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1. The Bullet Repository Application

The application is designed to carry out the ballistic examination of used bullets.

The window corresponding to the application can be opened in three ways:

- Directly at the application start by selecting the menu item **Bullet Repository** in the section **All Programs** of **Start Menu** or by means of the shortcut located on the **Active Desktop**;

  NOTE. As the Application is started there shows the **"Identification"** form containing fields for entering the user identifier and password, as well as the buttons to confirm or cancel the user parameters input.

  Upon pressing the **OK** button the system checks for the presence of the user with the entered identifier in the database and the correctness of the password entered. The user is allowed three attempts to correctly enter the system. Pressing the **Cancel** button cancels the start of the **Cartridge-case Repository** application.

specimen loaded into the upper window press the **Base** button) may be shown in the root of the tree. The opening list of experts' names is located in the upper part of the form. To view the coupled objects marked by one of them flag the corresponding name.

Comments to the selected couple, as well as the list of experts having also marked these specimens as "coupled" are displayed under the list of specimens.

To load the selected couple select the specimen located in the tree leaf and press the **Load** button. If the couple has been marked by several experts one can select the expert's name with his/her comment in the field of comments to the specimen.

Two loading modes are possible: of both specimens of the couple or only of the selected specimen. In the first case the image of the specimen located in the overlying tree knot will be loaded into the upper window, while the image of the selected specimen will be loaded into the lower window. The images will be positioned according to two coordinates in such a way that the marked matching area is located in the screen center. At this point the simultaneous viewing mode will be automatically activated. The marked area will be displayed as a triangle in the upper and lower viewing windows.

In the second case the image of only the selected specimen will be loaded into the lower window. If the image of a specimen marked as "coupled" to the specimen being loaded is loaded into the upper viewing window, the images will be positioned with regard to the marked matching area. Otherwise, the program will inform that the specimens were not marked as "coupled".

To delete the connection between two specimens select a couple of specimens and press the **Delete** button.
The menu item **Coupled specimens->Synchronize** is accessible in the two specimens comparison mode. If the specimens are marked as coupled in the database, they will be positioned with regard to the marked matching area, and the program will activate the simultaneous viewing mode. The matching area marked by the expert will be displayed as a rectangle in the upper and lower viewing windows.

- By pressing the corresponding **Switch to** button in the **TeleMicroscope** window;
- Automatically after recording the image of a lateral bullet surface.

2. Interface Description

The main application window contains a menu, a panel bar with a set of control buttons, a scale-setting window and two windows for images output with information elements – a horizontal limb and a vertical scale.

NOTE: If two images are loaded into the windows, one of them will be "active" (marked by light-gray background of the lighting direction indicator in the right upper or right lower corner). To make an image "active" move the cursor onto its field and press the left mouse button.

The figure shows the main window of the **Bullet Repository** application, which appears as soon as the application is started.

The main window includes two "working" windows. The lower window displays the specimens loaded from the database, while the upper window displays the specimen under examination.
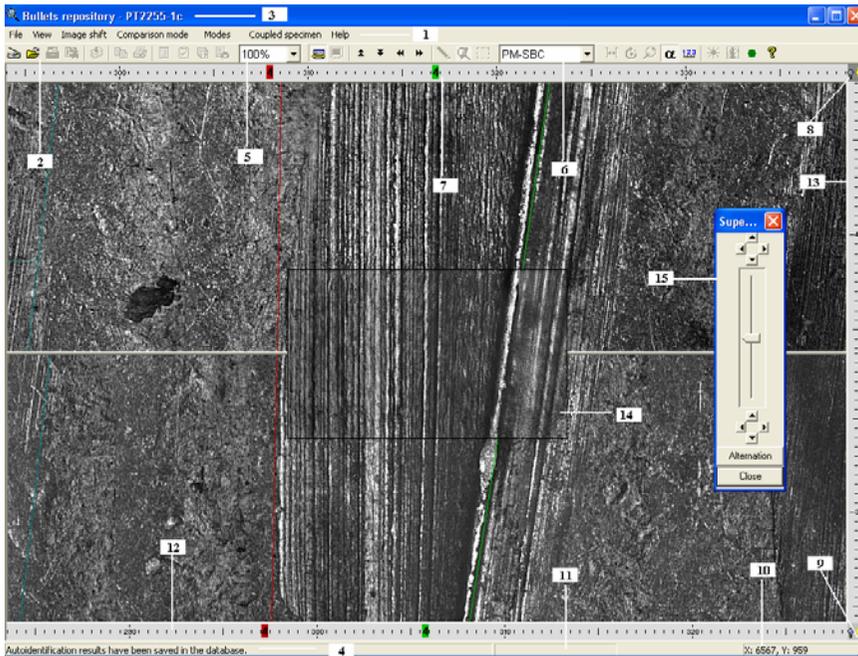
1. Main program menu. It contains commands changing the application's operating mode.
2. Tool bar. Contains control buttons duplicating program menu items. The main purpose of the tool bar is to facilitate the user access to the main program commands.
3. Heading of the main application window. It contains the application name, as well as the "active" specimen identifier.
4. Left part of the main application window state line. It displays overhead information.
5. Opening list of the image scale options. In this list one can select the specimen image scale in the upper and lower window. It is set simultaneously for both specimens.
6. Opening list of firearm system options. In this list one can select a firearm system for a new (recorded) object under examination. Specimens loaded from the database can be only of the same firearm system.
7. Numbers of rifle fields. The marks on the horizontal limb show the points of the intersection of rifle trace border lines with the lower object image border.

NOTE: Both object images marked as "coupled" should be preliminarily saved in the DB.

To view the list of coupled objects (specimens) select the menu item **Coupled specimens->Show**. The **Coupled Specimens** form appears on the screen.
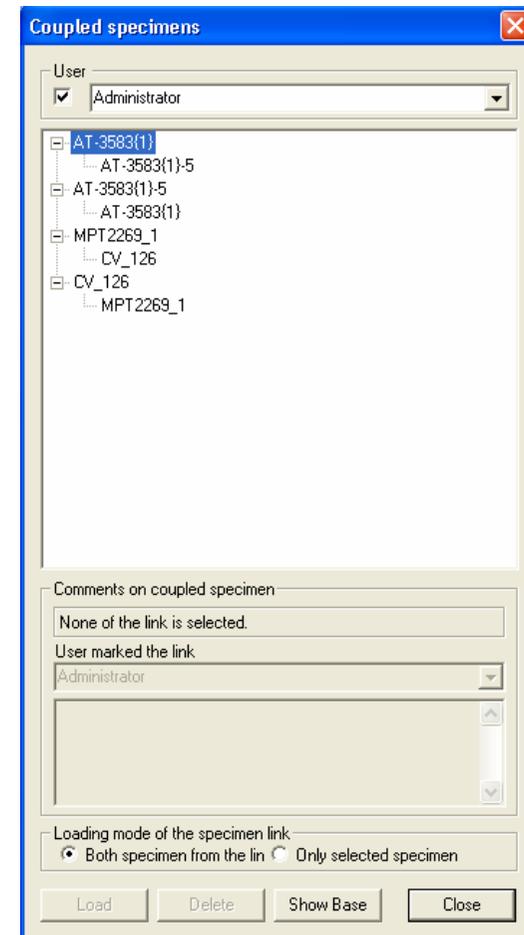

The window shows a list of coupled specimens in the form of a "tree". Either several specimens (to display all the coupled specimens press the **Show All** button) or one specimen currently loaded into the upper viewing window (to display only the

20. Work with Coupled Objects

The mode allows to mark objects as "coupled" by marking out and saving in the DB the most coinciding parts of the images, upon which they are automatically positioned. This mode is convenient for detecting the interconnection of objects related to different criminal cases. For example, if an expert working on one criminal case has established that object A belongs to the same barrel as object B, while an expert working on another criminal case has established that object B belongs to the same barrel as object C, then the given mode can help establish a connection between these criminal cases.

