

Packed Drawing Preparation Method

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KES

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1. Scope of Application

This KES covers the interpretation of a computerized Packed drawing* of automobile parts drawings.*(Ichigenzu in Japanese)

2. Purpose

The purpose of this KES is drawing-user's smooth business by rapid and correct interpretation of a computerized packed drawing.

3. Definitions of Terminology

(1) Packed drawing

A drawing made by combining a loft drawing and a part drawing, i. e., a full-scale drawing including information such as specifications, dimensions, etc., generated by the line drawing technique(wire frame output drawing) and used as the basis to manufacture production tools such as jigs, molds, inspection gages, etc.

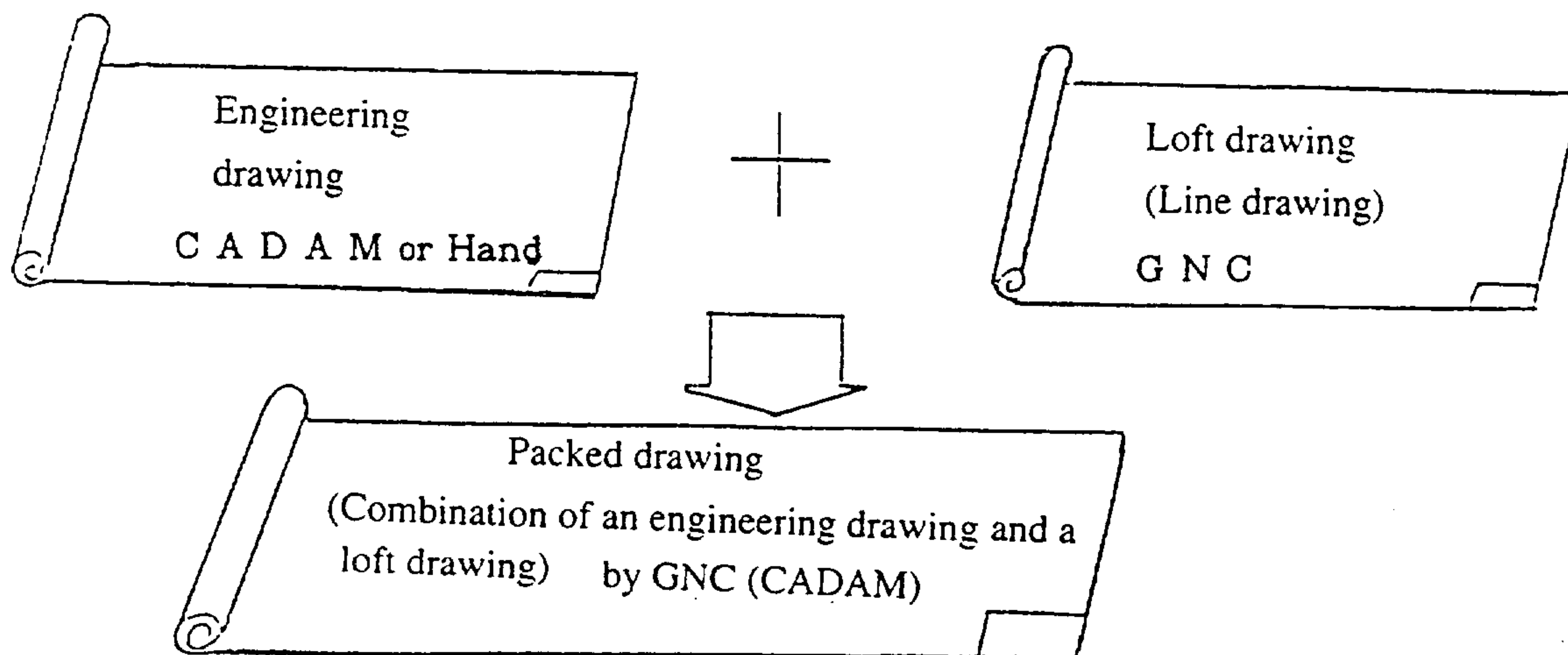
Engineering drawing + Loft drawing
(Line drawing)

by CADAM or handwriting by GNC

Packed drawing

(Combination of an engineering drawing and a loft drawing)

by GNC (CADA)



