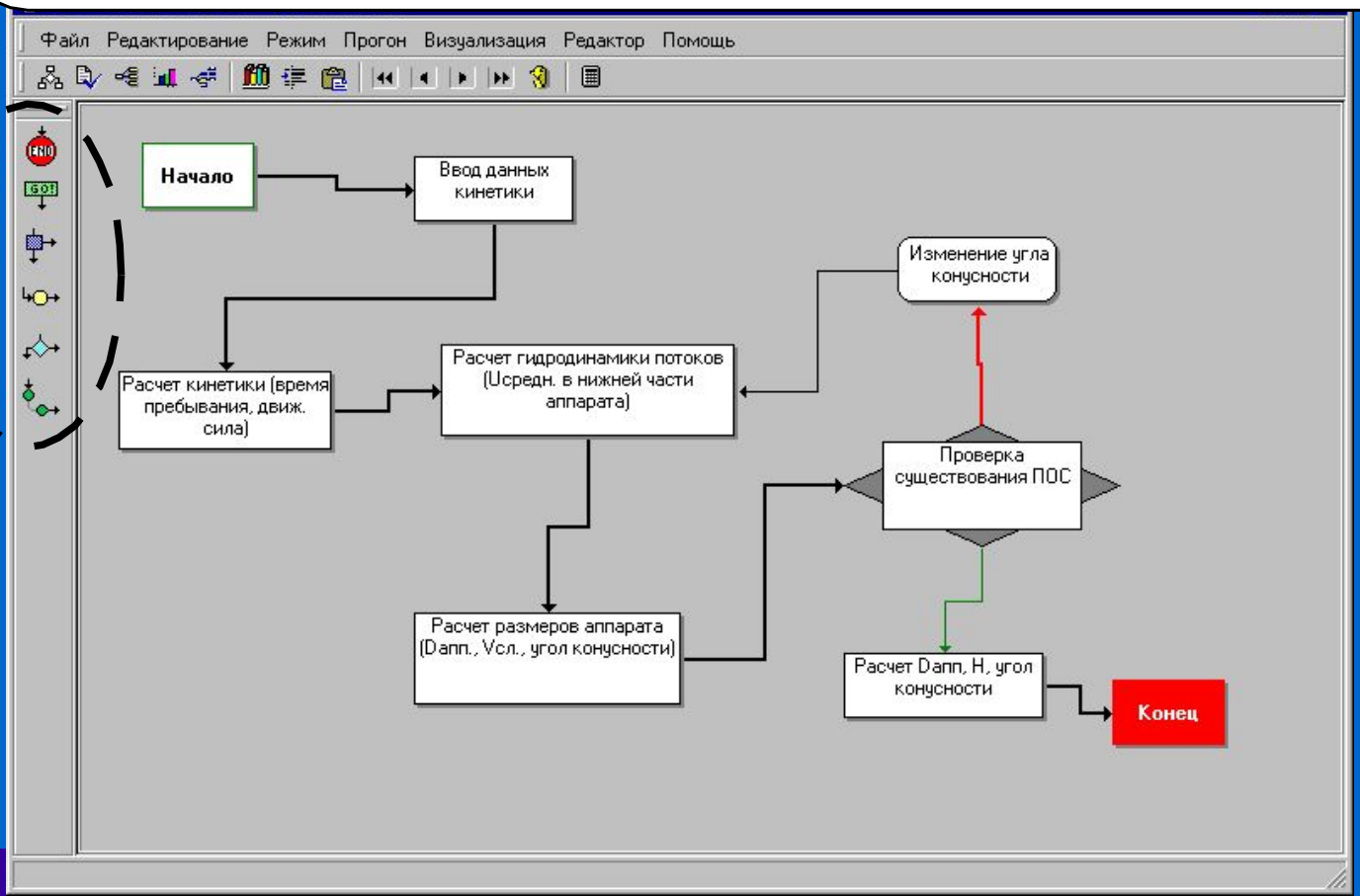


Modeling scheme



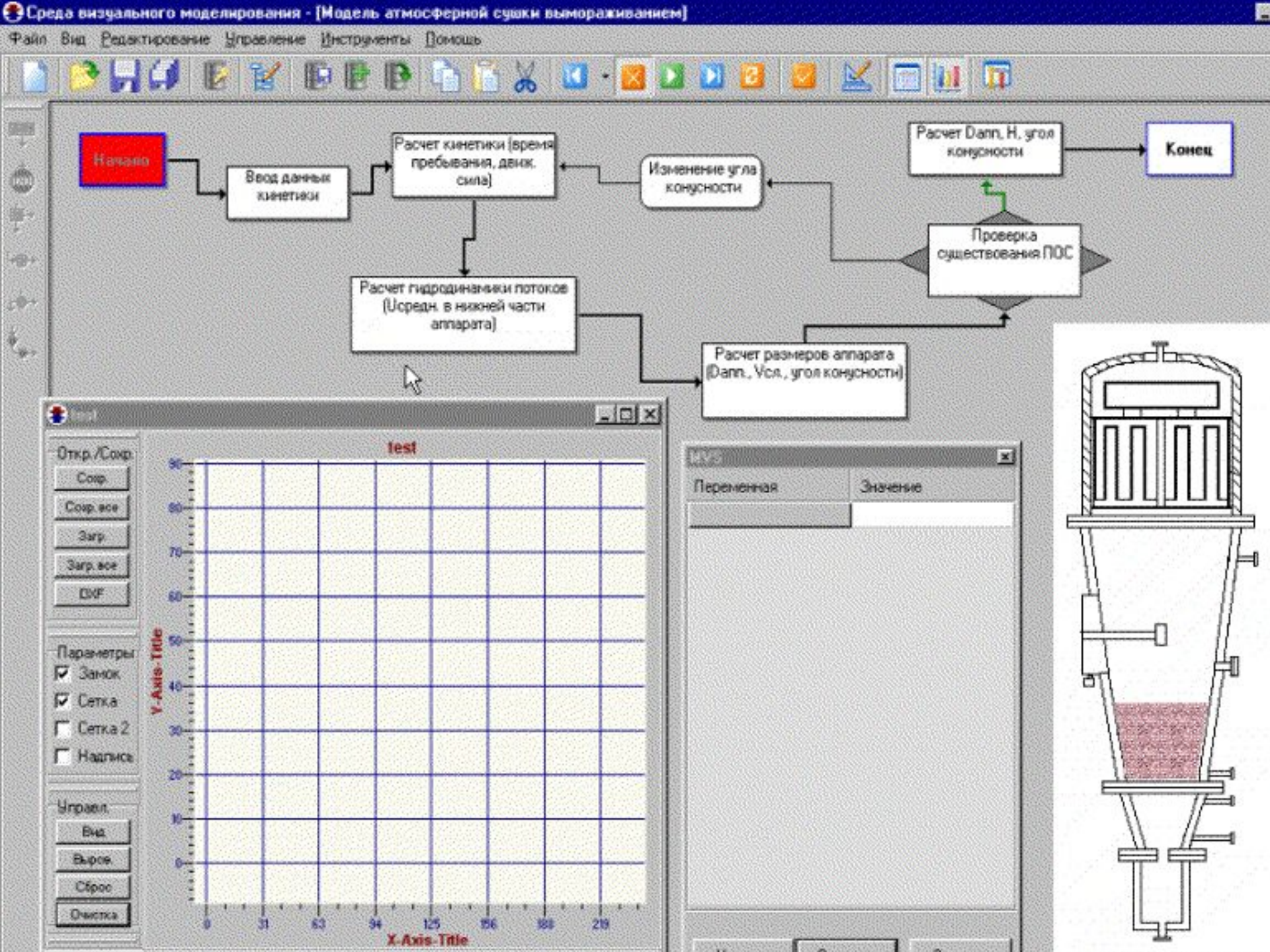
Visual block modeling





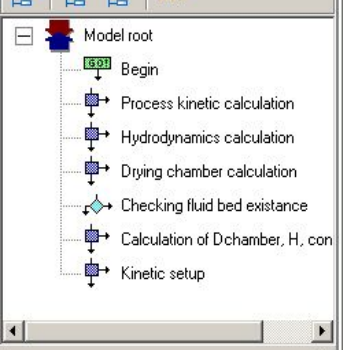
Среда визуального моделирования - [Модель атмосферной сушки вымораживанием]

