

## PARCAT — Applying $\text{\TeX}$ in industry

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### Abstract

PARCAT is highly sophisticated software for managing a company's product database and producing a printed catalogue alongside an online shop web site in an automated way. To produce the printed catalogues PARCAT employs  $\text{\TeX}$ .

In this article we present PARCAT in general and its  $\text{\TeX}$  back-end, describing some of its features in more detail:

- fitting tables to the column width,
- catalogue layouts,
- modularisation of the code,
- system of the layout parameters.

### 1 Introduction

The PARCAT system is a complex database application whose primary purpose is to comprehensively manage descriptions of products. Descriptions can be given in any language or in several languages. The main distinctive feature of the program is the ability to typeset a catalogue fully automatically. The generated catalogue can be passed to the printing houses in PDF format without any additional treatment. In addition to generating PDF files, PARCAT also prepares files ready for use on web sites. Due to this feature the system can be used as the base tool for managing product descriptions.

Another distinctive and, we dare say, revolutionary feature of PARCAT is its ability to generate several language versions of a catalogue into a single PDF with each language version on a separate layer, which in the printing house can correspond to one black plate, with no need to prepare separate full CMYK plates for each language.

### 2 History

PARCAT was developed for a large trade company operating for 20 years on the market of electronic components. For over a dozen years Transfer Multisort Elektronik (TME), the company in question, has been publishing the catalogue of its products, in 2011 reaching eight language versions containing about 1800 pages each. The catalogue was made by using CorelDraw software which took approximately five weeks for one language version, excluding the preparation of images. On its web site, the company also presented the same data from the catalogue now

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in the form of HTML files prepared without any automation. Thus it became obvious that the dynamic development of the company would be limited without tools to manage product descriptions.

PARCAT has been developed continuously since early 2008. After its successful deployment in TME it was decided to continue the development of the software and to try to prepare a universal version which could be useful for other companies as well.

### 2.1 The structure of a catalogue

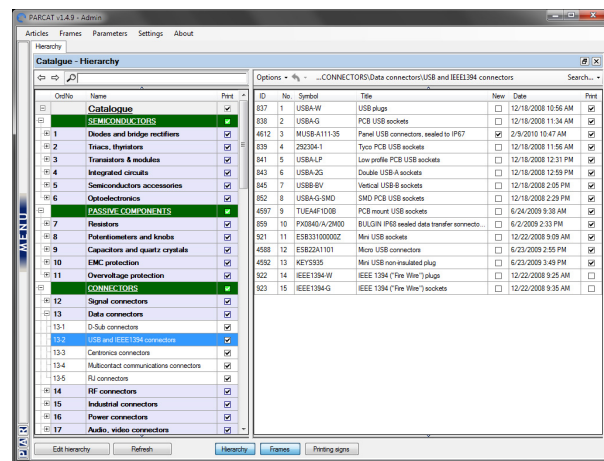


Figure 1: Main structure window in PARCAT

In connection with the need to store very large amounts of information, the idea of creating descriptions of individual products was taken from the previous manual composition. It is based on a catalogue divided into parts (e.g., semiconductors, tools, electrical and installation equipment, etc.), which are divided into chapters, and chapters are divided into sections. Frames, assigned to sections, are the smallest (and indivisible) part of the catalogue. A list of products featuring such information as manufacturer, summary description and prices is imported from the sales system. There is no need to enter symbols manually, which could pose a serious problem for such large quantities of products (tens of thousands and more).

### 2.2 Frames

The concept of a *frame* is the foundation of the system. It systematises the management of large amounts of products, facilitates the editing of data, making of amendments and also simplifies the data management for a large number of users. A frame is assigned to a section and can describe any number of products (in particular, one product). It is good if the products are a homogeneous group which

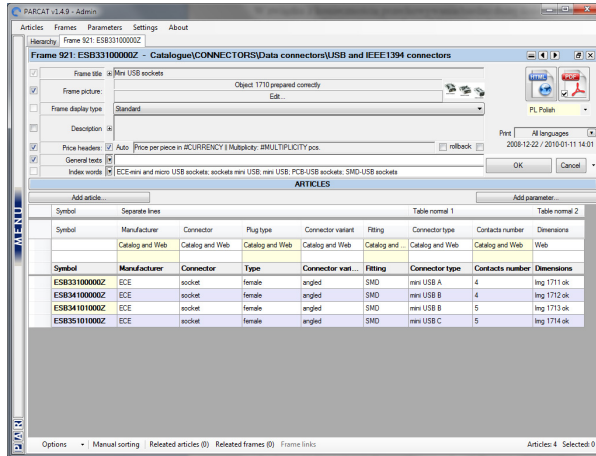


Figure 2: Frame editor in PARCAT

can be described by means of common characteristics. Thus, for example, it is possible to assign to one frame a whole series of resistors with a power of 0.25W in the SMD0608 housing (housing, power, manufacturer, maximum voltage are common features for all these resistors, and resistance—different for each resistor—is the distinguishing feature), or three universal hammers made by one manufacturer which vary in weight and the length of the shaft, but other characteristics (e.g., material, properties, applications) are the same. In addition, a frame features several permanent elements, such as frame title, overall picture, text description.

