



HOME

User Manual

DELMIA Process Engineer[®]

ERGOCHECK



Foreword

This manual provides an introduction to the Process Engineer ERGOCheck operations and functions. The ERGOCheck is a software tool for conducting ergonomic analyses.

While developing these functions we have made every effort to create a clearly organized, easy-to-understand program structure.

A user-friendly interface as well as a clear menu guide will enable you to quickly learn how to operate the program and to get familiar with its functions so that you can carry out your planning tasks in a quick and reliable way.

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1. Introduction

This manual explains how to use the Process Engineer ERGOCheck for your planning purposes.

This manual describes the software tool ERGOCheck. It explains the use and operation of the software. It does not contain a detailed description of the specific regulations and standards applying to this software. Whenever a description of a specific analysis process is used as an example in this manual, the applicable standards are also referred to, unless this information is already present in the page header. The appendix contains a summary of all standards and guidelines referred in this manual.

1.1 How to Use this Manual

This manual enables you to get familiar with the operation and functions of the ERGOCheck. This manual briefly describes:

- How to start and exit the software tool ERGOCheck
- Menus and views required for ERGOCheck
- How to start and exit the program
- How to execute menu functions and how to navigate in views



Note

When handling the ERGOCheck functions, please also refer to the general introduction to Process Engineer in the General Introduction Manual.



Click [General Introduction](#) to access the manual.

1.2 Documentation Conventions and Symbols

The symbols used in this manual are intended to provide you with keys to the contents in an immediately understandable manner.



This symbol is used to introduce key concepts that are covered in the sections immediately following this symbol. As a result, this symbol most frequently appears at the beginning of chapters or sections.



Note

*This symbol is used to mark notes, which provide you with additional information you need to have for further work. You will either find the Note sign at the beginning of a chapter or in a particular text passage in the chapter. Texts bearing this sign are additionally marked with **Note**. The text is always in italics.*




Caution

*This symbol indicates that the text that follows describes particular circumstances that you must avoid to avoid potential errors with the operation of the program or harm to data. You will either find the Caution sign at the beginning of a chapter or near a particular text passage in the chapter. Texts that are introduced by this sign are additionally marked with **Caution**. The text is always in italics.*

Example

This symbol marks examples which serve to illustrate a certain situation.

- 1) This symbol marks the individual operational steps involved in a particular operating instruction. Operating instructions describe operational steps, for example, how to open a menu or execute a function.
- This symbol marks listed subjects. The symbol for listed subjects can be either used to structure a continuous text or to list main subject keywords.
- This symbol marks list inside a bulleted or numbered list.
-  This symbol marks cross reference information that is available in another manual.

1.3 New Functions in ERGOCheck

No new functionality has been added for this release.

2. Ergonomics Analyses

Workstation and ergonomics analyses are functions structured as checklists. They can be applied in the planning phase as well as in operational areas. They are either based on applicable national or international standards, guidelines or laws, or they reflect generally recognized methods and procedures tested and proven in actual use. The methods of analysis available here are not claimed to be exhaustive. There are numerous company-specific guidelines, ranging from application-related bodies of knowledge to special national standards. Such company-specific methods of analysis are not contained in ERGOCheck.

For this reason, the procedures for creating and implementing analyses in ERGOCheck have been automated to an extent that permits new methods to be quickly added on as needed.

If you have such methods of your own that you would like to have available as an analysis function in ERGOCheck, please let us know. In such case, we would be pleased to create the respective analysis function for you.

Measures for ergonomically structuring/designing a product and the technical facilities in the work system, as well as the overall work environment all contribute to promoting occupational health and safety, to providing an attractive work environment and thus, in general, to increased productivity.

Furthermore, the occupational safety and health law in effect in Germany since December 1996 as well the EN 1003 engineering guidelines each stipulate the creation of ergonomic working conditions.

The extensive implementation of practical steps based on knowledge gained in industrial science and industrial medicine presumes that the comprehensive set of regulations, standards, and textbooks, etc. now available can serve as a source for creating a methodical approach to determining relevant variables and deriving a feasible process for conducting pertinent analyses and evaluations.

Accordingly, this process for evaluating work systems was developed for use by those planners working out in the field. In doing so, the primary objective is to make these methods of evaluation a permanent part of the planning and design process, and thus to always take into account the importance of work structuring in achieving uniform occupational safety and health.

The process of computer-supported work system evaluation should be able to be used as both a theoretical and actual corrective measure. On one hand, it should already be applied in the planning stage to obtain a rough evaluation of factors affecting work structuring. On the other hand, it should also be used to evaluate and, if necessary, reduce and correct undesirable working conditions in already functioning work systems.

The process should be able to be easily applied by all employees involved in planning and structuring procedures; that is, its application must not be restricted to groups of experts with specialized training and knowledge.

Computer-supported activities, directed by users and with system-derived standard analyses, mean that ergonomic evaluations can now be quickly and easily completed.

The results of a workstation evaluation are presented in the form of Green, Yellow, or Red ratings, which indicate the relative extent of possible deficits in structure and design.

The three possible ratings have the following meanings:

- Green rating means that the structure/design of the workstation (or the work system) is OK.
- A Yellow rating means that the workstation (or work system) is OK with certain restrictions. In this case, technical or organizational restructuring measures are not urgently required, but the weak points detected in the evaluation should be reduced or eliminated, as appropriate, such as in the context of a continuous improvement process.
- A Red rating for specifically evaluated criteria or for the overall structural quality means that the workstation (or work system) being studied is in need of technical and/or organizational improvements.

If, in certain individual cases, a recommended improvement is not possible, this situation must be documented and accounted for.

2.1 System Hardware and Software Requirements

- 1) PC with Windows NT 4.0 SP3, Windows 95, Windows 98, or Windows 2000
- 2) Main working memory (minimum/recommended): 16/32MB RAM (32/64MB for Windows NT, 64/128MB for Windows 2000)
- 3) 10MB of free hard disk space

Graphics System

Minimum requirements for the graphical display system:

- 4) 1024x768 pixels monitor resolution
- 5) Color depth of at least 256 colors
- 6) 15" monitor size

System Requirements for the Standalone Version

Since the standalone version is running at system level, the basis provided by the operating system is critically important.

The platform required is a Windows 32-bit environment (Windows 95/98, Windows NT4). Windows 16-bit environments are not supported, including those with a Win32 expansion.

MS Internet Explorer V5.5 or higher must be available for operation.

Requirements for the Intranet Version

MS Internet Explorer V5.5 or higher must be available for operation.

ERGOCheck is based on the HTML 4 version described in the W3C specification, including style sheets created in accordance with CSS1 and CSS-P specifications. Script execution requires JavaScript Version 1.2, or JScript Version 3.0.

Requirements for the Module Version

For the module version, the system requirements are primarily determined by the main application that are calling it.

For ERGOCheck, this means that the system requirements are comparable to those for the standalone version indicated above. MS Internet Explorer V5.5 or higher must be available for operation.

3. ERGOCheck Interface

The ERGOCheck user interface consists of a processing view as well as menu and tool bars.