To mark objects as "coupled":

1. Align the images of object marks in the upper and lower window in the optimal way.
2. Select the menu item **Coupled specimens->Mark**.
3. Then mark by a rectangle the matching areas on both specimens by pressing the right mouse button.
4. Release the right button. At this, the **Comments to Coupled Specimens** form will appear on the screen.
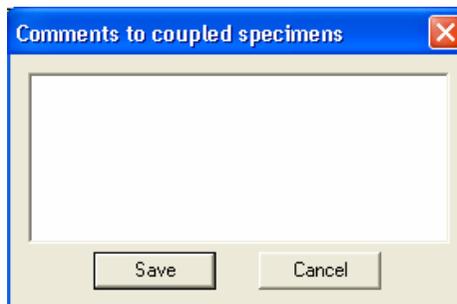
5. Having entered the comment save the information in the DB by pressing the **Save** button.
6. Upon pressing the **Cancel** button the information about the coupled objects will not be saved in the DB.

8. Lighting direction indicator (from the left or right) by recording an object surface image. It also shows the "active" (light-gray background) or "passive" (dark-gray background) image window. This is a "passive" specimen.
9. Lighting direction indicator (from the left or right) by recording an object surface image. It also shows the "active" (light-gray background) or "passive" (dark-gray background) image window. This is an "active" specimen.
10. The right part of the main window application state line. It shows the coordinates of the cursor position inside the "active" window (in pixels) or the phrase **"Outsides the area"**, if the cursor is outsides the window.
11. The field of the selected command execution indicator. While long operations are being carried out it displays the current percentage of the selected command execution. The indicator disappears from the screen after the task has been fulfilled.
12. Horizontal limb. It shows the angular distance (in degrees) from the beginning of the object surface image record.
13. Vertical bar. It shows (in mm) the distance from the lower border of the object surface image record.
14. Image window in tracing mode. It displays the image obtained by superposing the image of the object loaded into the upper window, with a transparency factor (**a**) and the image loaded into the lower window, with a transparency factor (1-**a**).
15. Tracing mode control panel.

Button for switching over to the **TeleMicroscope** window
Opens the **TeleMicroscope** application window.
It is accessible only for the data acquisition workstation (DAS) operator.

Specimen Import *button*
Opens the **Specimen import** form (**"Open").**
The form description is given below.

Bullet Repository Browser *button*

Opens the **Bullet Repository browser** form.
The form description is given below.

Add Specimen to the Database *button*

Opens the **Add Specimen to the Database** form.
The form description is given below.

Autoidentification *button*

Activates the **Autoidentification** mode.
The description is given below.

Copy *button*

Enables one to copy an image visible on the screen into the clipboard to be entered into the expert's file document.

Print *button*

Calls the window of the image preparation for print. Depending on the type of the printer being used select the corresponding printing settings. Only the parts of images and specimen information forms visible in the windows are output for printing. If specimens are loaded into both viewing windows, a dividing white strip will be drawn between them by printing.

List of Loaded Specimens *button*

Opens the **List of Loaded Specimens** form.
The form description is given below.

Assign Examined Status to the Specimen *button*

On pressing the button the image, which is located in the lower window and is "active", is assigned the status of the image under examination. In this case the object image moves from the lower window to the upper one.

2. To view the results of the previously made autoidentifications related to all specimens select the menu item **File->Load autoidentification results**. At this, the form will appear on the screen:

The list of autoidentifications whose results have been saved in the DB, indicating the identifier of the specimen with which the autoidentification was carried out, trace type, firearm system, operator and the date of carrying out the autoidentification is in the upper part of the form.

In the upper part of the form there are the lists of criteria to be used to curtail the list of autoidentifications (by flagging them). In case any selection criteria are changed the list will be automatically re-formed. To view the autoidentification results select the corresponding line in the list and press the **Load** button. The results of the selected autoidentification will be loaded into the **Autoidentification Results** form. Besides, the corresponding specimen will be loaded into the upper window of the **Bullet Repository** application.

Viewing of previously saved autoidentification results

The program provides for two ways of viewing the previously saved autoidentification results.

1. In the autoidentification mode press the **Load Results** button in the **Autoidentification Results** form. The **Saved Autoidentification Results** form appears on the screen.
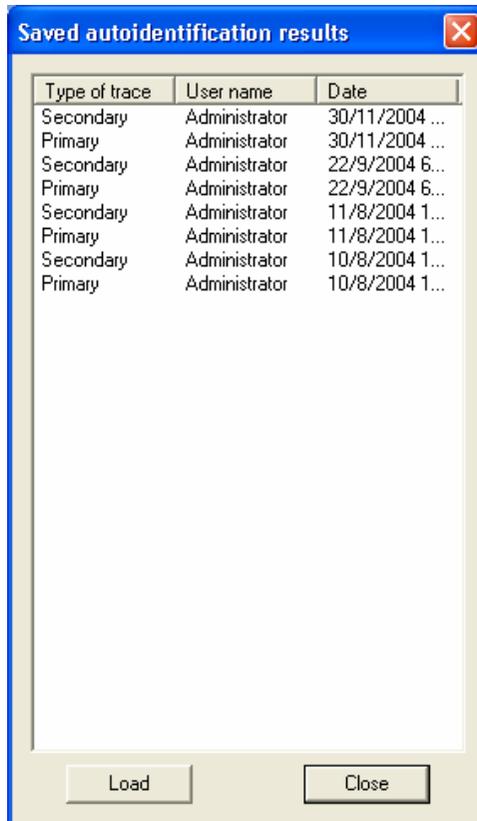
In the window contains a list of the previously made autoidentifications related to the specimen under examination, indicating the expert who has carried out the autoidentification, the date of the autoidentification and the type of traces it was based upon. To view the previously made autoidentifications results select the corresponding line in the list and press the **Load** button.

Switch to the Next Loaded Specimen *button*

On pressing the button the "active" object in the lower window is replaced by the next one out of the list of objects loaded into the memory. If only one object is loaded into the memory from the DB, the button is "passive".

Unload Specimen *button*

On pressing the button the "active" object displayed in the lower window is removed from the list of loaded objects and from the memory. Further access to this object is possible after its reloading from the DB.

Synchronize View *button*

On pressing the button the object images displayed in the upper and lower windows will shift synchronously.

Full Screen *button*

On pressing the button the "active" image expands over the entire screen, on repeated press it "contracts" to its original size.

Shift to Image Edges *buttons*

On pressing the buttons the "active" image shifts on the screen to the corresponding image border (upper or lower).

Next Rifle Trace *buttons*

On pressing the buttons the "active" image shifts on the screen to the left and to the right over a distance equal to that between two neighboring rifles.

Marking of Rifling Traces *button*

Opens the **Marking of Rifling Traces** form The form description is given below.

Show marked traces borders *button*
On pressing this button trace borders appear or disappear on the "active" image. At the same time the rifle number markers on the horizontal bar remain highlighted.

Marking of Additional Traces *button*
Opens the **Marking of Additional Traces** form. The form description is given below.

Display Mode *button*
Opens the **Display Mode** form.
The form description is given below.

Image Rotation *button*
Switches on the rotation mode in the "active" viewing window. To rotate the image move the cursor to the blue line, which appears on the screen, press the left mouse button and move the line until the required angle is obtained (the current angle value is shown in the right lower corner of the viewing window). On releasing the key there appears on the screen a form in which to confirm the rotation over the selected angle. The rotation angle value can be edited in the form window. The software provides for a limitation of the image rotation angle - $\pm$ 15 degrees. After the image rotation has been carried out the program automatically switches off the rotation mode.

Magnification of Images *button*
The description of the action is given below.

Tracing Mode (Superposition of Image) *button*
Switches on the mode of the semitransparent superposition of object images loaded into the upper viewing window and lower one.
The description is given below.