### 2.3 Parameters

The description of products is mainly based on user-defined parameters. This solution primarily ensures the consistency of generated descriptions and significantly reduces the costs of translation since the fields associated with a given parameter are translated only once. There are various types of parameters: text, single or multiple choice, several numeric options, as well as those allowing assignment of graphical objects.

### 2.4 Construction of tables

Parameters in a frame are automatically divided into two groups. The first group contains those parameters whose values are the same for all products in the frame, called common parameters. The parameters which have different values for individual products belong to the second group, called distinguishing parameters.

Clearly the method of data presentation for both groups should be different. The common parameters (Fig. 3) can be associated with their values and

Manufacturer : AMPHENOL  
 Connector type : BNC  
 Connector : plug  
 Type : male  
 Type : angled  
 Fitting : on cable; crimped  
 Contact plating : gold plated  
 Rated voltage : 500 V  
 Test voltage : 1.5 kV  
 Max contact resistance : 1.5 m $\Omega$   
 Min. insulation resistance : 5 G $\Omega$   
 Insulator material : delrin

#### Equipment:

- batteries
- FLK-TL165X - test leads set
- carrying strap
- FLK-C1600 - toolbox
- FLK-TP165X - remotely controlled probe (FLK-1652, FLK-1653)

Figure 3: Different presentations of common product parameters

Symbol	Wave imp. [ $\Omega$ ]	Max freq. [GHz]	Vswr	Cable type
B1112A1ND3G150	50	4	1.3	B7806A, KX15, L190-16, L910-30, LMR195, M17-28, RG141, RG303, RG58(A)
B1112E1ND3G550	50	4	1.3	B7805A, KX22, KX3, M17-113, M17-119, RG174, RG188(A), RG316
B1112A1ND3G375	75	1	1.15	KX25, KX30, KX52, KX53, KX61, L910-12, L910-13, M17-29, M17-30, RG140, RG210, RG59(A,B), RG62(A)
B1112E1ND3G675	75	1	1.15	B9921, KX55, L910-22, M17-94, RG179(A,B), RG187(A)

Symbol	Resist. [m $\Omega$ ]	Symbol	Resist. [m $\Omega$ ]
SMD1206 R10-LO	100	SMD1206 R33-LO	330
SMD1206 R15-LO	150	SMD1206 R47-LO	470
SMD1206 R22-LO	220	SMD1206 R56-LO	560

Symbol	FLK-1651	FLK-1652	FLK-1653
Earthing resistance measuring range - 0.1 $\Omega$ ...200 $\Omega$ /2000 $\Omega$			x
Earthing resistance measuring accuracy - $\pm$ (2% + 5 digits)			x
Loop impedance measurement - 0.1 $\Omega$ ...20 $\Omega$ /200 $\Omega$ /2000 $\Omega$	x	x	x
Loop impedance measuring accuracy - $\pm$ (3% + 10 digits)	x	x	x
Detection			
- fuses	x	x	x
- place of cable failure	x	x	x
RCD test			
- for AC current	x	x	x
- general purpose	x	x	x
- responding to impulse signals		x	x
- with time delay	x	x	x
Continuity test - 20 $\Omega$ /200 $\Omega$ /2000 $\Omega$	x	x	x

Figure 4: Different presentations of distinguishing product parameters

listed one under another. They can also be presented as a list with bullets. In general, since the common parameters relate to all products in the frame by definition, a list of respective products does not need to be specified.

The distinguishing parameters (Fig. 4) must be correlated with a list of products, thus showing precisely the products to which they apply.