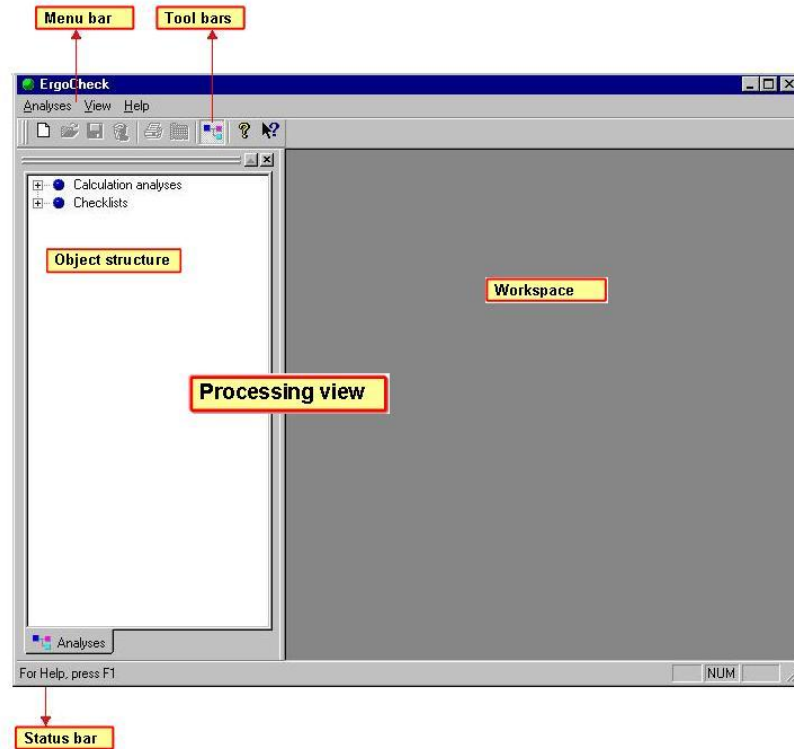


Figure 1: ERGOCheck User Interface

3.1 Processing View

The processing view in ERGOCheck allows you to easily and efficiently manage and edit all types of ergonomics objects. Here you can quickly and easily create, move, copy, delete, and edit objects as needed. In addition, you can assign various attributes to objects, change these properties at any time and define access rights for others to your objects.

The processing view automatically opens when ERGOCheck is started. When working with the software, you can also open this view via the menu bar located at the upper edge of the ERGOCheck program window. To do this, select the option **New Processing View** in the **Analysis** menu.

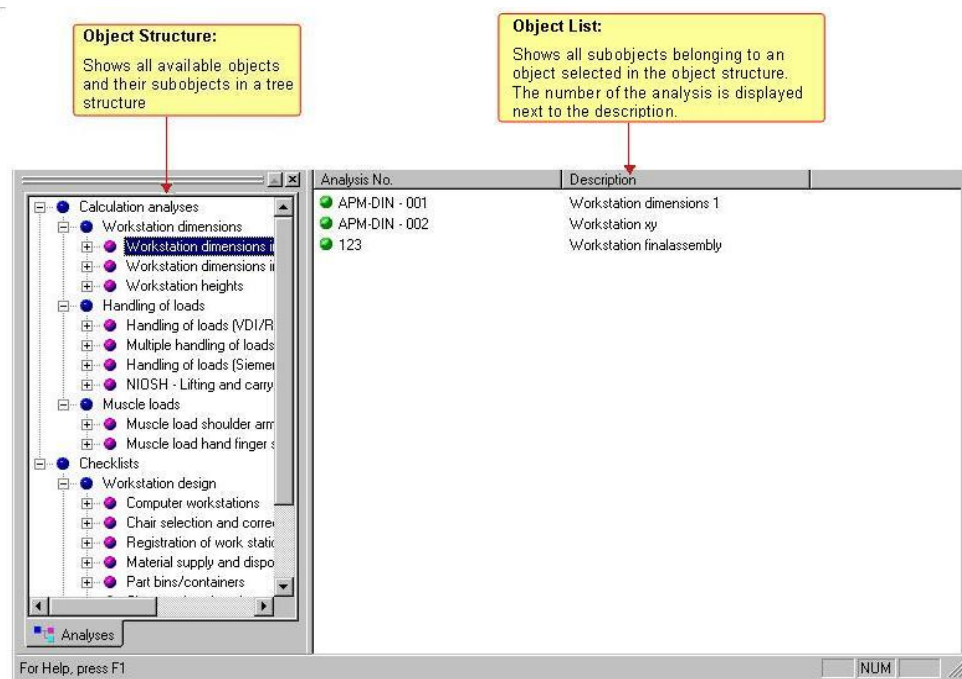


Figure 2: Processing View with Directory Trees and List of Objects

- The ERGOCheck processing view always contains the following two different display areas:
 - The **Object Structure**: It is displayed in the left section of the processing view.
 - The **Object List**: It is displayed in the right section of the processing view.
- The object structure contains all available objects and their structure displayed as a tree view. The object list shows all subobjects belonging to an object selected from the object structure.
- Different object types are distinguished by different icons.
- In the object structure, each icon for an object type has the name of the object next to it. In the object list, the objects shown are also characterized in greater detail with information such as the number, code, and date of creation.






3.1.1 Description of Data Structure in the Tree View (Object Structure)

In this data structure (object structure) you can do the following:

- Display a structured overview of existing analyses
- Open existing analyses
- Create new analyses
- Save updated analyses

The **object structure** displays the complete, overall structure of objects and subobjects that were created in ERGOCheck. With just a few clicks of the mouse, you can navigate through this structure to reach specific objects. The

dotted lines between the individual objects graphically represent their structural relationship to each other in the hierarchy.

A  sign before an object icon indicates that this object is linked to additional subobjects (such as analyses all belonging to one work system). To view the subobjects in a given object structure, left-click  sign. Other elements may be hidden behind these objects. To view the ones at this lower level, follow the same procedure. After the “structure branch” under an object has been opened (expanded), the  sign in front of it then changes into a  sign. Left-click  sign, to close (collapse) the display of the subobjects.

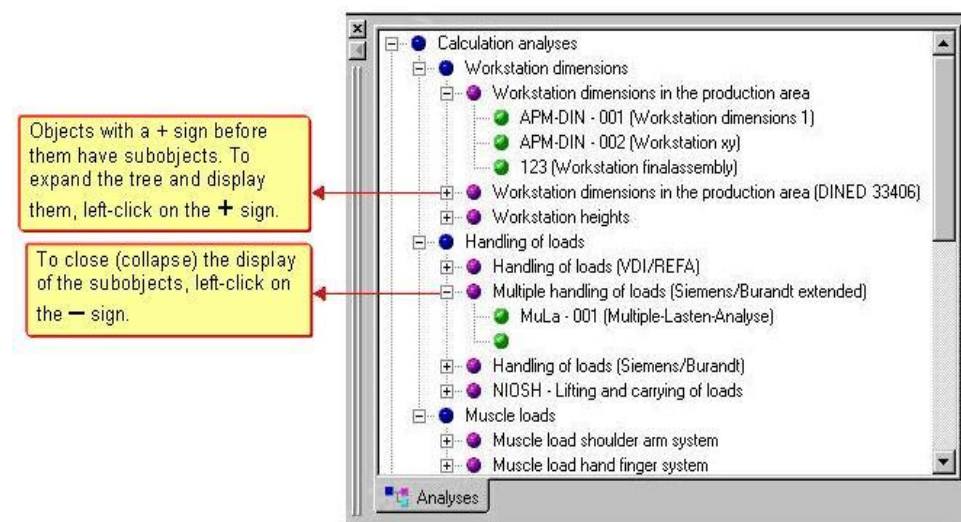


Figure 3: Object Structure in the ERGOCheck Processing View

The **object structure** in ERGOCheck is subdivided into four levels, each of which is described below.