(2) Loft drawing

A full-scale drawing generated by the line drawing technique used as the basis to manufacture production tools such as jigs, molds, inspection gages, etc. and showing the lines of parts including free-curve surfaces which cannot be depicted by a part drawing. A loft drawing and a part drawing shall be complements each of the other because parts can not be complements each of the other because parts can not be manufactured without either one.

(3) GNC Packed drawing

Packed drawing prepared by only GNC (three-dimensional CAD)

(4) CADAM Packed drawing

Packed drawing showing two-dimensional data (dimensions, symbols, remarks, legends, etc.) prepared by CADAM with three-dimensional shape data prepared by GNC.

(5) GNC

Three-dimensional CAD/CAM (Computer Aided Design / Computer Aided Manufacturing), system developed by Kia(Graphic Numeric Control)

(6) CADAM

A computerized drafting system developed by CADAM INC.

(7) Mating part

A part depicted to show the relation with the manufactured part

4. Parts Drafted in Packed Drawing.

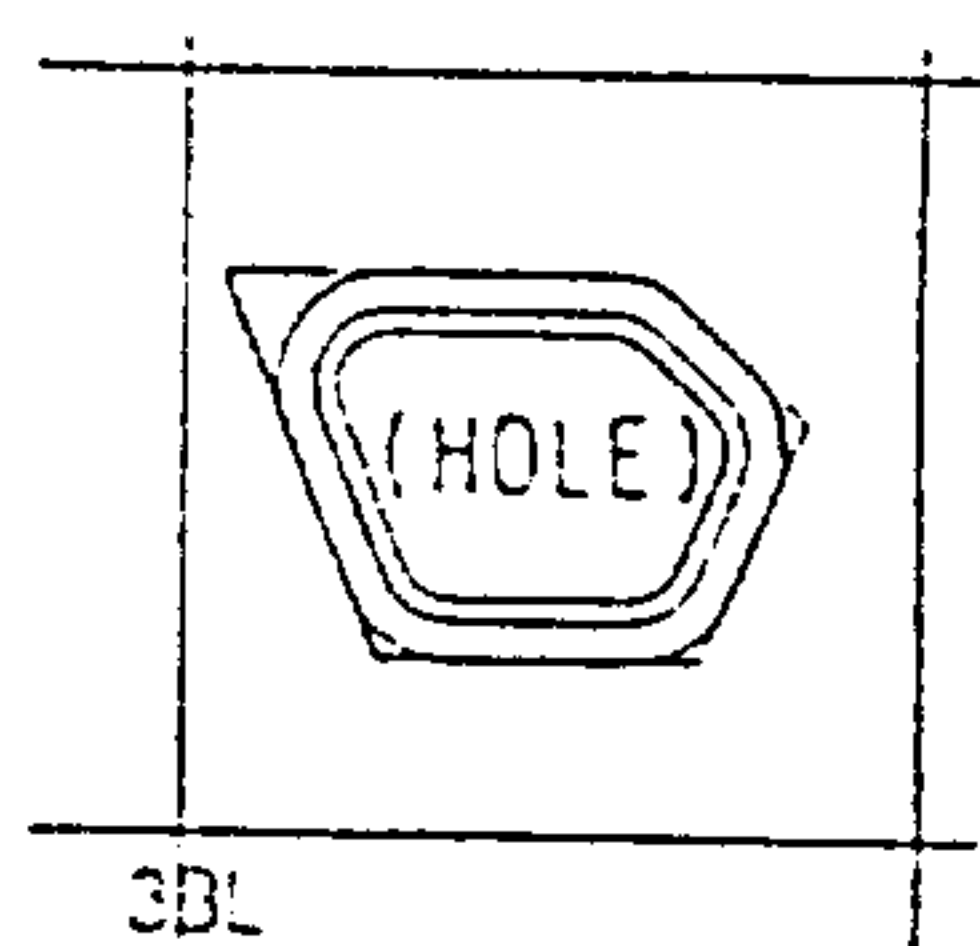
The parts drafted in packed drawing are as follows:

- (1) Parts with shapes that include free-curve surfaces created in design engineering such as a vehicle body structural part, exterior body panel, and interior/exterior trim parts.
- (2) Parts such as underbody having geometric features(straight lines and arcs) that are complex and that require precise coordination with the adjacent parts so that the line drawing is required.
- (3) Parts that require GNC data for CAM application

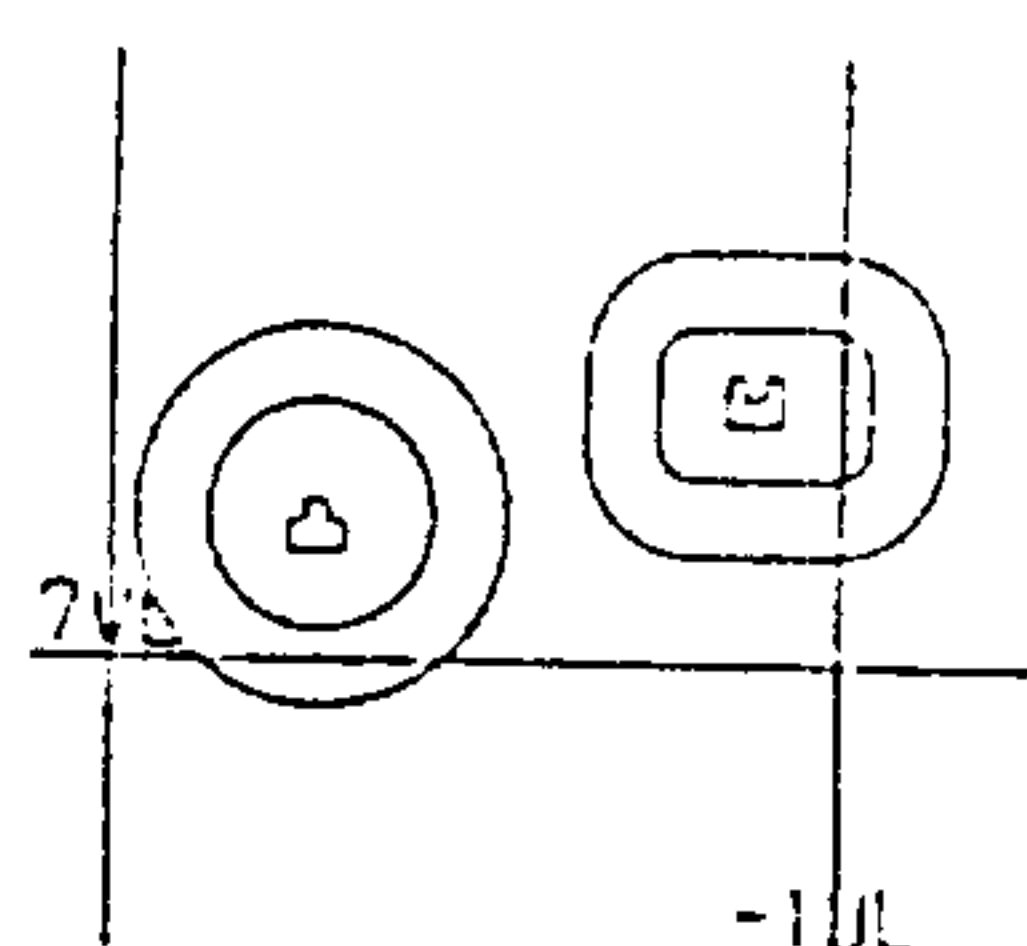
5. General Requirements for Packed Drawing Preparation

- (1) The dimension indicating side, i.e. the inside or outside of the panel, is standardized.
- (2) When the shape is complicated, a sectional view or a sketch is provided to show the surface shape.
- (3) The direction of a bearing surface or a step is shown by providing a sectional view or a symbol.