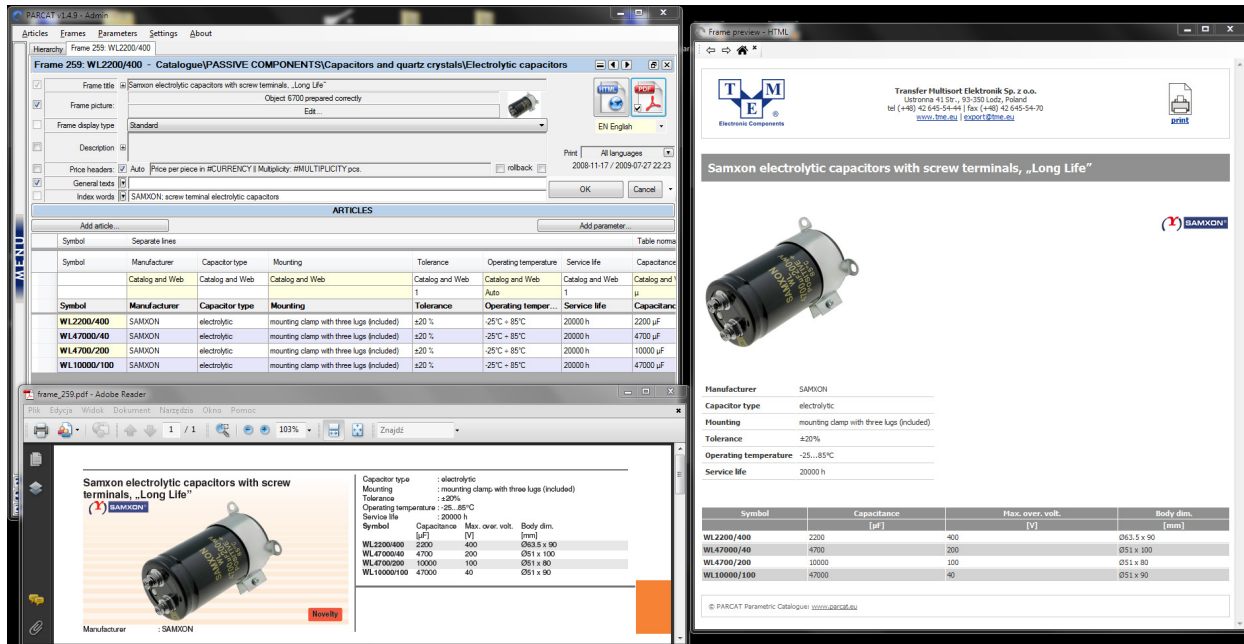


Figure 5: HTML and PDF previews in PARCAT

By default, PARCAT shows a simple text form for the common parameters and a table for the distinguishing parameters. However, the user has a number of tools to change the look of these tables, their order, the order of parameters inside the table, the font size in the table, the position of pictures around the table and many other aspects of the created description. By modifying the construction of tables, the user can adjust the appearance of the frames to their needs and present the data in the most readable way.

## 2.5 Translation

The list of languages used for product descriptions is not fixed and can be dynamically changed during work on a particular catalogue. All texts present in the system will be automatically marked for translation into a newly added language.

PARCAT features a complex panel for translation management. It indicates the exact number of phrases which require translation into a given language, and each phrase will be translated only once. It allows you to select those sections of a catalogue to be translated. Generated orders are sent to translators for whom a special application is prepared to facilitate their work. It is very important that the translators always see the full context of translation, even if they need to translate only one phrase. This allows for translation quality at the highest level. After the translator finishes work, their order is im-

ported into the database, after verification steps to eliminate mistakes and improve the quality of translation further.

## 2.6 Graphics

All graphical elements in the program are stored as a pair of PDF files (ready for printing, CMYK with a cut out background) as well as JPG, GIF, etc. (for Internet use). The system features a mechanism allowing users to order the preparation or editing of graphic element. In this way, users without the ability to use graphics programs can still manage graphics. Orders along with the comments are sent to other users with permission to edit graphics (graphic designers). After the image processing is done, the user who sent the order is able to accept changes or request new ones.

## 2.7 Preview

The possibility of previewing a frame at any stage of its creation (in particular, with the graphics still not accepted!), even without saving changes, is a very important feature of the system (Fig. 5). What is more, the preview in a freely chosen language or languages is created immediately and shows the frame exactly as it will look in print (with accurate pagination) or when connected to a web site, along the lines of WYSIWYG.

A true and fast preview is vital in extensive publications of over 1000-page catalogues. It makes

it possible for all users of the program to assist in the preparation of material, eliminating the complicated, time consuming and discouraging intermediate stage which is usually “the preparation of the preview” in traditional composition systems. Furthermore, the instantaneously generated preview allows users to quickly find both factual and graphical errors.

In addition to the frame preview it is possible to prepare a preview of a section, chapter or part of a catalogue. This allows you to check portions of a catalogue without the need to process all the material. It also enables easy monitoring of the number of pages in the forthcoming catalogue, which is important for ordering at the printing houses. The composition of a single chapter is no longer instantaneous, but it takes only a few minutes to compose tens of generated pages. Therefore these previews can also be generated as necessary.