Levels in ERGOCheck

First Level

In the first level, ERGOCheck distinguishes between calculation analyses and checklists.

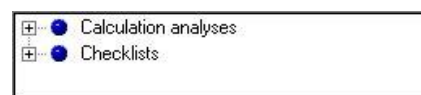


Figure 4: Levels in the Object Structure Connect the Two Groups of Words

Calculation analyses are analyses that provide a result calculated based on entries made (specific values from a permissible range of values). This result is an evaluation based on the values that you entered and the standards or guidelines that also apply.

Checklists are questionnaires structured similar to multiple choice surveys.

Second Level

In the second level, calculation analyses and checklists are subdivided into their own topic areas.

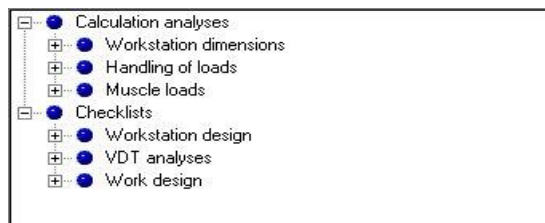


Figure 5: First and Second Levels of the Object Structure

Third Level

In the third level, the topic areas are further subdivided according to the type of analysis applied. This is the level where the various analysis types are listed. Here you can see all the processes currently available for use.

Currently, ERGOCheck has over 19 different types of ergonomic analyses available: (subject to change)

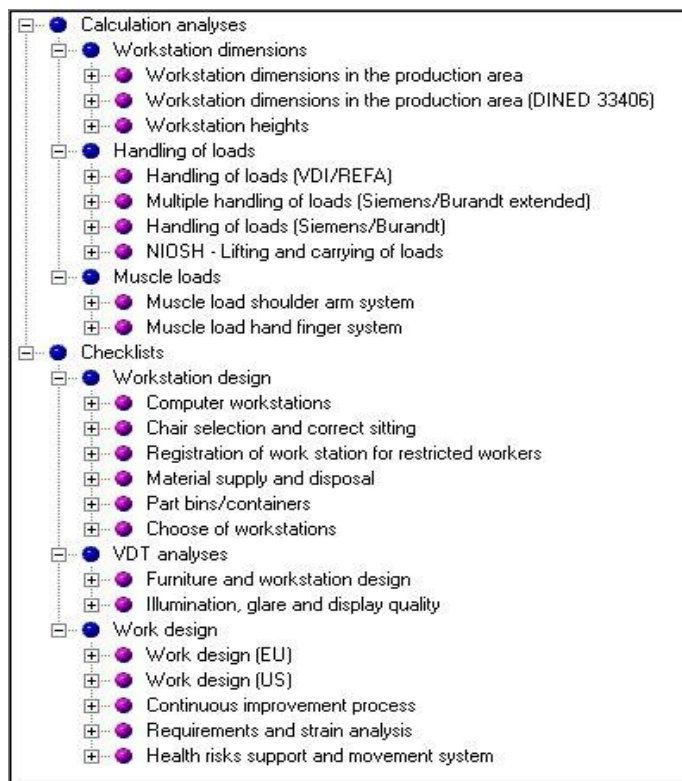


Figure 6: First, Second, and Third Levels in the Object Structure

Last Level

The last level is the actual analysis level. This is where you can find all previously processed analyses.

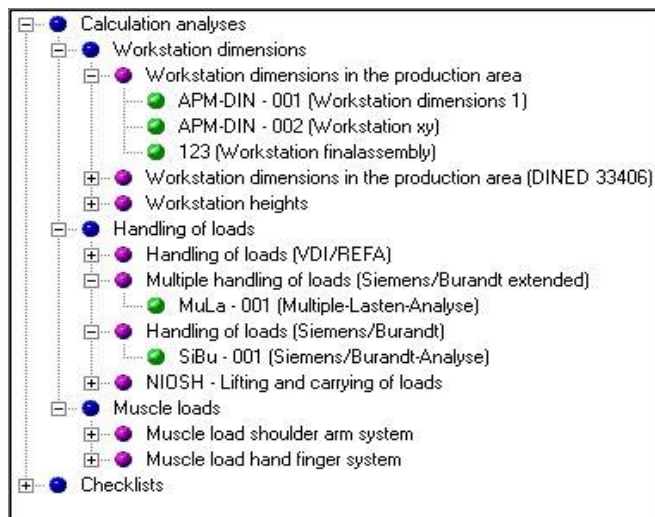


Figure 7: Analysis Levels within the Object Structure

Carrying Out Actions Listed in a Pop-up Context Menu

Various actions for an object, such as performing an analysis, can be triggered from within an object structure and object list by means of a pop-up context menu. To open the pop-up menu, right-click on the relevant object in the object structure or in the object list. The actions that are offered in the menu depend on the type of object selected.

The following actions can be triggered for all kinds of objects via the context menu in a directory tree as well as in the object list:

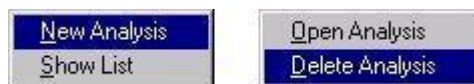


Figure 8: Actions for an Object

If the pop-up menu is opened in a directory tree, you can also create a subobject via the menu option **New Analysis**. However, this cannot be done by opening the context menu in the object list.



Note

When updating an analysis, you only have the index bar available as a context-driven menu. Please refer to the [Index Bar](#).