Файл Вид Редактирование Управление Инструменты Помощь

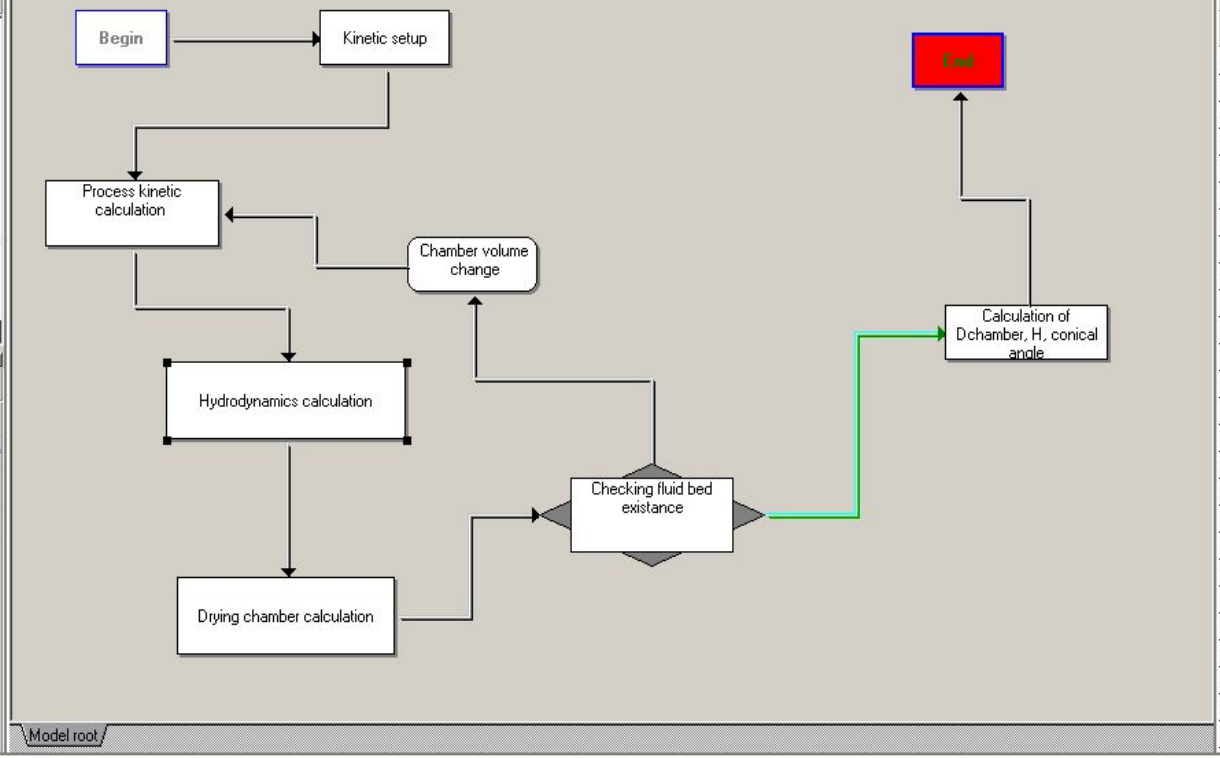


Среда визуального моделирования - [model153]