All these features translate into a significant, if not revolutionary, way to shorten the time users must spend to prepare the catalogue material.

## 2.8 Typesetting of a catalogue

After preparing and checking all the material you can proceed to a catalogue composition. A generated PDF file features cropmarks and trimboxes, which makes it suitable for submission to the printing houses without additional modifications.

Multi-lingual typesetting with replacement of only the black colour plate is a strategic function of PARCAT. The system provides the ability to compose a catalogue where the data in all languages chosen in the process of composition can be found in one output file. This means that the texts in each of the languages are inserted into the same spaces maintaining the common position of illustrations and the same page breaks. Every language is placed on a separate layer, which allows you to have a preview or trial print for the given language. In addition, each language layer is composed by means of its own additional colour (the spot colour), which facilitates the work of the CTP studio before the preparation of printing plates. This method of printing, with replacement of the black plate, allows us to achieve enormous financial savings. The more language versions of a catalogue and the more catalogue pages, the more savings.

## 3 Under the hood: $\TeX$ in PARCAT

The typesetting in PARCAT is done using  $\LaTeX$  with the  $X\TeX$  engine and a highly customised document class. Since we have to cope with text in several languages written in Latin and Cyrillic scripts,

we eagerly switched to using Unicode. In this context  $X\TeX$  with its UTF-8 input and its ability to use multilingual OpenType fonts provided a comfortable working environment.

$\TeX$ , being a batch processor, plays its role as a typesetting back-end for PARCAT very well. It is fast enough to provide almost instantaneous preview of selected frames. The user can also be practically certain that the result shown for a separate frame will be identical in a complete chapter. We think that in some aspects we have reached the edge of  $\TeX$ 's abilities, e.g., with respect to rearranging the language variants. Some of these manipulations would perhaps be easier in  $\text{Lua}\TeX$ . We will probably investigate this possibility in the future.

Typesetting product catalogues is a rather atypical use of  $\LaTeX$ , so we had to solve quite a few  $\TeX$ nic problems, the most important being the handling of language variants. This comprises combining several streams of text in one source file; overlaying language variants in such a way that page-breaking and picture positions are the same in all variants, and finally outputting all the variants of the text to the same PDF file using the “optional content groups” feature of the PDF format, with a separate spot colour for each language.

### 3.1 Tables

One major issue was handling the tables presenting parameters of the products being offered, an important part of the catalogues. Some of these tables are long, spanning up to about 20 pages. They contain headers repeating at the top of each column and should be typeset in a two-column arrangement. Unfortunately, standard  $\LaTeX$  packages (`multicols` and `longtable`, `supertabular`, etc.) do not handle such a combination. We developed a specialised solution in which page breaking is done by the `multicols` package. The package was slightly modified to carry the headers for the table in  $\TeX$  marks (we used the  $\epsilon\text{-}\TeX$  ability to create new mark classes).

The column widths are automatically set to fit a table to the column width. A typical table in question consists of a body containing some parameter values, usually decimal numbers, and a header naming those parameters, sometimes with very long contents.

The original class hacks the `tabular` environment so that it measures its columns and performs a trial setting of a table. There are at most three trials:

- without line breaking,
- with line breaking, at every allowed blank (not at ~'s),

Symbol	Imp. falowa	f <sub>max</sub>	Rodzaj kabla	3 lines {	
	[Ω]	[GHz]		Trwałość wtórna i mechaniczna	
				[cykl]	
BNC-104	50	4	B9907, max Ø5,0 mm, RG58	100	
BNC-105	50	1	B9907, max Ø5,0 mm, RG58	500	
BNC-106	50	4	B1522A, B8216, max Ø2,8 mm, RG174, RG188, RG316, RGB5	100	
BNC-114	93	2	max Ø2,8 mm, RG179, RGB VideoKabel	100	

Symbol	Imp. falowa	f <sub>max</sub>	Rodzaj kabla	2 lines {	
	[Ω]	[GHz]		Trwałość wtórna i mechaniczna	
				[cykl]	
BNC-104	50	4	B9907, max Ø5,0 mm, RG58	100	
BNC-105	50	1	B9907, max Ø5,0 mm, RG58	500	
BNC-106	50	4	B1522A, B8216, max Ø2,8 mm, RG174, RG188, RG316, RGB5	100	
BNC-114	93	2	max Ø2,8 mm, RG179, RGB VideoKabel	100	

Figure 6: A table justified with the original algorithm (left) and the “more subtle” version (right)

- with line breaking, at any allowed point (including word hyphenations).