3.2 Menu Bar and Toolbars

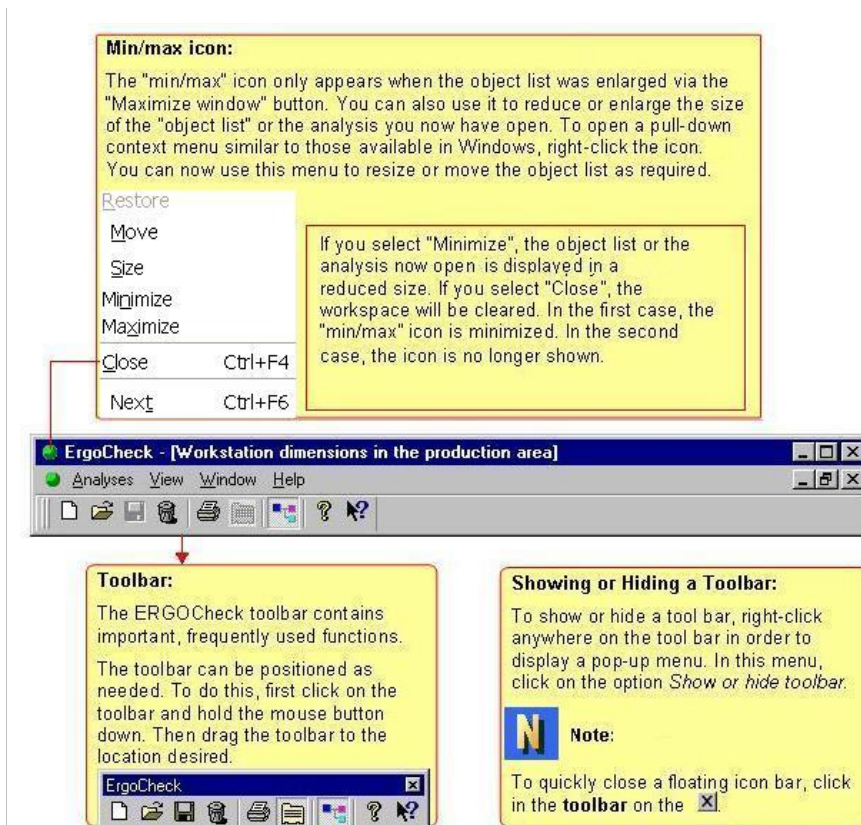


Figure 9: ERGOCheck Menu Bar and Tool Bars

All of the functions in the menu bar can be activated using pull-down menus. Click on the individual entries with the left mouse button, or activate them by typing the respective underlined letter. The specific entries shown in the menu bar depend on the element selected. This is discussed further in the description of these elements.

Showing or Hiding a Toolbar

To show or hide a tool bar, right-click on any of the tool bars in order to display a pop-up menu. In this menu, click on the name of the tool bar that you want to hide or show.








Note

To quickly hide a floating tool bar, just click Close button in the tool bar.

Table 1: Icons Description

Icons	Name	Description
	New Analysis	Opens the object list to create a new analysis
	Open Analysis	To open a new analysis (the analysis type vary depending on the current selection), click this icon.
	Save	Saves the current entries
	Delete	Deletes the selected analysis. This command is only available when an analysis is selected

Icons	Name	Description
	Print	Prints the selected analysis. This command is only available when an analysis is selected
	Show/Hide Index Bar	Shows or hides the index bar that is only available in analyses
	Show/Hide Tree Structure	Shows or hides the object structure.
	Help	Opens the online help
	Context-sensitive Help	Context-sensitive help contains information on various objects displayed on the screen. To display the context-sensitive help for an item in a dialog box, first click the question mark and then on the item. (If the dialog box does not display a question mark for context-sensitive help, select the item desired and then press SHIFT+F1.)

In cases where certain menu commands are frequently used, they are represented by graphical symbols or icons. Since you can directly execute the functions they represent by simply clicking on them, these icons can help you to work faster and easier with ERGOCheck.

Minimize/Maximize/Close Button Group




Figure 10: Maximize, Minimize, and Close Buttons

▪ Minimize Button

To reduce the application window, left-click **Minimize** the Window button.

▪ Maximize Button

To enlarge the application window so that it fills the entire screen, left-click **Maximize** the Window button. To restore the window to its original size and position, click  or double-click on the title bar.

▪ Close Button

To close the application window, left-click **Close** button.

Arranging Minimized Documents in the Program Window

If several analyses are minimized, they can be arranged at the bottom of the program window. To arrange the icons, click **Windows** menu on **Arrange Icons**. The minimized documents are then arranged from left to right at the bottom edge of the program window.



Note

If no documents are minimized, the Arrange Icons command is unavailable.

Restoring a Minimized Document Window in a Program

In the **Windows** menu, click name of the document that you want to restore.



Note

To restore a minimized analysis that is visible, double-click on it.

Keyboard Shortcuts

In menus, context-sensitive menus and pop-up menus, each command entry has a keyboard shortcut that you can also use to execute the command.

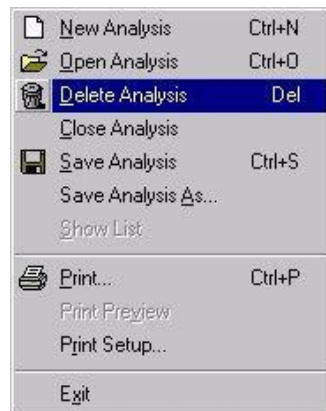


Figure 11: Keyboard Shortcuts



Caution

The keyboard shortcuts listed in this manual refer to the German keyboard layout. The keyboard layout for other languages may vary from the German one. If the keyboard language does not match the language of the ERGOCheck version installed, the shortcuts described may not work with your program settings.

3.2.1 Menu Item Analysis

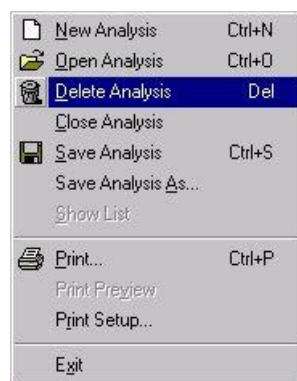


Figure 12: Pull-Down Menu Obtained after Activating the Menu Item Analysis

This menu contains the commands used to create, define, save, or print new objects or to exit the program. Data modified in the structure view is automatically updated back in the database. To save changes made while updating a time analysis, select **Save** command.

- To open the object list in order to create a new analysis, select the menu item **New Analysis**. In the new view you can not only create new analyses (as is possible in the already opened one), but you can also edit and update a second analysis or compare and exchange data between analyses.
- To open an analysis that you have selected, click menu item **Open Analysis**. If you have not selected a specific analysis, then the object list contains all analyses of the type selected, similar to the Show List function. Now you can open the analysis that you selected.

- To delete a selected analysis (after being prompted by ERGOCheck to confirm this action), click menu item **Delete Analysis**.
- To close the analysis, click menu item **Close Analysis**.” If you have added entries or made other changes to the analysis, ERGOCheck ask if you want to save these changes.
- To save the analysis, click menu item **“Save Analysis.”** The menu item is only available when an analysis is selected.
- To copy the selected analysis, click menu item **Save Analysis As...**” The menu item is only available when an analysis is selected.
- To display all analyses of a given type in the object list, click menu item **Show List**.
- To print the analysis currently opened, click menu item **Print...**
- To select printer options in the **Print Setup** dialog in Windows, click menu item **Print Setup...**
- To exit ERGOCheck, click menu item **“Exit**.

3.2.2 Menu Item - View

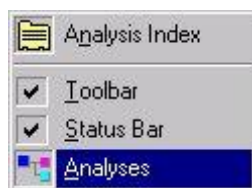


Figure 13: Menu Item - View

The menu item **View** always refers to the processing view. Here you can show or hide the toolbar, the status bar, and the object structure (analyses). If an analysis is open, you can also show or hide the index bar.

3.2.3 Menu Item - Windows

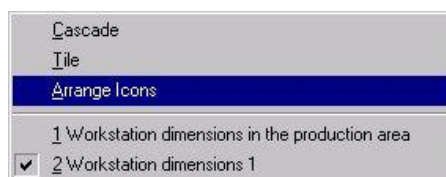


Figure 14: Menu Item - Windows

As with all other Windows applications, you can use this menu item to arrange open windows so that they are cascaded or tiled horizontally or vertically next to each other. Here you can also select from different views of analyses. This menu item is only available when an analysis is open.

3.2.4 Menu Item - Help

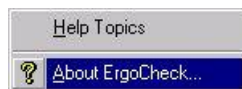


Figure 15: Menu Item - Help

Click **About ERGOCheck...** to get information about the ERGOCheck Software version currently being used.