File View Edit Runtime control Tools Help



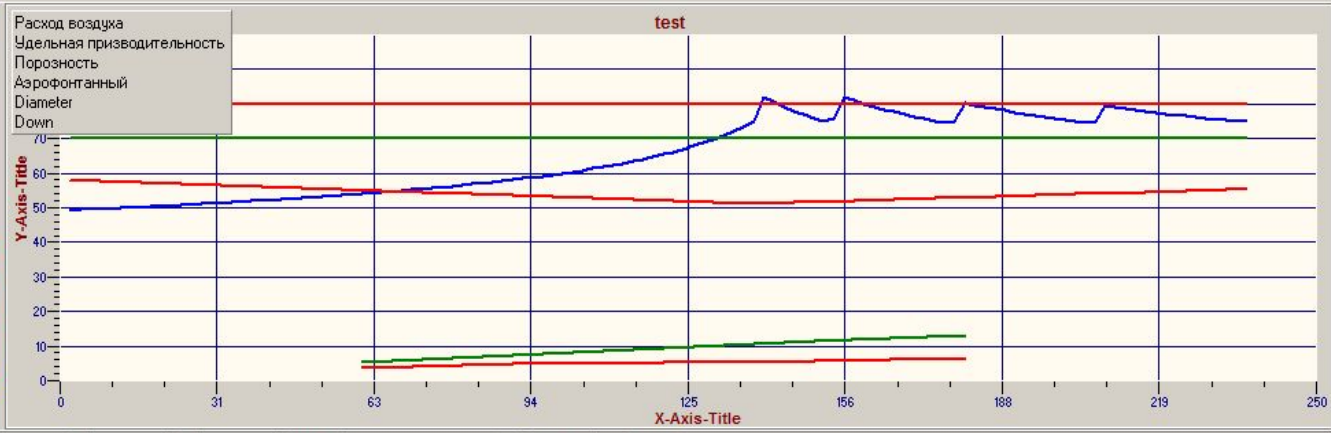
Property	Value
Default transition	StateNode3
Caption	Hydrodynamics calculatio
Element name	StateNode2
Element code	



Variable	Value
iter	7
g	9.81
tu	1.5
c	1042
v	2.27E-5
ro	1.395
eps1	0.7
a	3.11E-5
lambda	0.0306
u	7.5
d	0.0052
dmax	0.001
psi	0.8
ro1	1073
Ga	0.3
hsl	0.6
u1	1.01
u2	1.59
u3	2.16
u4	2.74
u5	3.32
u6	3.89
t1	200
t2	160
t3	120
t4	110

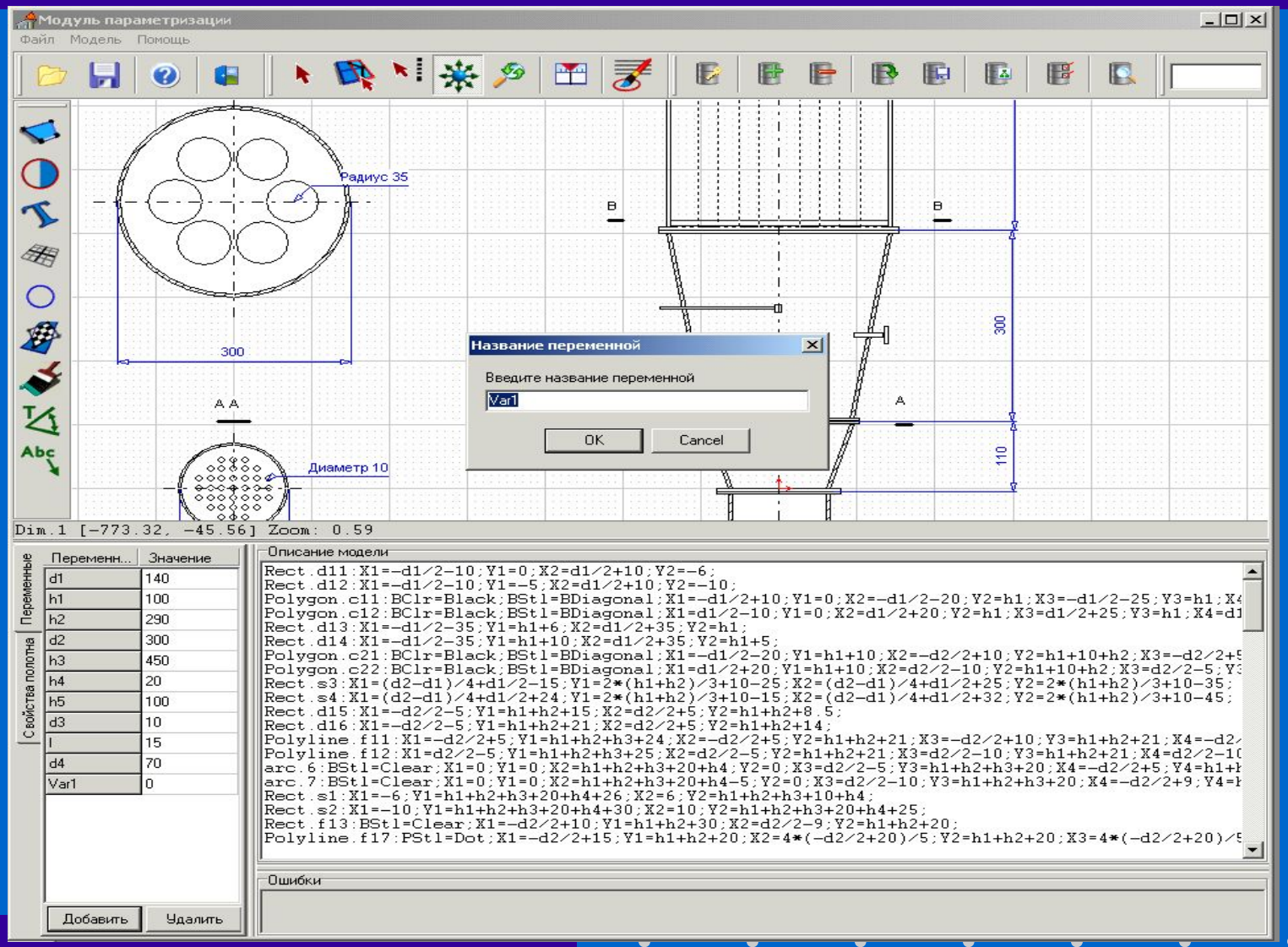
StateNode1:Invalid parameters, function GETFROMMVS : " is not a
StateNode2:Invalid parameters, function GETFROMMVS : " is not a