In some not-so-extreme cases the result appears as in Fig. 6, left. The table consists of narrow columns and large “column-glue” at the right filling the width to `\columnwidth`.

Let’s underline that making this work *fully automatically* is quite an achievement, as anyone who knows something of  $\TeX$  would agree. But it doesn’t look too good compared with other tables, especially if you know nothing of  $\TeX$ , does it?

So, the next step taken is to make such a table look as in Fig. 6, right, still fully automatically and without changes to the source of that table (so that no changes are necessary to the front-end software generating it).

The desired effect is achieved by repeating trial settings with an increasing `\looseness` in a sort of `\raggedright` scope (turning respective cells into `p{<dimen>}`), until a minimum value of `\looseness` is found (or a limit of iterations reached). Then widths of table columns are measured and applied to the final leading.

### 3.2 New layouts

As the project developed and the PARCAT system is offered to different clients, the need for new page layouts, or rather, graphical concepts, is natural. Samples of the layouts designed so far are shown in Fig. 7.

They are intended not only to present different shapes of graphical elements or placement of headings, but also to illustrate the fact that all those samples are typeset from the same product data and, moreover, the same “intermediate”  $\TeX$  code.

To be more specific, PARCAT’s front-end software (non- $\TeX$ ) produces  $\TeX$  code such as

```
{\sizevii
\begin{wykaz}{@{}l11}
\wynaglowek{\textbf{\war{PL}{%
Symbol}\war{EN}{Symbol}\war{CZ}{Symbol}%
\war{DE}{Symbol}\war{HU}{Jelölés}} &
\najweziej{\war{PL}{Klasa wykonania}%
\war{EN}{Manufacture class}\war{CZ}{Třída
provedeni}\war{DE}{Ausführungs-klasse}%
```

```
\war{HU}{Kivitelí osztály}} & \najweziej{%
\war{PL}{Pokrycie styku}\war{EN}{Contact
plating}\war{CZ}{Povrch kontaktu}\war{%
DE}{Kontaktbeschichtung}\war{HU}{Érintkezö
bevonata}} \ \ }
...
\end{wykaz}
} % wielkosc czcionki
```

in a multitude of files named `frame_<id>.tex`. Each file corresponds to a catalogue frame. PARCAT also produces code like this:

```
\begin{multicols}{2}
...
\KeysForNextFrame {2x3=0:1/0}
\NamedInput{frame_24_1/frame_24_1.tex}

\KeysForNextFrame {2x3=1:2-1}
\NamedInput{frame_3_1/frame_3_1.tex}
...
\end{multicols}
```

in so-called *intermediate* files. `\NamedInput` is an input wrapped with stacking the file name so that it can be referred to in messages, which we’ll discuss later (section 3.4). So, as you see, the intermediate file inputs the frame files.

This file in turn is input by the main  $\LaTeX$  document file, alongside files containing settings and configuration data generated by the front-end of the system.

You get all the different outputs (and more) depending on which main file you use — *on the same intermediate and frame files!*

Our intention is to keep all the templates compatible with one another. For example, notice the unconditional invocation of the `multicols` environment in the intermediate file (the code sample above) while only one of the examples shown in Fig. 7 is actually two-column.

Turning the `multicols` environment off was relatively easy. (Relatively, since it’s off only at the main level, where `\currentgrouplevel = 0`.)

A bit more difficult was to reach a reasonably simple solution for the layout introduced in the IL template (lower left corner of Fig. 7). As you see, the pictures are typeset on the right side of text (tables) and the table(s) break in pages. The complication

**BNC connectors**

**Professional BNC plugs, clamped**

Connector type : BNC  
 Connector : plug  
 Type : male  
 Fitting : straight  
 Filling : soldered on cable, screwed  
 Rated voltage : 500 V  
 Max contact resistance : 3 mΩ  
 Max frequency : 1 GHz

Symbol Wave imp. Cable type

Symbol	1*	5*	25*	100*	500*
BNC-141	50	RC2V, RS141, RG58			
BNC-142	75	RG218, RG52, RG59			

**BNC plugs with strain relief** Novelty

Connector type : BNC  
 Connector : plug  
 Type : male  
 Wave imp. : 50 Ω  
 Filling : on cable, screwed, crimped

Symbol Type  
 BNC-101 straight, with strain relief  
 BNC-102 angled, with strain relief

Symbol	1*	5*	25*	100*	250*	
BNC-101		1,02	0,93	0,79	0,63	0,53
BNC-102		0,96	0,71	0,56	0,46	

**BNC terminators**

Connector type : BNC  
 Connector : terminator  
 Type : straight

Symbol Wave imp.