Figure 16: ERGOCheck Software Version



Note

To open the online help, press F1 key.

3.2.5 Status Bar

The status bar is the line displayed at the very bottom of the monitor screen and shows the current operating status of the software. Here you are either shown the operation that is currently being executed, or the word **Ready** is displayed to indicate that the system is waiting for input.

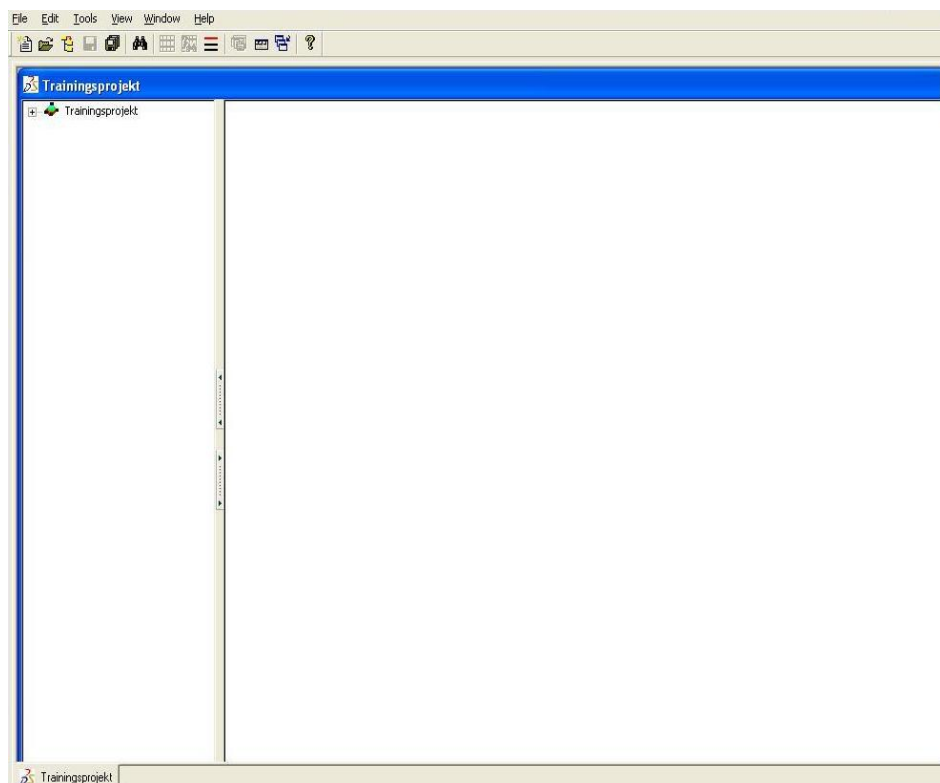


Figure 17: Status Bar

4. Creating New Analysis

This section uses examples as a basis for explaining how to create analyses.

At times, these explanations also refer to the previously described ERGOCheck user interface and its functions.

4.1 ERGOCheck Analyses

This section explains the terms and basic functions used in ERGOCheck.

Control and Input Elements

These elements activate one or more settings. When the setting is **activated**, a checkmark or a dot is shown.

You can enter values in the white input boxes. The blue display areas are used for calculations and cannot be edited.

Resizing and Moving Windows

Move the cursor to the window border. When the cursor has changed its appearance, you can drag the border to increase or reduce the window size or change its shape.

To move a window, place the cursor in its title bar and drag it to the new position.

Scroll Bar

If a window is not large enough to display all of the information in it, a scroll bar is displayed. Scroll bars can be displayed horizontally or vertically. To display contents of the screen that are not visible, click the arrows at either end of the scroll bar, move the slider in the scroll bar track, or click in the scroll bar track on either side of the slider.



4.1.1 Basic Structure of an Analysis

When you first open a calculation analysis, you see the index bar and an empty page (this does not apply to checklists).

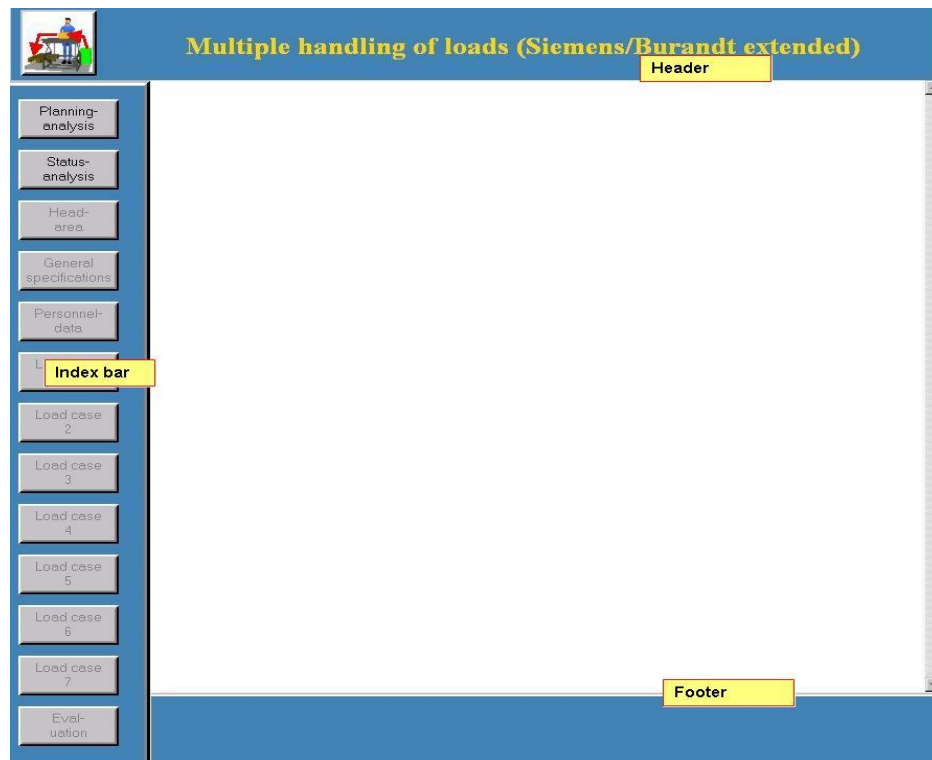


Figure 18: Calculation Analysis

In the index bar, only the following two buttons are active:

- **Planning** analysis
- **Status** analysis

After you have selected a planning analysis or a status analysis, it is then displayed on the page.

All analyses, whether a calculation analysis or a checklist, have the same structure. They are always subdivided into specific areas.

The following is the difference between a planning analysis and a status analysis:

Planning Analysis: A **planning analysis** is carried out in a planning phase; i.e., for a workstation that does not yet exist. The result of a planning analysis is a recommendation.

Status Analysis: A **status analysis** is carried out to examine the ergonomic characteristics of an existing workstation. The result of a status analysis is an evaluation.

Analysis Header Area



Figure 19: Analysis Header Area

The header contains the name of the analysis being carried out along with a graphical representation of the characteristic being examined.

Analysis Footer Area

If you click **Comment** field within the header, the entire footer or, at minimum, the text displayed there get changed.

