



Skins in automation: zenon Chameleon Technology

How the flexible adaptation of colors, contrast and design improves the operation of terminals - as well as security and usability.

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For MP3 players, mobile phones and audio/video software, changeable user interfaces known as skins, are a popular luxury. While they serve to increase enjoyment for consumer entertainment products, in the field of professional automation they can contribute significantly to user comfort and security. When carrying out usability research, COPA-DATA focused on delivering optimal visual information under the most varied conditions. This resulted in the development of zenon's Chameleon Technology – individual skins for all zenon terminals. Skins are based on central, switchable color palettes and, as a result, bring benefits to engineering.

In this document, you can read about the advantages that skins provide for automation and how you can get the most out of them using zenon.

Skins in automation: areas of use

Skins help to improve the operation of terminals in a variety of different circumstances, primarily:

1. Engineering
2. Central design
3. Bad lighting conditions
4. Red-green visual impairment
5. Adaptation of the terminal to the person, role or application

1. More simple engineering

Color palettes simplify and shorten engineering times. The project engineer selects colors directly from color palettes, like in graphics programs, instead of laboriously entering color codes, which carries a high risk of errors being made.

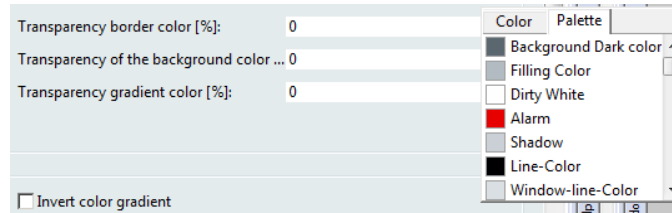


Figure 1: Color selection from predefined palettes

A meaningful name can also be given to individual colors. The project engineer places a meaningful note next to the color palette, stating the correct use of the color. A design developed in this way can be reused at any time using color palettes and can also be amended at any time very simply.

No.	Identification	COPA-DATA Inr
0	Background Dark color	#5A676F
1	Filling Color	#B2BBC2
2	Dirty White	#FEFEFE
3	Alarm	#E60000
4	Shadow	#CAD0D5
5	Line-Color	#000002
6	Window-line-Color	#DADFE3
7	Window-2nd-Color	#E6E9EC
8	Dark Frame	#2D363F
9	Logon-Button_dark	#659B2F

Figure 2: A meaningful name can be given to individual colors.

This contributes to more efficient development whilst maintaining quality and increasing usability. As a result, engineering costs are reduced and productivity increases.

2. Central design

If several suppliers or subcontractors work on a project, coordination of central design requirements is a considerable challenge. The solution is standardized subprojects, which are simply combined into a superordinate integration project. Using centrally defined color palettes that have been supplied to the user, they are adapted to the corporate design without problems and with the same look & feel.

Users, therefore, receive the usual user interface with trusted graphic design and coloring. Projects that have been assigned separately can thus have a common user interface and integrate seamlessly into the one project. Subsequent expansions can be integrated into an existing project without disruptions in the

user interface. Old designs can be integrated this quickly and transferred to the current design in a few mouse clicks. New projects can also be integrated as quickly and, thanks to the familiar look and feel, can expect better acceptance. This ensures reduced costs for training and high productivity from the start.

3. Worse viewing conditions

Viewing conditions in factory buildings can change quickly. Viewing conditions at the terminals can change according to the time of year, weather and type of window. Mobile devices used outside are influenced much more by these difficult-to-control conditions. Sunlight, for example, leads to reflections on the displays and bad contrast. On the other hand, bright displays can dazzle in a dark environment.

If contrast and brightness can be adapted to the environment, panels can be more safely operated in difficult conditions. If this is to take place at operating system level, the operator must have the corresponding rights; and for touch panels with full screen HMI, this isn't possible anyway. A better solution is provided by configurations already available at the press of a button in the HMI/SCADA system. The adapted displays can result in continued high productivity, less operator errors and, thus, reduced downtime.

4. Red-green visual impairment

Every tenth person worldwide has problems in perceiving colors in the way that other people perceive them. In Germany alone, approximately two to three million men are affected by this. For most of them, it is a red-green visual impairment, which can have different degrees of severity. Color perception can be so sensitive that minor deviations can lead to color confusion and mix ups; the signal colors of red and green - so important in automation - become brown-green color tones that are difficult to distinguish. Signal colors in alarm lists and process screens, color-coded KPI displays and trend curves or status information on navigation elements can then no longer be recognized and interpreted at a glance.



Figure 3: Original screen (left) and simulated perception (right) with red-green visual impairment (Deuteranope)

Habit and knowledge of the position of important elements help signals to be interpreted correctly. But in everyday working situations, it makes a clear difference if the status of equipment can be recognized immediately or if it must first be decoded from symbol form. It is better, safer and more productive to provide users with their own color scheme with color tones that are more clearly and easily distinguishable for them.