Symbol	1*	5*	25*	100*	
BNC-012	50				
BNC-013	75				

**BNC Bis connectors**

Connector type : BNC  
 Connector : plug

**Professional BNC plugs, clamped**

Symbol Wave imp. Cable type

Symbol	1*	5*	25*	100*	500*	
BNC-141		3,23	2,91	2,53	1,96	1,39
BNC-142		3,47	2,77	2,03	2,09	1,77

The "classic" STE template

**Wtyki męskie MMCX kątowe, zaciskane**

Typ złącza : MMCX  
 Złącze : wtyk  
 Rodzaj : męskie  
 Wersja : bezwłose  
 Montaż : na przewód zaciskane  
 Połączenie styku : złączony  
 Napięcie znamionowe : 170 V  
 Imp. falowa : 50 Ω  
 Rezystancja styku maks. : 5 mΩ

Symbol Rodzaj kabla

Symbol	1*	5*	25*	100*	
MMCX-01		8,49	6,99	5,59	4,49

**Gniazda żeńskie MMCX do druku, AMPHENOL**

Producent : AMPHENOL  
 Montaż : THT  
 Połączenie styku : złączony  
 Złącze : gniazdo  
 Typ złącza : MMCX  
 Rodzaj : żeński

Symbol Wersja  
 MMCX251N1 prosta  
 MMCX252N1 kątowa

Symbol	1*	5*	25*	100*	
MMCX251N1		16,43	14,50	13,50	11,40
MMCX252N1		20,90	17,90	14,90	12,90

The WZ template

**1. Złącza w.c.z.**

**Złącza BNC**

**Złącza BNC Bis**

The IL template, mini-toc on left page

**Beerenauslese** 2-HF-Steckverbinder

**TNC-Steckverbinder**

**TNC-Crimp-Stecker**

Verbindungsart : TNC  
 Verbindung : Stecker  
 Art : Stecker  
 Version : gerade  
 Montage : Crimp

Symbol Kabeltyp

Symbol	1*	5*	25*	100*
TNC-001	RG58			
TNC-003	RG59			
TNC-004	RG58			

Symbol	1*	5*	25*	100*	
TNC-001		0,85	0,46	0,35	0,25
TNC-003		0,84	0,77	0,70	0,56
TNC-004		0,95	0,51	0,44	0,35

**Professionelle TNC-Crimp-Stecker, gerade**

Verbindungsart : TNC  
 Verbindung : Stecker  
 Art : Stecker  
 Version : gerade  
 Montage : Crimp  
 Nennspannung : 500 V  
 Wellen-Wert : 50 Ω

The MK template

**Złącza BNC**

**Profesjonalne wtyki żeńskie BNC zaciskane (c.d.)**

Symbol

Symbol	1*	5*	25*	100*	500*	
B6121ANT02150		8,99	6,99	5,99	4,99	4,69
B6121END02550		8,99	7,49	6,99	5,99	4,99
B6121BND03275		6,99	5,49	4,99	3,99	3,69
B6121END02675		24,00	19,50	17,50	14,50	12,50

**Wtyki żeńskie BNC, skręcane**

Typ złącza : BNC  
 Złącze : wtyk  
 Rodzaj : żeńskie  
 Wersja : prosta  
 Montaż : na przewód skręcane

Symbol Imp. falowa Rodzaj kabla

Symbol	1*	5*	25*	100*
BNC-111	50	RG58		
BNC-134	75	RG59		

Symbol	1*	5*	25*	100*	
BNC-111		3,62	2,99	2,66	2,53
BNC-134		3,62	3,40	3,09	2,99

**Wtyki BNC proste, nakręcane**

Typ złącza : BNC  
 Złącze : wtyk  
 Rodzaj : męskie  
 Wersja : prosta  
 Montaż : na przewód skręcane

Symbol Rodzaj kabla

Symbol	1*	5*	25*	100*
BNC-001	BT2002, PFG18M, RG20A, RG6, URM98			
BNC-002	RG218, RG58, RG62, RG71, URM70, URM91, URM93			
BNC-011	BT2002, BT2003, RG142, RG430, RG58, URM43, URM72, URM76			

Symbol	1*	5*	25*	100*		
BNC-001		3,29	2,79	1,99	1,39	1,19
BNC-002		3,29	2,99	1,99	1,39	1,14
BNC-011		2,79	2,19	1,89	1,49	1,19