When ranking specimens by secondary traces one can view the images of the selected areas coinciding in the optimal way with the traces on the specimen under examination. For this press the **Show traces** button. The **Viewing of Traces** form appears.
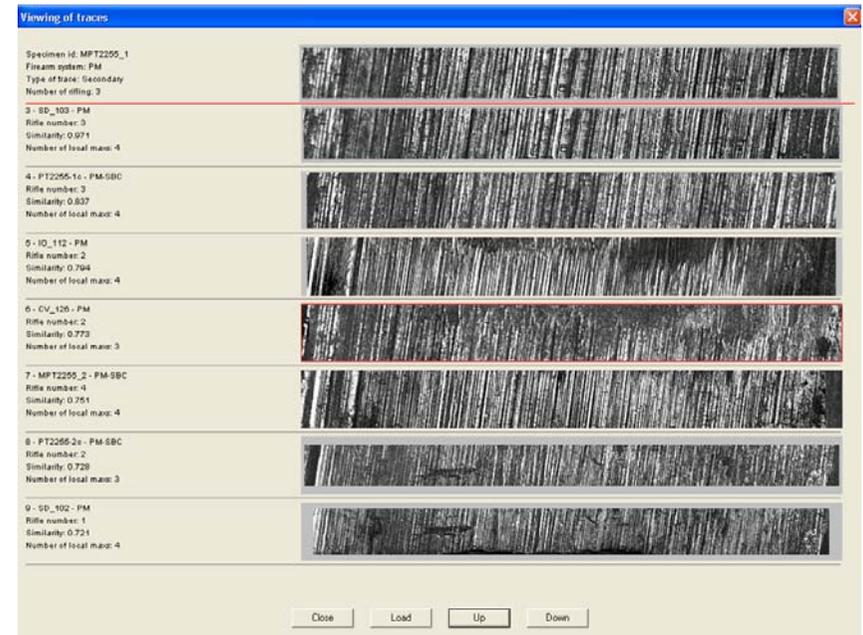
The image of the trace area of the specimen under examination, which coincides in the optimal way with the specimen trace from the list located above it, is located in the upper part of the form over the red line. The information form of the corresponding specimen is located to the left of the trace image. One can scroll the list of images up and down using the corresponding buttons located in the lower part of the window. To load a specimen from the list select it with the mouse and press the **Load** button. Upon loading the image under examination and the image to be checked will be superposed according to two coordinates in such a way as to allow the operator to view the parts of rifle traces with the highest similarity degree in the screen center.
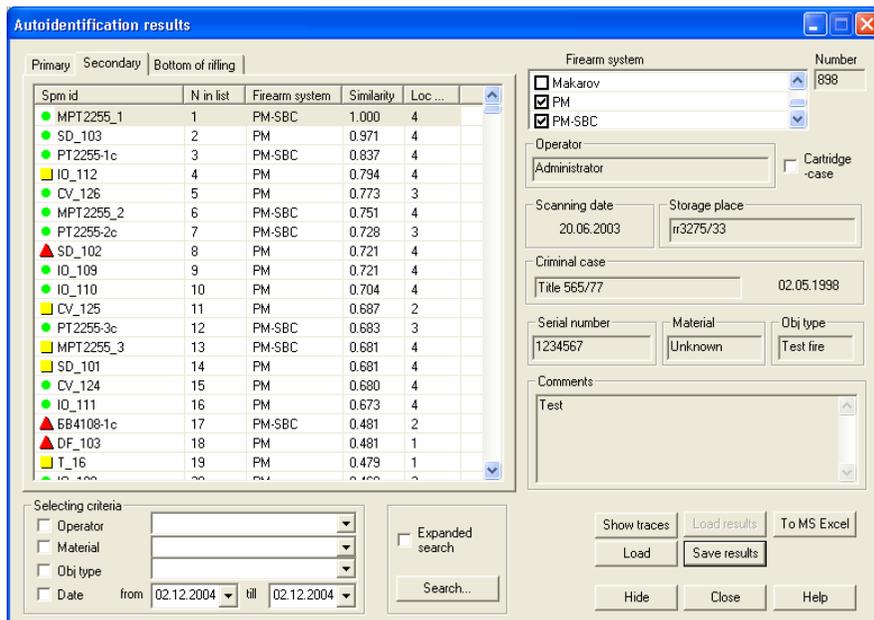
Specimens in the list are arranged in the descending order of the degree of similarity to the object under examination in the corresponding trace. Furthermore, to the left of the specimen name is a pictogram of green, yellow or red color containing additional information for the user as to the actual extent of similarity of the given object's trace border coordinates with those of the object under examination:

- Green – great extent,
- Yellow – medium extent,
- Red – lesser extent.

To view information about a specimen, click the left mouse button on the specimen identifier in the list.

To view the image of the bullet selected in the list, press the **Load** button.

NOTE: The image from the database and the image under examination will be positioned according to two coordinates in such a way as to allow the operator to view the parts of rifle traces with the highest similarity degree in the screen center.

Measure Lengths and Angles *button*
Switches on the mode of measuring the distance between two points and an angle relative to the vertical. First mark the base point relative to which measurements will be made. For this bring the cursor to the point of interest and press the left mouse button. Then, holding the button down, bring the cursor to the second point of interest. The angle and distance values between the base point and the cursor are displayed in the **Measurement** form. The form description is given below.

Brightness and Contrast *button*
Opens the image brightness and contrast adjustment form. The form description is given below.

Information about Traces *button*
Opens the **Information about Traces** form. The form description is given below.

Show Bullet Cross-Section *button*
Opens the horizontal bullet section display window. The description is given below.

About Program *button*
Opens the window showing information about the program. **Note.** Help is called by pressing the F1 key.

3. Specimen Import

This mode is designed to provide for the opportunity to enter into the DB specimens recorded by other Condor systems.

To initiate the procedure of importing the file containing information about the specimen select **File**-> **Specimen Import** in the main application menu or press the **Specimen Import** button on the main application window tool bar. This will result in the appearing of the **Open** form.
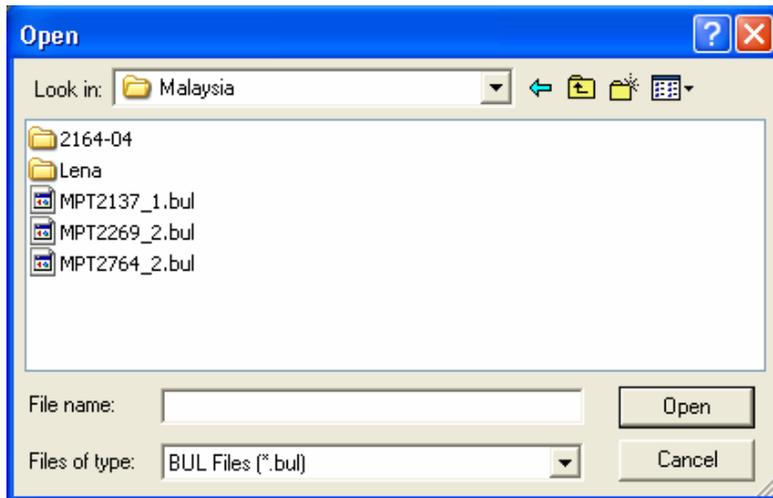
In this form select the file to be imported and press the **Open** button.

The user is offered to select the firearm system and the object material from those registered in the database. For this purpose there appears on the screen the **Choice of Firearm System and Material** form.

Depending on the selected traces the autoidentification will result in forming corresponding lists.

The **Firearm System** field, in addition to the firearm system name of the object under examination, also contains the firearm system names from the DB having similar parameters: caliber, number of rifles and direction of rifle traces. The user can add the objects of these firearm system names (by flagging them) to the autoidentification.

The operator can curtail the list of objects for autoidentification. For this select a criterion (by flagging it) and a line in the opening lists of the group of control elements **"Selecting criteria"**. The selection is carried out according to the following criteria:

- Name of the operator who has entered the information into the DB;
- Object jacket material;
- Object type – test fire or criminal;
- Temporary specimen record range in the DB.

NOTE: Using the **Expanded Search** option may improve the autoidentification results on secondary traces and rifle bottom traces through the use of additional information.

Press the **Search** button to start the autoidentification procedure. The message **"Sorting of the list completed!"** shows as the procedure is over.