Figure 4: Original screen (left) and the same screen with adapted color palette for users with red-green visual impairment (right)

This is very easy to deliver using zenon skins. Once defined, these color palettes can be implemented in any project. Users either switch when needed or their tailor made profile automatically appears when they log in. People who perceive colors differently can also use them when calling up color-coded information. Reaction times are thus shortened and operator errors are reduced.



Figure 5: Original screen with zenon skin "Color Corrected" (left) and hence improved Deuteranope-perception (simulated, right)

5. Adaptation to person, role or use

Skins can also be used very specifically to signal user roles, to signal operating modes or to individualize the user interface. Via a switching function, a project can also support the personalization of the user interface. The role of the logged in user can be linked to the color scheme in precisely this way: administrators, for example, might receive a different color scheme to the operators. Operating modes can also be recognized at a glance through colors, for example, if a different color scheme is displayed in simulation mode and live operation. The user unmistakably identifies the mode that the system is currently operating in and knows whether a switch would have an effect on the equipment and production – or if the displayed operations are only simulated.

In this way, roles and modes are clear at a glance: it is possible to see immediately if you are logged in as a user or administrator, if user operations are simulated or actually impact on live processes - and you can even tailor the user interface according to your personal preferences.

zenon Chameleon Technology: Central color palettes for skins

Skins can be implemented in zenon with central color palettes that can be switched in Runtime. They make engineering, operation and standardization easier. Projects with central color switching can be displayed in Runtime in different color schemes – and combined perfectly with the central switching of fonts and units.

The configuration of color palettes is very easy in zenon. However, the choice of suitable colors and color combinations could mean more effort for many project planners. COPA-DATA, therefore, provides premade skins that have been developed by designers and usability experts and are available for download free of charge.

Premade color palettes

COPA-DATA offers a set of premade color palettes for different uses. To start with, there are five palettes available. These are simply imported into zenon as XML files and are ready for use immediately, but they can also be freely adapted to individual requirements:

1. **Design:** The COPA-DATA standard design – clear and optimized for usability.
2. **Eagle Eye:** High contrast for safe operation when glare from the sun is an issue.
3. **Color Corrected:** For users with red-green visual impairments.
4. **Administrator Mode**
5. **Simulation Mode**

So what do these five skins do?

Design



This color scheme is the COPA-DATA standard design. It ensures clear screen allocation for unambiguous differentiation between navigation and display or user elements. The coloring was developed and optimized by both aesthetic and usability experts. The color scheme guides the user and supports simple and safe perception of equipment states without taking attention away from the content too much.

Eagle Eye



COPA-DATA recommends this high contrast skin for difficult light conditions such as direct sunlight that impairs the visibility of the screen. It may be that case that a user terminal can usually be operated without problems, under perfect lighting conditions for the majority of the day, at certain times it might receive direct light, for example, from the sun's rays above. At these times, on the touch screen user interface, the environment around the panel is reflected and more markedly visible than the contents of the screen. In order to be able to see the

displayed information, despite the reflection, and to be able to react appropriately, acrobatic contortions are required!

„Eagle Eye“ increases the contrast values and increases color nuances that would otherwise be difficult to differentiate under poor conditions. The user can thus comprehend information safely and quickly in difficult lighting conditions, navigate within the user interface without making errors and carry out precise switching actions. This skin is also helpful for use of mobile end devices outside (such as Tablet PCs, PDAs, smartphones etc).

Color Corrected



Approximately 10% of the male population cannot interpret all colors correctly. (The percentage of women with this genetically induced visual color impairment is under one percent). The “Color Corrected” skin provides a color palette that is adapted to the color perception of many of the people suffering red-green visual impairment. The configuration of a switching function that enables the operator to select and save the best color tones for their own use, or for these to appear automatically on log-in, is ideal for use on a terminal.

Administrator Mode



This skin changes the colors of the user interface considerably when an administrator logs in. The user recognizes at a glance the role in which he is logged in: as a user with limited rights or as administrator.

Simulation Mode



Simulation mode makes it possible to test projects in zenon without any danger of impacting on live operations or to use projects for training purposes. If simulation mode and active use are clearly distinguished by the color scheme, the operational safety also increases. Users, therefore, always know whether an operation has been implemented in the live process or whether it is only simulated.

COPA-DATA Chameleon Technology

Usability studies demonstrate how much colors, contrast and fonts can divert or attract attention and make it easier - or more difficult - to operate devices. Conclusions that apply to Internet sites, ticket machines or in-car visualizations are all the more significant to automation. The productivity of production lines depends on the quick and correct actions and reactions of machine operators. Panels that are easily readable and can be operated in bad light conditions reduce errors, minimize downtime and make fast and correct operation more likely.

COPA-DATA Chameleon Technology makes it very easy, through the use of skins, to present each display optimally. Just like the skins, fonts and font sizes can also be flexibly adapted to provide each operator with the best display of

information and operating elements for him and the respective situation. COPA-DATA provides premade skins for download.

You can find them here: www.copadata.com/skins

It is also possible to create your own color palettes without great difficulty during configuration. The use of skins can increase attentiveness decisively to reduce operator error and thus increase productivity.



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