**Wtyki BNC proste, skręcane**

Typ złącza : BNC  
 Złącze : wtyk  
 Rodzaj : męskie  
 Wersja : prosta  
 Montaż : na przewód skręcane, zaciskane

Symbol Imp. falowa Materiał izolacji Rodzaj kabla

Symbol	1*	5*	25*	100*
BNC-003	50	-	RG58	
BNC-004	50	teflon	RG58	
BNC-005	75	-	RG59	
BNC-005-T	75	teflon	RG59	

Symbol	1*	5*	25*	100*		
BNC-003		2,74	1,99	1,79	1,65	1,52
BNC-004		3,99	4,99	4,39	3,39	2,79
BNC-005		2,99	2,19	1,89	1,82	1,67

Ceny nie zawierają podatku VAT ani kosztów transportu

The IL template, left page

**1. Złącza w.c.z.**

**Złącza BNC**

**Wtyki BNC proste, zaciskane z izolacją teflonową**

Symbol

Symbol	1*	5*	25*	100*	500*	
BNC-005-T		2,99	2,59	2,29	1,99	1,89
BNC-010-T		0,69	0,69	0,62	0,70	0,53

**Wtyki BNC proste, zaciskane**

Typ złącza : BNC  
 Złącze : wtyk  
 Rodzaj : męskie  
 Wersja : prosta  
 Montaż : na przewód zaciskane  
 Połączenie styku : złączony  
 Materiał izolacji : teflon

Symbol Imp. falowa Rodzaj kabla

Symbol	1*	5*	25*	100*
BNC-005-T	75	RG59, RG62, RG71, URM70, URM90		
BNC-010-T	50	B9907, RG141, RG58, URM43, URM76		

Symbol	1*	5*	25*	100*		
BNC-005		2,99	2,69	1,79	1,19	0,99
BNC-010		0,59	0,69	1,79	1,29	0,99
BNC-135		0,5	0,5	0,69		

**Gniazda BNC na panel, izolowane**

Typ złącza : BNC  
 Złącze : gniazdo  
 Rodzaj : żeńskie  
 Wersja : prosta  
 Montaż : izolowane, lutownicze, na panel

Srednica otworu montażowego : 8 mm

Symbol	1*	5*	25*	100*	
BNC-006		3,79	3,29	2,99	1,99

Ceny nie zawierają podatku VAT ani kosztów transportu

The Mod(ular) template

Figure 7: Samples of the PARCAT templates' output

is that the picture is *not* boxed with adjacent text (which would kill the flexibility of `\vskips`) but put in a “smashed” box preceding the text, and proper page breaking (i.e., forbidding breaks until subsequent text at least reaches the height of the picture) is ensured by a local change to `\pagegoal`.

The template presented in the lower right corner of Fig. 7 (Mod), is quite distinct from all the others. It positions a logical frame in a geometric frame consisting of some number of modules *sensu graphico*, i.e., rectangles of a grid. The grid on the illustration is  $2 \times 3$ .

This template is under construction. Our goal is to make it typeset a frame in a proper shape according to free space left on page. So far it typesets frames in a “greedy multicolumn” shape, either “vertical-first” or “horizontal-first” by default or in a shape specified by a key. For instance, the middle frame of the example has (in the optional argument of the `ramka` environment) a key `2x3=1:1`, which means that on the  $2 \times 3$  grid it should be put in two horizontally adjacent rectangles.

The keys are handled by the `pgfkeys` package by Till Tantau, which I find much easier to learn than `xkeyval`, thanks to the path-like structure of the keys.

Although in this article we present illustrations in grayscale, real templates allow colours, of course. Moreover, all the colours are adjustable by the end user. But that belongs to the next story:

### 3.3 Changing the layout parameters

#### 3.3.1 ParcatColours

The PARCAT templates provide a straightforward mechanism for setting colours. The end user doesn’t have to define the colour of each graphical element separately but is given a set of colour variables that are initialised hierarchically.

This mechanism is realised with the commands `\NewParcatColor` and `\SetParcatColor`, whose names are self-explanatory. These commands use the mechanisms of colour definition of the `xcolor` package, so a very wide range of assignments, re-assignments, mixing and shading is available.

In most of the templates the basic colour is `nadroz`, a legacy name derived from “nadrozdział”, ‘super-chapter’ in Polish. Other colours are tints of it by default. There are also colours (colour names) for the distinctive frame of inserted advertisements, for the backgrounds of pictures and so on.

A nearly parallel mechanism handles other parameters such as dimensions of graphical elements, values of Boolean switches, etc.