Viewing the autoidentification results

Appearance of the **Autoidentification Results** form upon completing the ranking procedure:
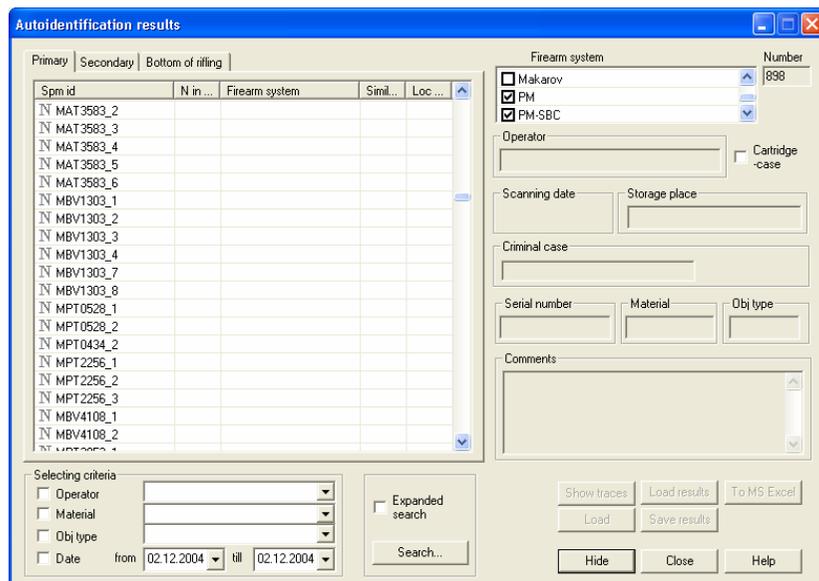
Control buttons:

Search… starts the automatic search procedure;

Show traces   opens the **Viewing of Traces** form. The form description is given below;

Load Results   loads from the DB the results of the autoidentifications on the specimen under examination made earlier;

To MS Excel displays the autoidentification results in the MS Excel format (version 7.0 and higher);

Load loads the selected specimen into the lower viewing window;

Save Results saves in DB the result of the carried out autoidentification;

Hide hides the form;

NOTE: In this mode a number of buttons of the main application window become inaccessible.

Close closes the form;

Help provides necessary information on the given form.
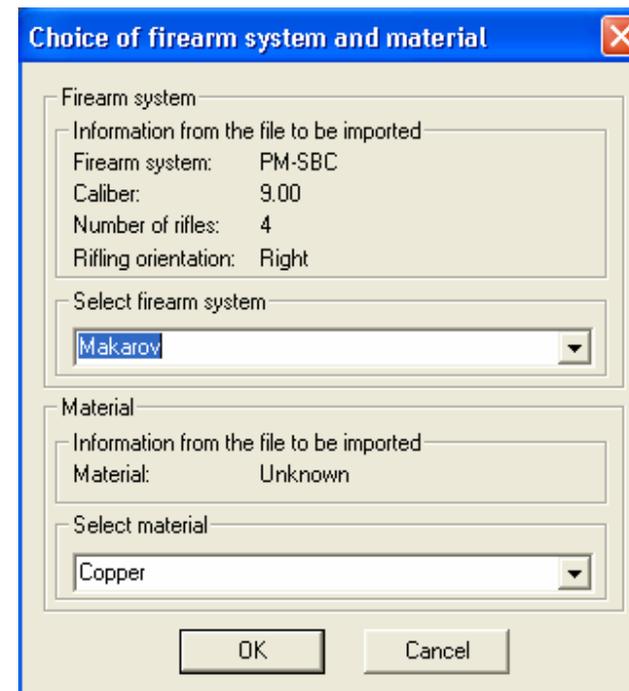
Firearm system properties (name, caliber, number and direction of rifles) are read out from the imported file and displayed in the information fields. The names of all the firearm system registered in the DB are in the list of firearm system selection box. The user can select a firearm system similar in characteristics to the one from the file or ask the Administrator to register a new firearm system in the DB.

Following the successful file import the image will be displayed in the upper viewing window (the specimen will be assigned the "under examination" status). To save the specimen in the database press the **Add Specimen to the Database** button on the main application window tool bar.

4. "Bullet Repository Browser" form

It opens on pressing the Bullet Repository Browser button or on selecting the corresponding menu item File->Bullet Repository Browser.

It allows to view the contents of the bullet repository (DB) storing the images of the objects grouped by firearm system, as well as information cards accompanying them. Viewing the contents is carried out by browsing through individual object image codes (identifiers) of specimens with information cards about them.
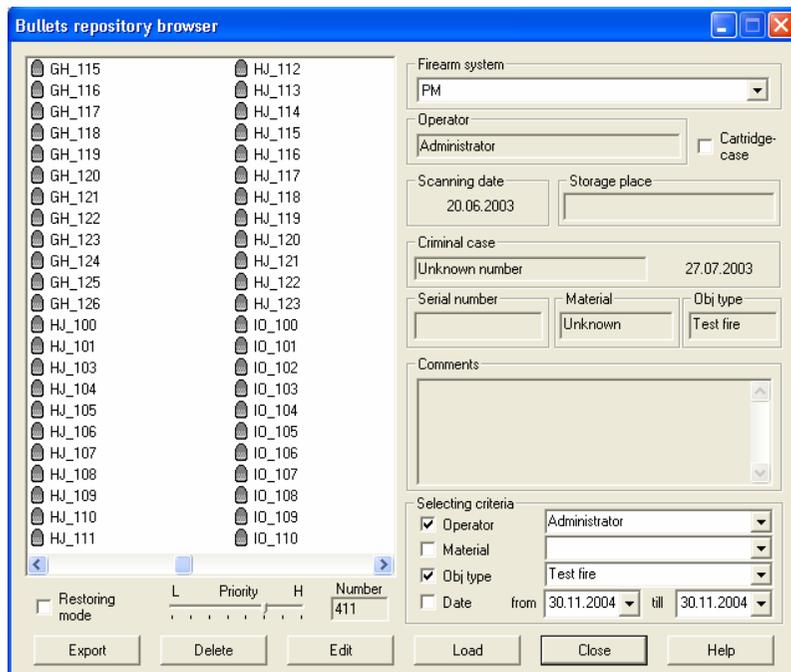
Control buttons:

Export enables the highlighted specimen to be recorded as a file to be transferred (exported) to another Condor system;

NOTE: By selecting the specimen identifier out of the list and by pressing the **Export** button the user will be offered to

19. Autoidentification Mode

The mode is designed to carry out an automatic ballistic examination. It allows to form for the bullet under examination a list of bullet specimens from the DB having similar parameters (caliber, number and direction of rifle traces) and arrange this list in the descending order of the degree of matching with the bullet under examination.

Autoidentification start
The mode is activated by means of the **Autoidentification**

button or by selecting the menu item **Viewing->Autoidentification**, upon which there appears the **Autoidentification** form.

NOTE: The button and the menu item are accessible only in the case the image of the object under examination with marked traces is loaded into the upper window of the **Bullet Repository** application.
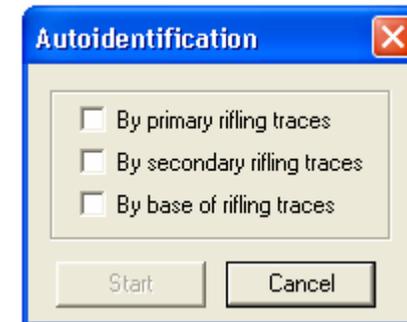
In the form mark the traces to be the base for the autoidentification and press the **Start** button. The **Autoidentification Results** form appears.

18. Specimen Selection according to Preset Criterion

The mode is designed to form a list of objects from the DB corresponding to the preset criteria.

Upon selecting the menu item **View->Specimen selection according to preset criterion** there opens the **Specimen Selection according to Criteria** form.

It contains the main specimen classification properties by which they are stored in the DB. To include a parameter in the search criterion check the field (by flagging it) and select a line out of the opening list or input search information and then press the **Select** button.

The left window will display identifiers of all the specimens satisfying the preset criteria.

Pressing the **Load** button allows to load a specimen for viewing selected from the list into the lower window of the **Bullet Repository** application.

preset the name of the file under which the specimen will be recorded. Information on recording process is displayed in the **Status of Specimen Loading** form. The following information will be saved in the file:

- Specimen identifier,
- Bullet surface image,
- Firearm system name, as well as additional information including the caliber, number and direction of rifles,
- Lighting direction by recording the object image,
- Initial object scanning position,
- Name of the bullet material,
- Brightness and contrast values set by the operator who carried out the bullet scanning.