File
Parameters
Lock
Grid
Grid 2
Legend
Control
View
Align
Reset
Mode



Mode: Mouse: Position X: 10.371 Y: 61.885 Line: Index: Angle:

Parametrical drawings module

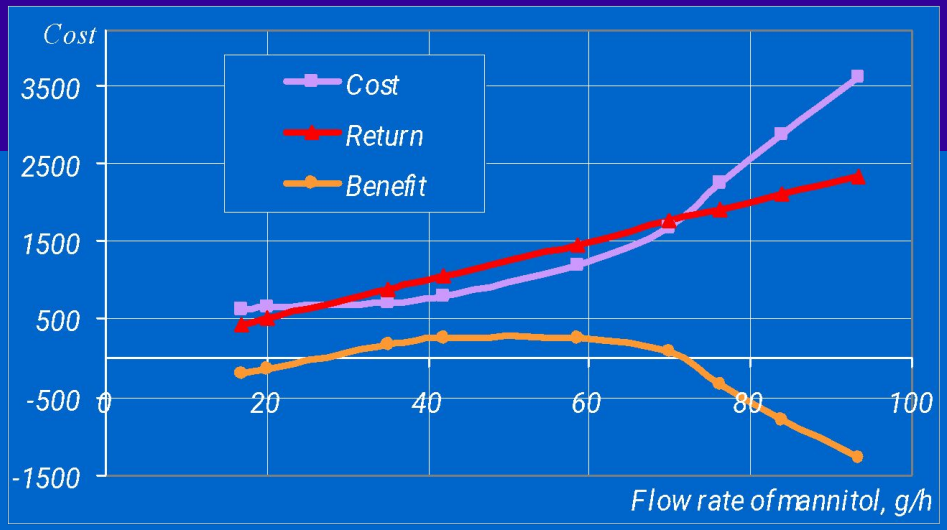


Optimization

Benefit = Return - Cost

$Cost = f(Price_{Raw\ m.}, Price_{Air})$

$Price_{Air} = f(Energy)$



Air velocity, m/sec	*Flow rate, g/h*	*Return, $*	*Cost, $*	*Benefit, $*
0,844	*93,36*	*2334,00*	*3010,00*	*-676,00*
0,719	*84,00*	*2100,00*	*2564,45*	*-464,45*
0,594	*76,38*	*1909,50*	*2118,57*	*-209,07*
0,469	*70,02*	*1750,50*	*1671,92*	*78,58*
0,344	*58,50*	*1462,50*	*1227,04*	*235,46*
0,219	*42,00*	*1050,00*	*782,45*	*267,55*
0,119	*35,00*	*875,00*	*670,00*	*205,00*
0,100	*20,00*	*500,00*	*600,00*	*-100,00*

Contact information

Visit Web-page at **http://stop.at/dryinf/**

for more information and demo download.

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chemcom@muctr.edu.ru