#### 3.3.2 ParcatParameters

The main commands are:

- `\NewParcatParameter`,
- `\SetParcatParameter`,
- `\RenewParcatParameter` and
- `\OldParcatParameter`.

These commands not only declare or set PARCAT parameters but also put them on checklists to issue an error message if a parameter isn’t set at the point of `\AtBeginDocument` (which we discuss in section 3.4).

The first three names are self-explanatory. The last serves to include standard  $(\LaTeX)$  parameters in PARCAT’s checklists (with the information about their types). E.g., `parcat.cls` has a declaration specifying `\parindent` as a value of type `dimen`:

```
\OldParcatParameter\parindent
\dimen[Opt]
```

This allows the standard `\parindent` to be specified with `\SetParcatParameter` in a `settings_...tex` file. It doesn’t *have* to be set because the optional argument sets it to `Opt` by default.

Among the available parameter types are `dimen`, `count`, `skip`, and the corresponding `\dimexpr`, `\numexpr`, `\glueexpr` to denote a proper *text* for the respective  $\varepsilon$ - $\TeX$  primitives, and `\edim`.

This last item stands for ‘evaluated `\dimexpr`’, where evaluation (`\the`-expansion) of the expression is performed `\AtBeginDocument`.

As with `ParcatColors`, `\edims` are organised in a sort of inheritance hierarchy.

#### 3.4 PARCAT messages

As mentioned earlier, PARCAT’s  $\TeX$  back-end generates information, warning and error messages in an XML format, which is intended for parsing by the front-end PARCAT software to provide information to the end user, who most probably is not acquainted with  $\TeX$ .

In particular, such messages are issued if some parameters are not set while they should be, or if an attempt is made to assign a parameter value not appropriate for it. As an example, the `parcat.cls` class declares

```
\NewParcatParameter\TitleOnBg
\boolean[true]
```

which means the only allowed values for the parameter are (case-insensitive) `true` and `false`. But suppose the `settings_...tex` file contains a typo:

```
\SetParcatParameter\TitleOnBg{fals}
```

Then  $\TeX$  outputs an error message:

```

!
<ParcatError>
<ParcatErrorFile>settings_Modular.tex
</ParcatErrorFile>
<ParcatErrorLine>108
</ParcatErrorLine>
<ParcatErrorForDummies>
  The only values suitable for ***\TitleOnBg***
  are ***true*** and ***false***
  while you gave ***fals***.
</ParcatErrorForDummies>

<ParcatErrorForTeXies>
</ParcatErrorForTeXies>
</ParcatError>

.
Type H <return> for immediate help.
...
1.108 \SetParcatParameter\TitleOnBg{fals}

```

The XML is subsequently parsed by the front-end programme to be presented to the user in a nice form.

### 3.5 Modularisation of the code

Another goal of redesigning the code was to make it suitable for new clients, who would want not all the layouts in any possible configuration but only a few or even just one. It was immediately evident that dividing the code responsible for distinct parts of the templates into separate files (*modules*) would be a good idea.

For that purpose we created a mechanism based on these three commands:

- `\DeclareParcatModules`,
- `\ProvideParcatModule` and
- `\LoadParcatModule`.

The last two names are self-explanatory, given that a module (*sensu programmatico*) is much like a  $\LaTeX$  macro package or a document class options file. But why is the first in plural? It is because from the very beginning of the operation (Operation *Divide et Impera* ;-)) it was clear to us that there would be more than one module (variant) for each logical part of a template.

And indeed, so far there are about 10 modules of page layout, 6 modules of headings, 3 modules of index, 5 modules of frames, 3 modules of tables, &c.

We intend to keep the modules compatible with one another, e.g., any of the frame modules can work with any of the table modules (as far as logically possible). The tests performed so far seem to confirm that such a condition is preserved.

Not the least in preserving that compatibility is the manner of writing the code: all in one source file (using the `gmdoc` package, with an abundance of commentary) and generating the working files with `docstrip` directives.

### But what about that “industry” in the title?

— one may ask.

Our clients are companies with large product bases. To mention just one of them, its printed catalogue for the year 2011 is over 1700 A4 pages in thousands of copies in each of eight languages. That *is* industry and being able to handle it with  $(X\LaTeX)$  makes us proud.

Another and probably not the least aspect of the “industrial strength” of PARCAT’s  $\TeX$  backend is its flexibility for the different needs of different clients, achieved with modularisation and variation of the parameters.

The PARCAT project is developing dynamically and dedicated to treating every client individually so hopefully there’ll be many new features to present in the future.

More information about the PARCAT project can be found at [www.parcats.eu](http://www.parcats.eu).

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