The file formed in this way can be recorded onto a portable information carrier and imported to another CONDOR system.

Delete marks specimen as "to be deleted" in the DB. The physical removing of the record from the database and of the corresponding image file is performed from the Administrator software;

Edit opens the text fields of the object information card for editing;

Load loads the selected object into the lower window of the **Bullet repository** application;

Close closes the **Bullet Repository Browser** form;

Help provides the necessary information about the form.

List formation by criteria

The list of specimens in the left viewing window can be reduced by presetting selection criteria. The selection can be carried out according to one or several of the criteria listed below:
- Operator having recorded the specimen in the DB.
- Object material.

- Object type (object from the crime scene or test-fired in the laboratory).
- Date of entering the specimen in the DB (by setting time interval).

To set the selection criteria select the mark (by turning on the flag) and the line in the opened lists of the control elements group **"Selecting criteria"**. In this case the list of the specimens to be displayed will be automatically re-formed.

Loading Specimens from the DB

To load the selected specimen into the viewing window, press the **Load** button. Depending on the type of connection to the storage server the process of image loading may take from several seconds (in case of broad band connection) to several minutes (in case of narrow band, modem connection). The image loading process is displayed in the **Status of Specimen Loading** form.
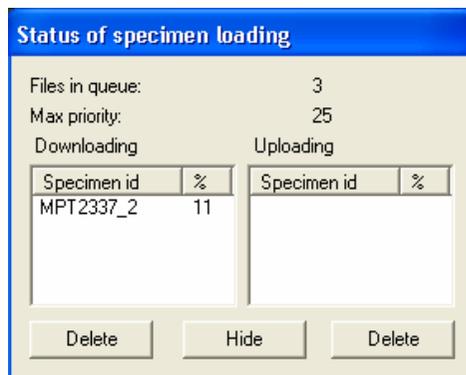

Located in the upper window part are the information fields showing the number of the files waiting for their turn to be loaded from the server, as well as the maximum priority of the loading assignment. In the lower part there are the display windows for the specimen identifiers whose files are loaded from the server or recorded onto the server. The window shows the specimen identifier and the percentage of the loaded information volume. If the user has changed his mind about loading the specimen from the server, he can select the specimen name in the viewing

17. Viewing of the Form of the Horizontal Section of the Scanned Object

This mode is designed to display the horizontal bullet section corresponding to the first band level of the recorded image. It is called by the button or by selecting the corresponding menu item **Modes->Bullet cross-section**. It displays the horizontal bullet section of the "active" object image.
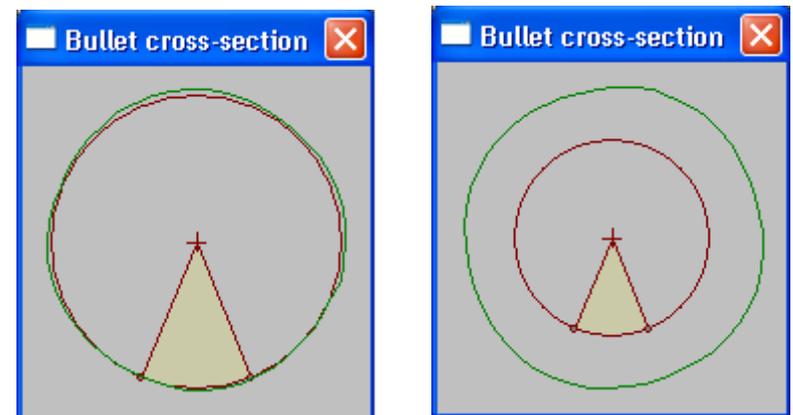
The real bullet cross-section is shown in green, while the circumference drawn with a radius corresponding to the firearm system caliber is red. The circumference radii indicate the borders of the visible image zone in the viewing window.

- Number of actually marked traces.

Information about the characteristics of the first rifle trace visible on the screen is displayed in the upper part of the form. With the aid of the upper tabs one can select the type of the trace the information on which is to be displayed – primary or secondary. The insert fields display:

- Trace number;
- Inclination angle of the left trace border in degrees;
- Inclination angle of the right trace border in degrees;
- Trace width of the lower image part;
- Trace width of the middle image part;
- Trace width of the upper image part.

With the aid of the control buttons located in the lower part of the window one can move the image to the next or preceding traces.

window and press the **Delete** button.

If the user wishes to load a specimen in the first place without canceling current specimen loadings, he/she can raise the priority of the specimen to be loaded by means of the loading priority slider located in the lower part of the form **"Bullet Repository Browser"** under the list of specimen names.

Restoration of deleted specimens

The list of the specimens marked for deletion but not yet physically deleted from storage servers can be displayed by marking the **Restoring mode** field. In this case the user can restore an accidentally removed specimen by selecting it in the list and pressing the **Restore** button. At this point the form will be transferred into the specimen information card editing mode.
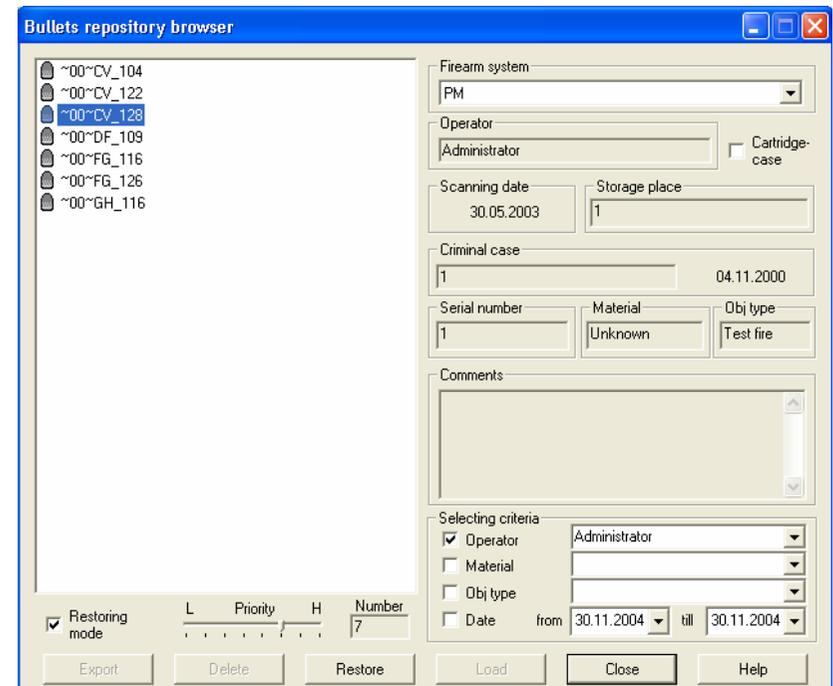
The user can select specimen to be restored and, by pressing the **Restore** button, change the information about it, then save this information in the DB (by pressing the **Update** button, which substitutes the **Restore** button). After the specimen restoration the form will switch to the mode of viewing the bullet repository contents, from which the user can load the restored specimen.

5."Add Specimen to the Database" form

It opens on pressing the Add Specimen to the Database **button or by selecting the corresponding menu item** File-> Add specimen to the database**.**
It allows to enter a new image into the bullet repository and fill out an information card about it or to change the information about the specimen already existing in the DB.

16. Viewing of Object Characteristics

The mode is designed to present metric information about the traces of the object stored in the DB. It is activated by means of the button or by selecting the menu item **Modes->Information about the rifling traces**. This calls the **Information about traces** form.

The lower part of the form displays the following information about the "active" specimen:
- Specimen identifier;
- Firearm system;
- Object diameter and image record height in millimeters.
  NOTE: The diameter and height are calculated on the basis of the real image size. Therefore, if the image is highly deformed, the object diameter may differ from the caliber for the given firearm system.
- Number of rifles for the given firearm system.