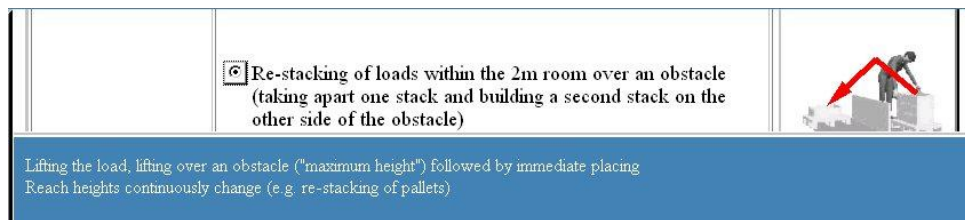


Figure 20: Changes in Text

The footer area in ERGOCheck is used to show information or provide help. Whenever you activate an area or a field, brief helpful information related to it is displayed there. This feature is intended to help even inexperienced users for carrying out analyses correctly.

Index Bar

The index bar is always visible when an analysis is opened for the first time.

To show the index bar (or hide it if it is already visible), you can either click **Index bar** icon in the toolbar or select the menu command **Analysis/Index bar**. The index bar contains buttons labeled with the **names of all system areas**. To access a desired area, click the corresponding button.

How an Analysis is Structured Areas

Each area is structured differently, depending on the particular analysis to be carried out. However, all analyses do have areas in common: the analysis header area and the evaluation area.

These areas are structured like a table, with rows and columns. The first column is reserved for a description of the analysis process and cannot be edited. The remaining columns are structured differently, depending on the type of analysis. To improve understanding and provide an overview of the analysis, the last column contains illustrations of movement sequences. Of course, entries such as **Duration of activity** or **Frequency of exertions** do not require such an illustration.

In ERGOCheck, you can input data in the following two ways:

- By selecting an entry from a list of options
- By entering and editing information in input boxes

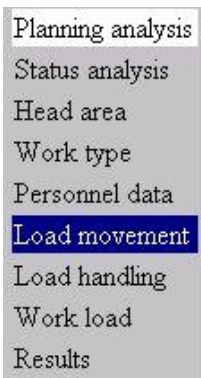
Header Area

Name of the analysis:	Multiple-handling of loads	Number of the analysis:	MuLa - 001
Remark:	Remarks on the analysis		

Figure 21: Header Area

The header contains the name and number of the analysis as well as a field for entering your remarks. The header format is the same for all analyses.

The program automatically enters the name and the number of the analysis in their respective fields. If you want to change this default name or number, first select the entry in the field (either by holding down the left mouse button or by using the keyboard shortcut **SHIFT** + **←** or **→**) and then overwrite it as required.



Analysis Evaluation

A calculation analysis can only be evaluated after all the remaining areas have been filled in.

An evaluation is performed for all analyses, but checklists and calculation analyses are each handled differently. The evaluation process for calculation analyses can be started only after all remaining fields have been filled in. However, in checklists the evaluation process can be started immediately, even if there is no result.

Entering Values from a Range of Values

The range of values is displayed for you in the footer.

If you have made an input error and your values does not lie within the permissible range, ERGOCheck displays an error message in a small window, as shown in [Figure 22](#).



Figure 22: Error Message

Navigating in Analyses

You can navigate in analyses in the following three ways:

- **By using the Scrollbar**
 - By placing the mouse cursor on the slider in the scroll bar and holding the mouse button down.
 - Drag the slider as needed to reach the desired location.
- **By using the Index Bar**
 - The index bar allows you to navigate very quickly. The index bar contains buttons labeled with the names of all system areas.
 - To access a desired area, click the corresponding button.
- **About the Pop-up Context Menu**
 - If the index bar is not shown, you can right-click in the analysis area to display a context menu with the same options and functions available as in the index bar.





Note

The context menu contains only those functions that would also be available in the index bar for the respective analysis.

You also have the following ways of moving from one input field to another:

- After entering a value, confirm it by pressing the RETURN key.
- The cursor jump to the next input field.
- After entering a value, confirm it by pressing the TAB key.
- The cursor jump to the next input field.
- After entering a value, select the next input field with the mouse.
- The value entered is accepted, and the cursor is now located in the next field selected.

If you have many values to choose from, you can select the one you want by clicking on it directly with the mouse or by using the  or  key to reach it.

Printing an Analysis

You can only print the analysis that is currently open.

- Click **Print** icon in the toolbar; or in the menu **Analysis**, select the item **Print**. A **Print** dialog similar to others in Windows opens.

5. Examples

5.1 Handling Loads in Compliance with VDI/REFA

This first example Handling Loads in Compliance with VDI/REFA demonstrates a calculation analysis used in the planning stages of a project. In this example, individual processing stages that are essentially self-explanatory are not discussed in detail. We are only interested in the result of analysis:

The result obtained is a recommendation for the layout of your planned workstation.

This new workstation is to be designed for one worker and have a force rating of 175N. If this layout is not possible, then it should be designed for 2 workers, in which case the permissible force limit shall be reduced by 15% down to 166N.

General Guidelines for Handling of Loads

- Ensure that the workstation has the free area (clearance) required for all work-related movements.
- Avoid obstacles that make shifting of loads more difficult within the free area provided.
- Remove any visual obstacles that may be present when handling large, bulky loads.
- Possibly provide handles or similar devices for carrying heavy or bulky loads.
- Ensure that work movements performed under load do not involve jerking motions and extreme exertion. Instead, strive to achieve balanced and even working movements involving minimal force.
- As far as possible, avoid rotating movements of the torso in order to prevent additional strain on the spine.
- Whenever possible, allow for a straight back posture while bending to handle heavy loads so that the resulting pressure is evenly distributed over the spinal discs.
- Whenever a load is handled by two workers, ensure that the load is equally distributed between them. The recommended load limit for two workers together is to be set at less than the total of the combined load limits for two individual workers.
- When handling heavy loads, pulling is to be preferred to pushing. Avoid rotating movements when pulling or pushing loads.
- If rotating movements are absolutely necessary while lifting loads, the handling sequence should be structured as follows:
 - Lift the load up.

- Rotate the body and load simultaneously until the entire movement is completed.
- Set the load down.

Limit Values

In standard cases, the following limit values must not be exceeded (exceeding them will lead to working conditions endangering health):

Table 2: Limit Values

Sex	Limit Value	Notes
Women	150N	Legally mandated
Men	400N	Recommended limit for repetitive work

These maximum values always apply.

Handling of loads according to VDI/REFA

Name of the analysis:

Remark:

Number of the analysis:

Type of work

Type of the activity execution:	<input checked="" type="radio"/> Shifting of loads without obstacle within the 2m room	
	<input type="radio"/> Re-stacking of loads without obstacle within the 2m room (taking apart one stack and building another stack)	
	<input type="radio"/> Shifting of loads within the 2m-room across an obstacle	
	<input type="radio"/> Re-stacking of loads within the 2m room over an obstacle (taking apart one stack and building a second stack on the other side of the obstacle)	

Figure 23: Sample Planning Analysis, Part 1

Personendaten

Group of persons employed for load shifting	<input type="radio"/> women only <input checked="" type="radio"/> men only <input type="radio"/> women and men	
Age group of the employed group of persons	<input type="radio"/> 15 to 18 years <input checked="" type="radio"/> 19 to 35 years <input type="radio"/> 36 to 45 years <input type="radio"/> 46 to 55 years <input type="radio"/> older than 55 years	?
Physical condition of the employed group of persons:	<input type="radio"/> high training <input checked="" type="radio"/> average training <input type="radio"/> low training	?
Body size (with shoes) of the employed group of persons:	<input type="radio"/> 1.65m or smaller <input checked="" type="radio"/> taller than 1.65m	?

