

HMI design guidance for engineers,

Who is this design for?

> Table			Dark Silver	
01	Error excessive area	640	06	Speed loop derivative gain
02	In-position area	480	07	Speed feed-forward coefficient
03	Position loop gain	384	08	Spd. up feed-forward coefficient
04	Speed loop proportional gain	256	09	Torque command filter
05	Speed loop integral gain	512	10	Directive multi-ply, molecules

Speed and Response



Pro-face that is an HMI specialist sees a lot of HMI units from our customers. When we provide consultation for slow speed of screen update, we can say one of the causes is to place too many parts. As a volume of communication with PLC increases, more loads are applied on updating a screen and it takes more time to display.

1

Loads are applied to the Numeric Display and the Graph because the screen is always updated for them. When using those parts, you should divide the parts and place them on another screen. If the area of drawing appears quickly but it takes some time for the area of numerical values of the Numeric Display to appear when you change screens, loads may be applied on communication with the PLC.

2

When processing the PLC's device addresses with the D Script's arithmetic expression after reading them, the shorter an execution interval is, the more loads are applied. Please use more memory inside of the HMI such as USR or LS.

3

For the animation feature, loads are applied on screen update. If you plan to use animation a lot, we recommend you to use SP5000 series Power Box.

It's important to consider these things above, but what we would like you to first consider at the time of designing screens is **“Usability”**. Pursuing “Easy to use” and “Easy to understand” is much more important than adopting elaborate design.

Law of $IC = P + M$



For usability studies of “Web” or “Mobile”, there is a law of $IC = P + M$ (interaction cost= physical effort + mental effort). The interaction cost is the sum of efforts that users must make in interacting with a site in order to reach their goals.

$$IC = P + M$$

Physical effort Mental effort

For HMI, P means touch count and M means users searching information they need. In other words, reducing IC to minimum means that high-usability design is available.

A screen full of arranged Numeric Displays beside which full of switches and lamps are placed, that is a neatly organized screen with which you can operate all.

Unfortunately, such a screen is often said to be hard to use.

HOME	Line1	Line2	Line3	Line4	Line5	Line6	Line7
Alarm	6530291	6530291	6530291	6530291	6530291	6530291	6530291
Monitor	6530291	6530291	6530291	6530291	6530291	6530291	6530291
Trend	6530291	6530291	6530291	6530291	6530291	6530291	6530291
Recipe	6530291	6530291	6530291	6530291	6530291	6530291	6530291
Backup	6530291	6530291	6530291	6530291	6530291	6530291	6530291
	6530291	6530291	6530291	6530291	6530291	6530291	6530291
	6530291	6530291	6530291	6530291	6530291	6530291	6530291
	6530291	6530291	6530291	6530291	6530291	6530291	6530291
	6530291	6530291	6530291	6530291	6530291	6530291	6530291
	6530291	6530291	6530291	6530291	6530291	6530291	6530291

It's not necessary to change screens a lot, but it's not easy to operate because lots of information is packed in a screen. This is a prime example showing that reduction in P ends up increasing M. When you design screens, consider a balance between P and M, and you will be able to create a user-friendly screen.

From 3D Design to Flat Design



Some engineers use high-resolution images a lot. That is “3D Design” and a metallic image or button design using shade and gradation is its representative example.



On the arrival of mobile devices, Flat Design has been getting popular in recent 5 years in . Apple’s web site or Windows8 screen is a typical example. For this design, shade is rarely used and buttons are expressed with just adding a simple design like underline. Because more people use mobile devices, this design is becoming a standard. A recent research shows people’s tendency to prefer Flat Design due to mobile devices prevailing.



What is the best about the Flat Design is that high-resolution images are not necessary. We advise those who use high-resolution images a lot and make screen display speed slower to use this design.

Who is this design for?



HMI is for having people safely operate machines, so cool design is not always satisfying. You should not choose to sacrifice usability when creating an HMI screen.

What you should remember is that you are not a real user of the HMI.

The ability to well use machines is different between engineers and users. There should be something only machine-creators know. You may have heard of eyes of customers. That is for creating HMI screens as well.

Machines that you design considering how users feel can generate values. We encourage you to design such a machine with Pro-face HMI.