The clearance of image fragments is carried out in the following sequence:

1. Select the fragment. For this mark the left and right vertical fragment borders by double-clicking the left mouse button, when the cursor is on the graduated limb. At this point on the image there will appear dark-yellow vertical lines signifying the borders of the fragment to be deleted.
With the aid of the **Delete** button one can cancel the selection of the "current" fragment borders.
2. Mark the remaining fragments to be removed. The fragment numbers are displayed in the information window of the form.

NOTE: To switch to fragments select their number in the information window of the
form.

3. Delete the marked fragments by pressing the **Clear** button.

NOTE: Once saved in the database, the deleted fragments cannot be restored.

Control buttons:

Add allows to enter an object image with a filled out information card in the bullet repository;

NOTE: If a specimen is called from the DB for introducing changes, the **Update** button is substituted for the **Add** button.

Cancel closes the **Add Specimen to the Database** form without saving information in the DB;

Browse…: opens the **Criminal Case** form. The form description is given below;

Help provides necessary information on a given form.

6. "Criminal Case" form

It allows to view the criminal cases registered in the bullet repository, edit them or add new ones.
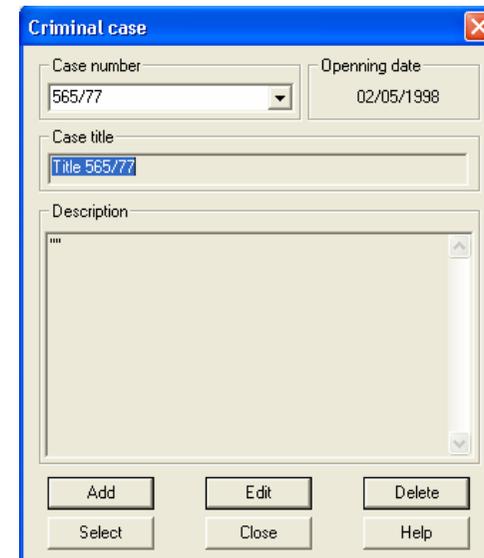
Control buttons:

Add allows a new criminal case to be registered in the bullet repository;

Edit allows to edit data on a criminal case, which is already in the database;

Delete deletes information about a criminal case from the database;

ATTENTION! If there are specimens concerning to this criminal case, the button is disable.

Select transfers the selected criminal case into the **Add Specimen to the Database** form;

Close closes the **Criminal Case** form;

**Help** provides necessary information on a given form.

- Buttons with arrows in the lower and upper slider part – serve to move the image in the corresponding window. When the mode of synchronized object image movement is activated, irrespective of which button is pressed, both images move simultaneously.
- The **Alternately** button – activates the cyclic switching mode of images loaded into the upper and lower viewing windows in the tracing region. The images are switched at a frequency of 2 Hz.
- The **Close** button – closes the tracing mode.

15. Clearance of Image Fragments

This mode is designed to edit object images – delete the fragments of object images that do not contain useful information (for example, highly defocused areas).

NOTE: Only newly scanned images, which are not yet entered in the system's database, can be edited.

It is activated by selecting the menu item **Modes->Clearance of image fragments.** There appears on the screen the **Clearance of Image Fragments** form.
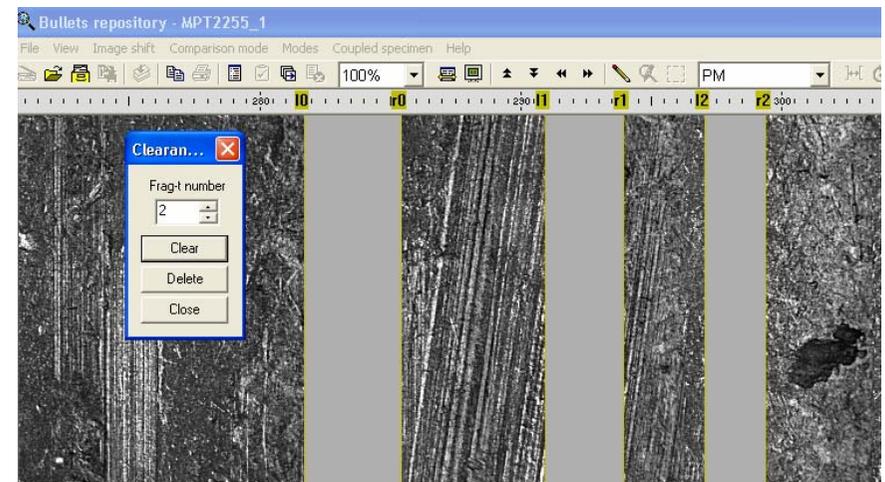
14. Image Superposition Mode – Tracing Mode

Is designed to increase the efficiency of comparing the two objects' traces.

It is switched on by means of the **Tracing Mode** button or by selecting the menu item **Modes->Superposition of Images**. At this in the screen center there appears a rectangular area with an image obtained by mutual superposition of objects loaded into the upper and lower windows, with different transparency factors. The tracing mode control panel will appear in the right part of the tracing window.
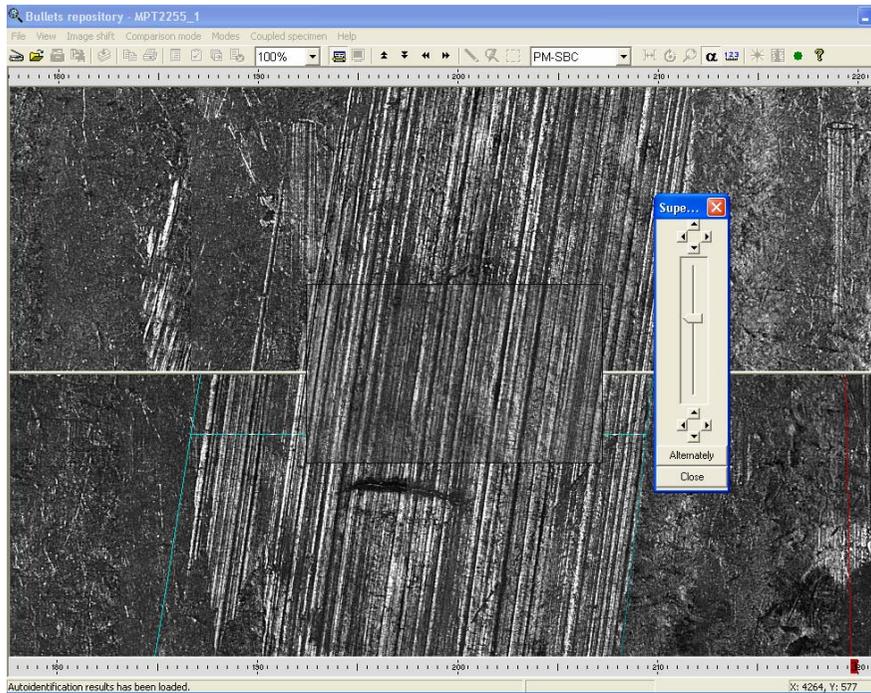

Control elements on the panel:
- Slider – adjusts the image transparency factor. The upward slider movement decreases the transparency factor of the image loaded into the upper window and increases pro rata the transparency factor of the image loaded into the lower window, and vice versa.

7. "List of Loaded Specimens" form

It opens on pressing the **List of Loaded Specimens** button or by selecting the corresponding menu item **View-> List of loaded specimens**.

The form window displays the identifiers of the specimens loaded into the Application from the database.
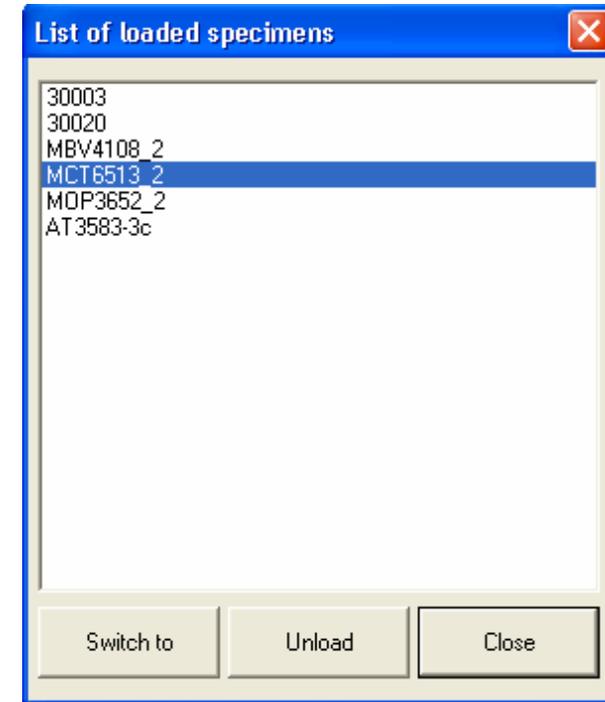

To switch over to the required specimen select it out of the list and press the **Switch to** button.