Load movement

Reach height at load taking up	<input type="text" value="400"/> mm	?	
Reach distance at the load taking up:	<input type="radio"/> close <input checked="" type="radio"/> medium <input type="radio"/> far		
Reach height at the load release	<input type="text" value="900"/> mm		
Reach distance at the load release:	<input type="radio"/> close <input checked="" type="radio"/> medium <input type="radio"/> far		

Load handling

Number of persons involved in the load shifting	<input checked="" type="radio"/> 1 person <input type="radio"/> 2 Persons	?
Load shifting is done	<input type="radio"/> one-handed <input checked="" type="radio"/> both-handed	?

Work load

Länge des Beurteilungszeitraums:	<input type="text" value="400"/> Minuten	?
Anzahl der Kraftanstrengungen im Beurteilungszeitraum:	<input type="text" value="400"/>	?
Schwere Nebenarbeiten:	<input checked="" type="radio"/> kommen nicht vor <input type="radio"/> kommen vor	?

Ergebnisse

Consideration of the body weight shifted along	bei der Lastaufnahme notwendig
Maximum force of men in the age of 20 to 30 years	450 N
Individual maximum force of the employed group of persons	450 N
Supportable maximum force of the employed group of persons under the specified work conditions:	175 N

Personendaten

Group of persons employed for load shifting	<input type="radio"/> women only <input checked="" type="radio"/> men only <input type="radio"/> women and men	
Age group of the employed group of persons	<input type="radio"/> 15 to 18 years <input checked="" type="radio"/> 19 to 35 years <input type="radio"/> 36 to 45 years <input type="radio"/> 46 to 55 years <input type="radio"/> older than 55 years	?
Physical condition of the employed group of persons	<input type="radio"/> high training <input checked="" type="radio"/> average training <input type="radio"/> low training	?
Body size (with shoes) of the employed group of persons	<input type="radio"/> 1.65m or smaller <input checked="" type="radio"/> taller than 1.65m	?

Load movement

Reach height at load taking up	<input type="text" value="400"/> mm	?	
Reach distance at the load taking up	<input type="radio"/> close <input checked="" type="radio"/> medium <input type="radio"/> far		
Reach height at the load release	<input type="text" value="900"/> mm		
Reach distance at the load release	<input type="radio"/> close <input checked="" type="radio"/> medium <input type="radio"/> far		

Load handling

Number of persons involved in the load shifting	<input checked="" type="radio"/> 1 person <input type="radio"/> 2 Persons	?
Load shifting is done	<input type="radio"/> one-handed <input checked="" type="radio"/> both-handed	?

Work load

Länge des Beurteilungszeitraums	<input type="text" value="480"/> Minuten	?
Anzahl der Kraftanstrengungen im Beurteilungszeitraum	<input type="text" value="480"/>	?
Schwere Nebenarbeiten	<input checked="" type="radio"/> kommen nicht vor <input type="radio"/> kommen vor	?

Ergebnisse

Consideration of the body weight shifted along	bei der Lastaufnahme notwendig
Maximum force of men in the age of 20 to 30 years	450 N
Individual maximum force of the employed group of persons	450 N
Supportable maximum force of the employed group of persons under the specified work conditions	175 N

Figure 24: Sample Planning Analysis, Part 2

5.2 Selecting a Suitable Container

This second example shows how to use checklists to select a suitable container.

When you click on an entry, a "traffic light" as shown below is displayed.

The number of buttons stands for the number of questions in each area.

- Stands for questions **unanswered**
- Stands for questions answered **positively**
- Stands for questions answered **negatively**

Part bins/containers

Analysis name: Analysis No.:

Comment:

Question	Options
the containers dimensioned according to part batch (not too large or too small)?	<input type="radio"/> not relevant <input type="radio"/> correct <input type="radio"/> incorrect
the containers match each other (container lat. dimension of grid 800x1200mm)?	<input type="radio"/> not relevant <input type="radio"/> correct <input type="radio"/> incorrect
only few different containers used (small container train)?	<input type="radio"/> not relevant <input type="radio"/> correct <input type="radio"/> incorrect
requent repacking avoided?	<input type="radio"/> not relevant <input type="radio"/> correct <input type="radio"/> incorrect
the parts already delivered in the right containers (recycled containers)?	<input type="radio"/> not relevant <input type="radio"/> correct <input type="radio"/> incorrect
the containers match the transporters?	<input type="radio"/> not relevant <input type="radio"/> correct <input type="radio"/> incorrect

Input field for the analysis number
Input is optional.

Section stage: 10 blue buttons
Answer stage: 10 buttons (1 green, 9 blue)
Fulfillment stage: 10 buttons (1 red, 1 yellow, 8 green)

5%
100%

Figure 25: First Dialog Section in the Container Checklist

Part bins/containers

Is the container arranged at the work station so that a refill of parts is unnecessary?

Do the containers always stand in the same place?

Are the containers arranged at the work station corresponding to the optimal work method (passing avoided, movement sequence taken into account)?

Is the container content (piece number) adapted to the consumption?

Are the containers selected in order to keep the piece number for supply about equal for all containers?

Do the containers have an optimal height for taking parts out (e.g. lifting device)?

Are the containers arranged within reach range?

Can the containers be neatly changed or changed (free access)?

Are the weights of full containers adapted to manual handling (weight limits)?

Does the worker have a clear view, if necessary (i.e. no container walls)?

Selection and design of containers

Are the containers dimensioned according to part/batch size (not too large or too small)?

Do the containers match each other (container kit, dimension of grid 800x1200mm)?

Are only few different containers used (small container spectrum)?

Is frequent repacking avoided?

Are the parts already delivered in the right containers (pool/recycled containers)?

Do the containers match the transporters?

Are the containers suitable for transport and storage?

Can the transport volume of empty containers be reduced for transporting them back (foldable, reusable)?

Can containers be marked with a certain color (e.g. network, repairs, ...)?

Sections stage
Answer stage
Fulfillment stage

As already shown in side image, the number of buttons in each color stands for the number of questions in each area.

This is the **section stage**, where the questions are sorted.

The **answer stage** shows you the percentages of questions already processed and evaluated.

The **fulfillment stage** shows you the latest ratings for the currently processed condition. For an example of the process, see the graphic below:

- For the same number of questions being processed, only the evaluation will change.
 - The fulfillment stage will become smaller as the number of "Red" ratings decreases.