To remove a specimen from the Application select it out of the list and press the **Unload** button.

8. "Display Mode" Form

It opens on pressing the button or by selecting the corresponding menu item **View ->Display mode**.
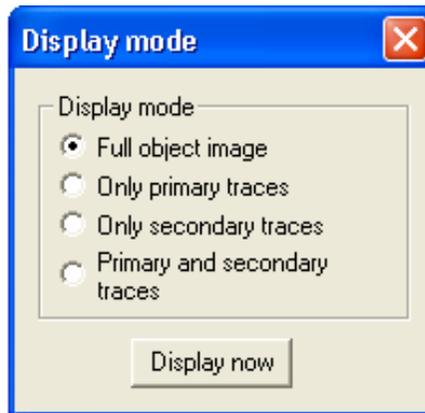
The program provides for four object image display modes:

- Full object image,

- Only primary traces,

- Only secondary traces,

- Primary and secondary traces.

To switch over to the required mode select it in the menu and press the **Display now** button. At this the program will switch to the selected display mode in both viewing windows.

　　NOTE: If in one of the windows no trace is marked on the object image display mode will not change.

On the second press of the **Display now** button the form will be closed, with the program remaining in the selected display mode.

13. Magnification of Images Mode

Is designed to carry out a more exact alignment of images in the upper and lower viewing windows at the established scaling factor of less than 1.

On pressing the button on the tool bar or selecting the menu item **Modes->Magnification of images** there appears in the screen center a rectangular area in which magnified image fragments located in the upper and lower viewing windows at their common border are displayed. The form for setting the factor of magnification appears in the left part of the screen.

In the form one can select the factor of fragment magnification within the range from the current scaling factor to 1.
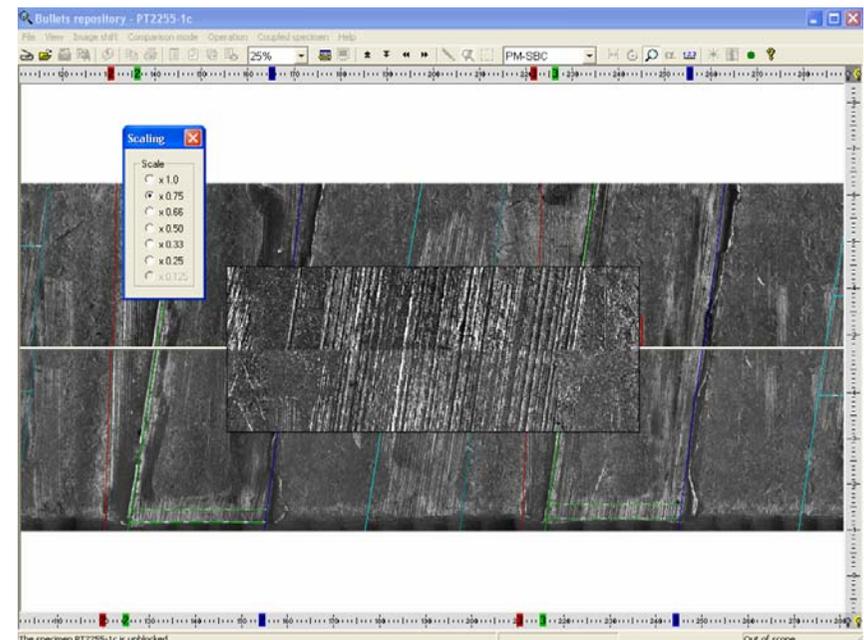

One can exit the mode by pressing the button on the tool bar or by unflagging the corresponding menu item.

sheet size will be output for printing (the factor of image magnification may change from 1 to 4). Otherwise, the image is output for printing on the initial scale.

3. To carry out the marking bring the cursor to the upper left or lower right corner of the area being marked, press the right mouse button and, while holding down the button, draw out the emerged outline.

4. Input the comment for the marked area into the comment field.

    NOTE: The outline of the "currently selected" marked area is red. All the other areas are highlighted in green outline. The ordinal number is output in the upper left corner of the outline.

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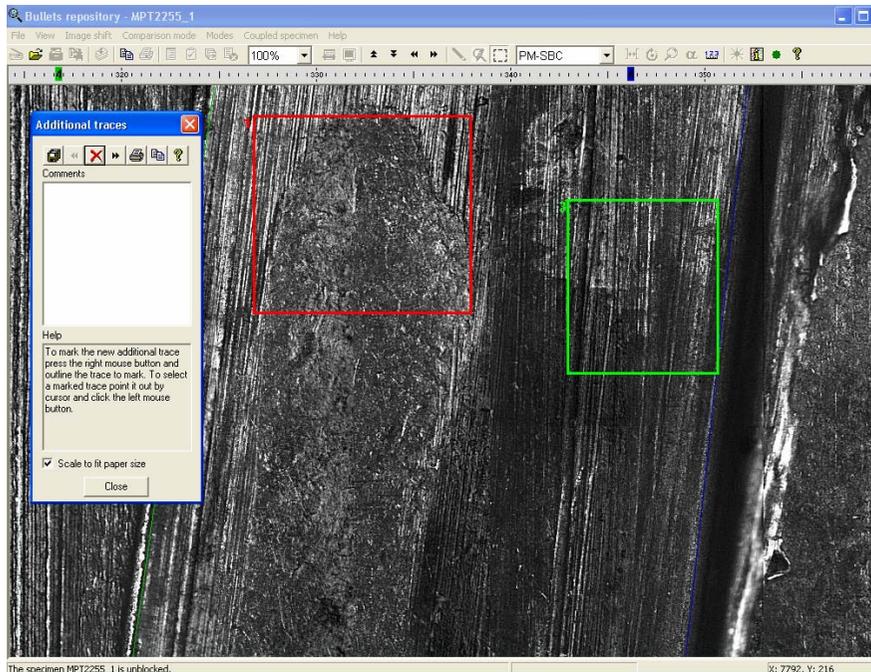
9. Work in the Bullet Repository Application

Recording an object images into the Bullet repository

    NOTE: Only the object image from the upper viewing window can be recorded into the bullet repository. This image can be either transferred from the **TeleMicroscope application** or imported from a file.

1. Press the **Add Specimen to the Database** button.

2. Fill out the fields being edited in the **Add Specimen to the database** form.

3. Select the criminal case name from the list, in case it has been registered earlier.

4. Select the **Browse…** button for editing or entering information about the new criminal case.

5. In the **Criminal Case** form:

a)   Press the **Edit** button and introduce changes in the information about the already registered criminal case and then press the **Save** button,

b)   Press the **Add** button and fill out the information fields about the new criminal case, then press the **Save** button.

6. Select object type: **Criminal** is an object from the crime scene;

        Test fire is an object of the firearm gun being tested.

7. Press the **Add** button in the **Add Specimen to the database** form.

## Loading of object images from the Bullet repository

1. Press the **Bullet Repository Browser** button.

2. In the **Bullet Repository Browser** form:

a)   Select the firearm system,

b)   Select the specimen identifier.