Figure 26: Container Checklist

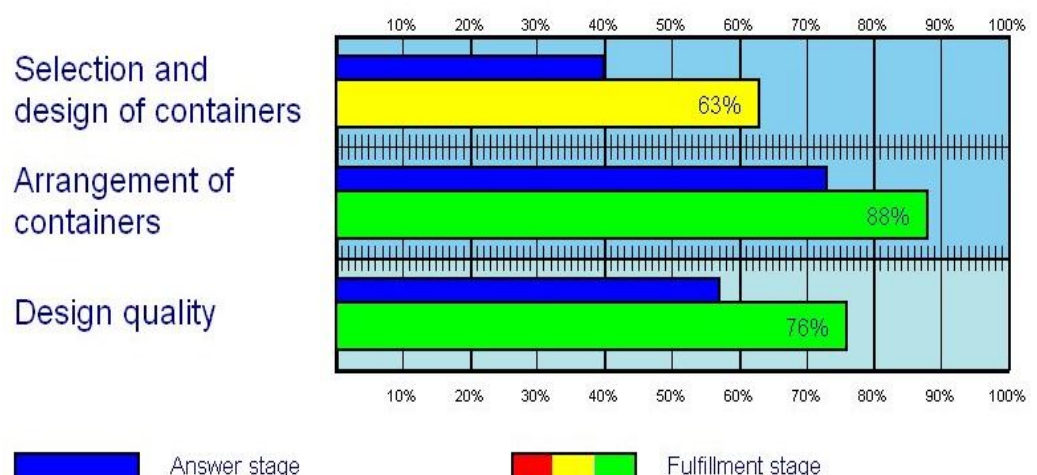


Figure 27: Container Ratings

- A **Green** rating means that the container is **OK**.
- A **Yellow** rating means that the container is **OK** with certain restrictions. In this case, technical or organizational restructuring measures are not

urgently required, but the weak points detected in the evaluation should be reduced or eliminated, as appropriate, such as in the context of a continuous improvement process.

- A **Red** rating for specifically evaluated criteria or for the overall structural quality means that the container being studied is in need of technical and/or organizational improvements.

Appendix

List of Standards and Regulations Referred in this Document

Table 3: Calculation Analyses








 Workstation Dimensions	
Workstation dimensions in production areas	(DINED 33406)
Heights of assembly workstations	Determining the recommended height of assembly workstations (TÜV Rheinland)
 Handling of Loads	
Handling loads while seated or standing (as per VDI/REFA)	[Handling loads while seated or standing (VDI/REFA)]
Repetitive handling of loads while seated or standing	Guidelines for planning ergonomic design of workstations" in REFA News 6/1984 (Berger, G.; Jenner, R.-D.; Planungsleitfaden für die ergonomische Arbeitsplatzgestaltung)
Shifting loads while seated and standing	Determining recommended limit values when shifting loads by hand while seated and standing (SIEMENS/Burandt)
Shifting loads while standing	[NIOSH Guideline (OSHA, USA)]
 Muscle Stress and Strain	
Muscle stress and strain in the shoulder-arm system	Determining maximum muscle stress and strain in hand-finger and in hand-arm systems (Schultetus/VDI)
Muscle stress and strain in the hand-finger system	Determining maximum muscle stress and strain in hand-finger and in hand-arm systems (Schultetus/VDI)

Table 4: Checklists

 Workplace Design	
Computer workstations	
Chair selection and correct posture when sitting	Safety report of the "Management Occupational Group", No. 4/89, p. 4-10.]. [Trade Association of the Steel Furniture Industry, Düsseldorf]
Workstations for disabled workers	This process was developed by Robert BOSCH GmbH and is being applied there in various plants.
Supplying and removing workstation containers	
Selecting suitable work system types	This process was developed by Robert BOSCH GmbH.
 VDT Analyses	

 Workplace Design	
Furniture and workstation design	
Lighting and display quality	
 Work Design	
Test questions for work design (EU)	Test questions for work design – specific, detailed design tips to help you find all the weak points and potential for improvement. Can also be used as work station inspection list (MTM)
Test questions for work design (US)	Test questions for work design – specific, detailed design tips to help you find all the weak points and potential for improvement. Can also be used as work station inspection list (MTM)
Continuous Improvement Process (CIP)	
Requirement and capacity analysis	RCA- Requirement and Capacity Analysis The methods and equipment used in a “Requirements and Capacity Analysis” - RCA were developed as part of a study program, [Humanization of working life] conducted by the [German Federal Ministry of Research and Technology] 01VD588 - AA - TAP 0017, 01VD588/1)
Health-related criteria for support and moving devices	Health risks for support and moving devices as per Kentner, M.; Bachmeier, W.; Menges, R.; Wilken, A.: Beschwerden und Erkrankungen im Bereich des Stütz- und Bewegungsapparates - Mögliche Mitursachen im beruflichen Bereich und Präventivmaßnahmen. [“Complaints and illnesses related to support and moving devices – an investigation of possible contributory causes in occupational areas and preventive measures”] In: Zentralblatt für Arbeitsmedizin, Arbeitsschutz und Ergonomie (1993), Nr. 11, S. 370 - 387. [“News on occupational medicine, work safety and ergonomics” (1993), No. 11, pp. 370-87.]

Laws and Regulations

German Occupational Safety Law

The German occupational safety law (enacted on August 7, 1996) is concerned with implementing measures necessary for improving worker safety and health protection on the job.

The most important section of the German occupational safety law is to be found in Section 5, Paragraph 1, in which employers are held responsible for evaluating working conditions. As stipulated in Section 6, an employer must take such measures and document them accordingly. The law is divided into the following sections.

Table 5: Laws and Regulations

Section	Contents
§ 1	Objectives and areas of application
§ 2	Terms and definitions
§ 3	Basic employer obligations and responsibilities
§ 4	General principles
§ 5	Evaluation of working conditions
§ 6	Documentation
§ 7	Assignment of tasks
§ 8	Cooperation among many employers
§ 9	Special dangers
§ 10	First aid and other emergency measures
§ 11	Provisions for occupational medical care
§ 12	Instruction
§ 13	Responsible persons
§ 14	Notification and hearings for civil service employees
§ 15	Employee obligations and responsibilities
§ 16	Special assistance
§ 17	Employee rights
§ 18	Authority to issue regulations
§ 19	Directives within the European Community and international agreements
§ 20	Relations applying to civil service
§ 21	Competent authorities Cooperation with providers of legally mandated occupational accident insurance (workman's compensation coverage)
§ 22	Jurisdiction of responsible public authorities/agencies/offices
§ 23	Company data; cooperation with other public authorities/agencies/offices; annual report
§ 24	Authority to issue generally applicable administrative regulations
§ 25	Regulations on imposing fines

Section	Contents
§ 26	Regulations on offences punishable by imprisonment or fines

Regulations Set Forth in the Amending Articles

On December 20, 1996, the German occupational safety law as amended/extended by the following articles:

- **Article 1** implements the EEC Guideline 89/656/EEG on the minimal regulations for employee occupational safety and health protection when using personal safety equipment on the job.
- **Article 2** implements the EEC Guideline 90/269/EEG on the minimal regulations for employee occupational safety and health protection when handling loads which, in particular, present a danger to the lumbar area of the spine.
- **Article 3** implements the EEC Guideline 90/269/EEG on the minimal regulations for employee occupational safety and health protection when working at computer monitors and similar display devices (5th individual guideline).
- **Article 4** changes the regulation applying to workplaces which is necessary to permit full implementation of EEC Guideline 89/654/EEG on the minimal regulations for employee occupational safety and health protection in the place of work (1st individual guideline).

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