3. Press the **Load** button.

> **NOTE:** The image is loaded into the **lower** viewing window of the **Bullet Repository** application.
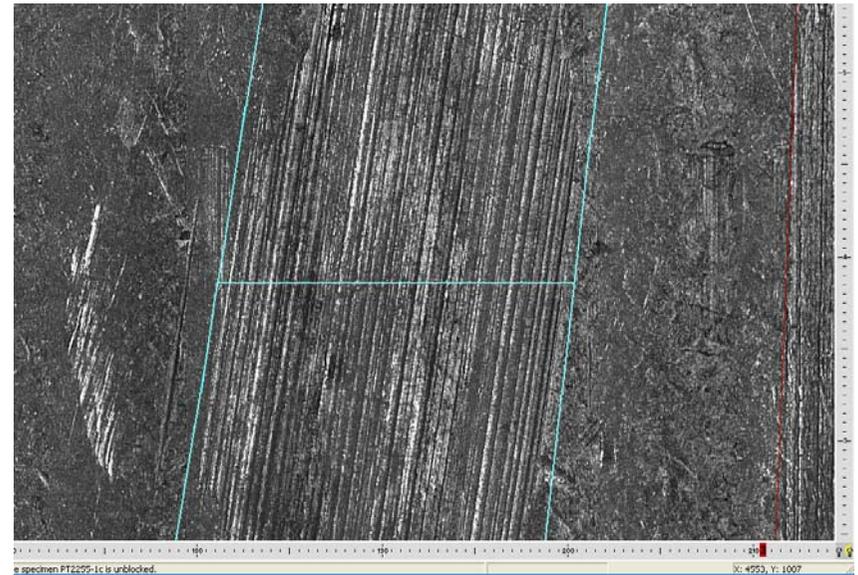
12. Mode of Marking Additional Traces

Is designed to highlight on an image or a DB record rectangular areas containing additional information necessary for the expert's work.

NOTE: Additional traces are not used for the automatic search.

1. Make the image "active".

2. Press the button or select the menu item **Modes->Marking of additional traces**. At this there will show the **Additional Traces** form.
Control buttons used to save, delete the marked area, switch to the next or preceding marked area, print out or call contextual information are located in the upper window part. The field for inputting the comment to the current highlighted area is located under the buttons.
The field for selecting the "Scaling" print mode is located below. By checking this field an image fragment scaled to the

bring the cursor to the upper region boundary and click the right button. On the image there will appear a horizontal line signifying the upper boundary of the secondary trace region. Then mark the lower boundary in a similar manner.

- Mark the remaining traces in a similar way.

NOTE: The marked borders have the following color: red – own border of the primary trace, green – common border of the primary and secondary traces and blue – own border of the secondary trace.

NOTE: To delete the last marked border press the **Delete Border** button, and to delete the whole marked trace - the **Delete Trace** button.

5. Mark the rifle bottom trace borders in the following way:
- Bring the cursor to the upper point of the left rifle bottom trace border.
- Press the right mouse button and, while holding it down, move the cursor parallel to the strokes toward the lower point of the left trace border and then release the button.
- Mark the right trace border in the same way.
- Draw a horizontal line between the borders, which crosses the most characteristic strokes – bring the cursor to the assumed line and click the right mouse button.

NOTE: The marked borders are pale blue. The horizontal line is dotted.

6. Save the trace border coordinates in the DB by pressing the **Save** button.

NOTE: If the user forgets to save the marked traces in the DB, the program will offer to do this on exiting from the trace-marking mode. If the user refuses to save them, the newly marked traces will not be displayed in the viewing window.

10. Object Image Comparison Mode

Is designed to carry out ballistic examination by comparing the images of characteristic object traces on the monitor screen.

The image of the object under examination is always loaded into the upper viewing window (by transferring from the scanner or by importing the specimen from the file).

The image being loaded from the bullet repository may be made the one under examination. In this case the image is assigned the examined status by pressing the ▢ button or by selecting the menu item **Comparison mode->Assign examined status to the specimen** after it has been loaded from the database into the lower window of the **Bullet Repository** application.

The images of the objects with which the object under examination is being compared are loaded from the bullet repository into the lower viewing window.

Use mouse to move the images in the viewing windows. The image in the window will shift together with the cursor, with the left mouse button being held down.

The button provides for the ▢ simultaneous viewing of two images. It means that the images will move synchronously within the limits of their display windows.

The functions of the other buttons providing for the work with images is explained in the description of the **Bullet Repository** application.

11. Marking of Rifling Traces Mode

Is designed to leave mark traces on an image and save the coordinates of rifle trace borders and rifle bottoms in the DB. The border coordinates are used for the automatic search in the DB for objects "similar" to the one under examination.

Work procedure:
1. Load the image from DB or obtain it from the **TeleMicroscope** application.
2. Move the image in such a way as to make the whole rifle trace or its left part visible.

3. Press the ![pencil] button or select the menu item **Modes-> Marking of Rifling Traces**. At this, the **Rifling Traces** form will appear.

Its upper part displays the buttons by means of which the marked trace borders can be saved in DB and the last marked trace border or the whole marked trace can be deleted.

Under the buttons there are located the tabs with the aid of which the marked traces selection can be made:
- Marking the borders of primary and secondary traces,
- Marking the borders of rifle bottom traces.

The information fields contain information about the number of traces, the number of traces to be marked, the type of the border to be marked and the inclination angles of trace borders.

The group field in which the types of the traces to be marked on the given specimen image are selected is located in the lower form part.

4. Mark trace borders in the following way:

NOTE: Border marking sequence: "from left to right" for the rifles' right inclination angle and "from right to left" for the left one.

- Bring the cursor to the upper point of the border of the trace to be marked.
- Press the right mouse button and, while holding it down, move the cursor parallel to the strokes toward the lower point of the trace border and then release the button.
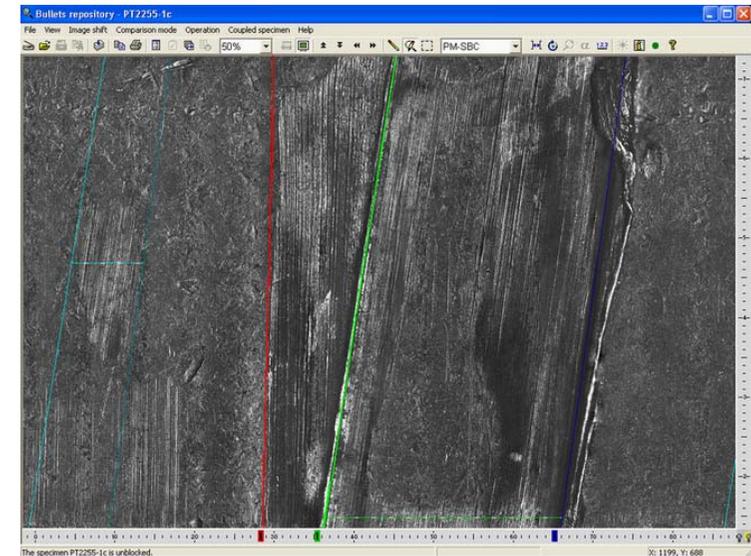
- Mark the next border of the trace to be marked in the same way.
- For secondary traces mark the upper and lower boundaries of the most informative regions (the lower part of the trace image with strokes parallel to the borderlines, see fig.).
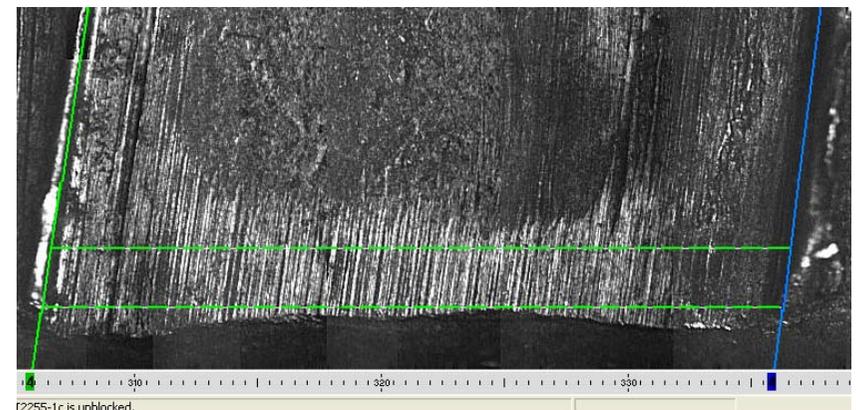
After marking the right border of the secondary trace