Indication example of
hole



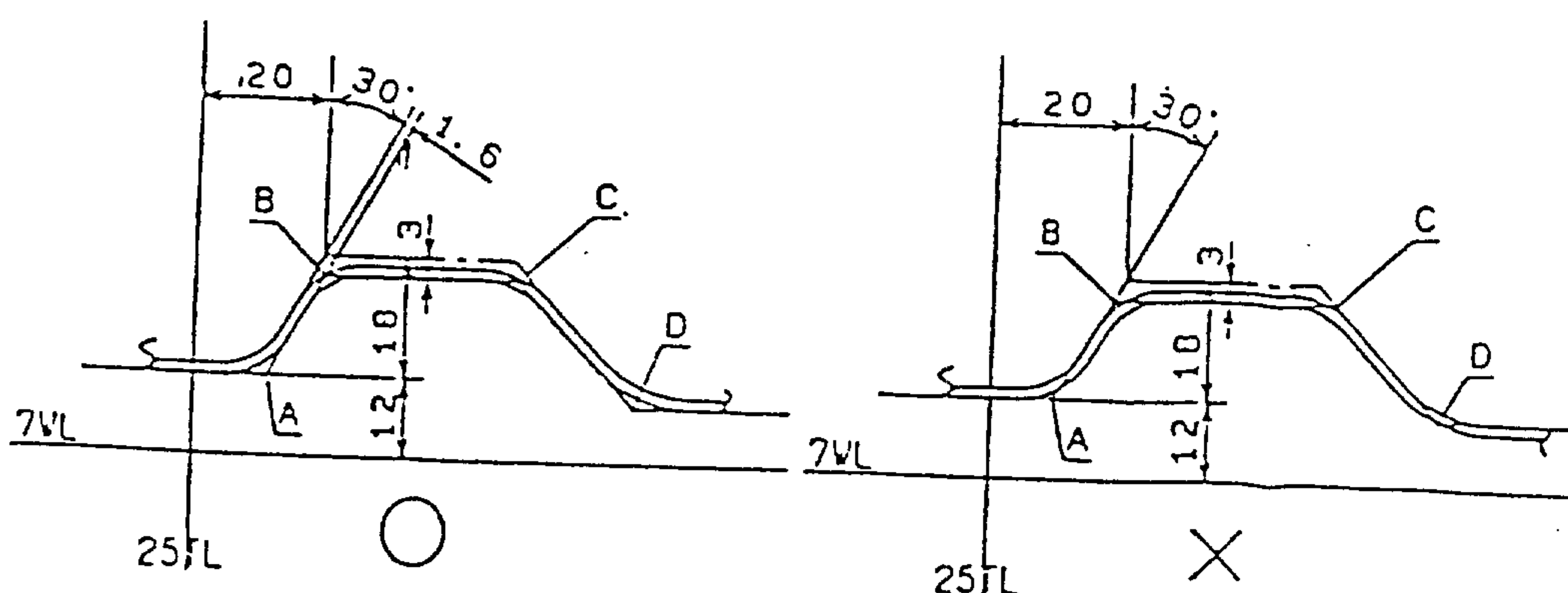
Indication example of
fitting surface



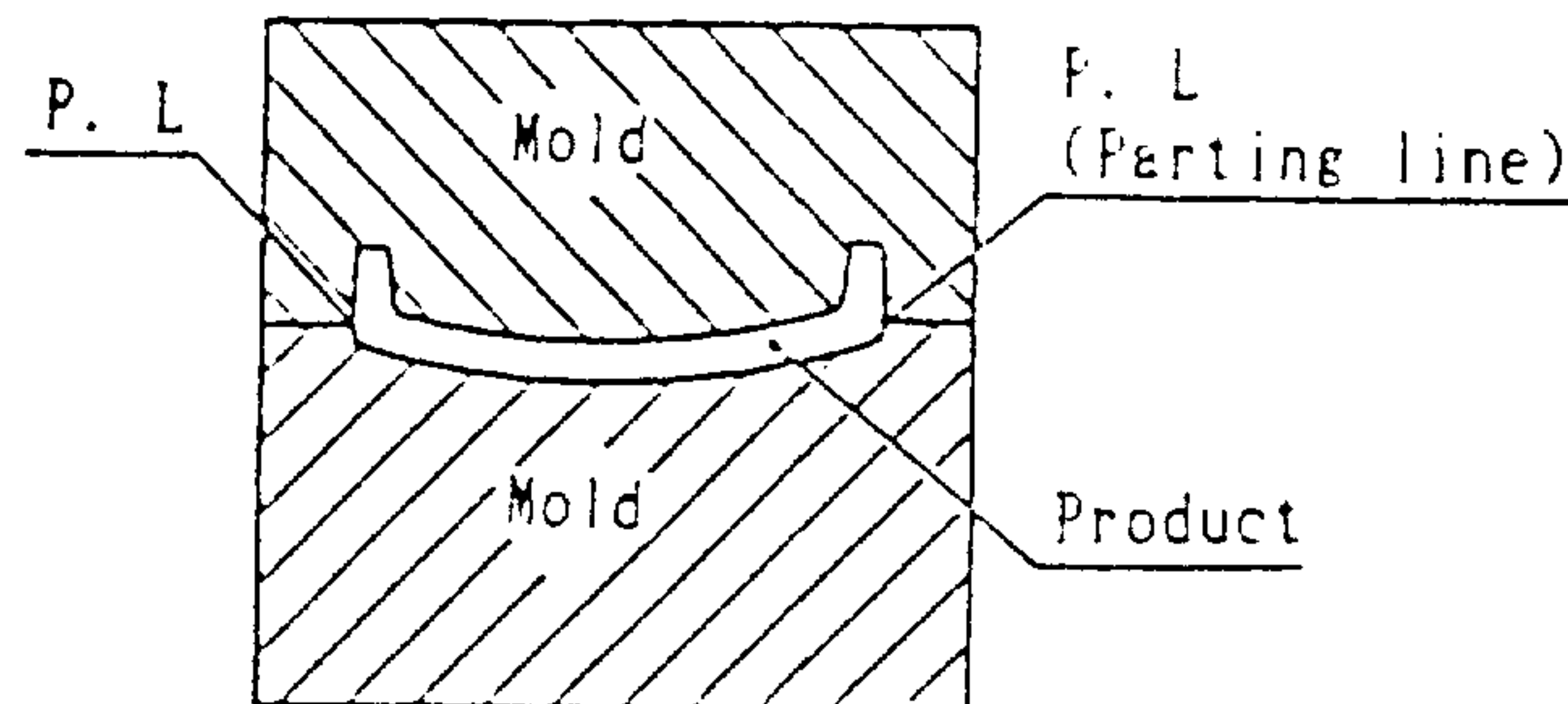
: Bearing surface protruding
to ward this side on the
screen.

: Bearing surface protruding
beyond the screen.

- (4) The rules of surface description for model approval are defined. When the surface description is not indicated the explanation that the surface shape is left to a manufacture is written by sketch or in the remark column.



- (5) Parting lines are indicated for plastic parts. When they are not indicated, the explanation that they are left to a manufacturer is written in a drawing.



- (6) A perspective drawing is placed as close as possible from the principal projection drawing, showing the shape of external appearance as well as bending radiuses. (See the Paragraph 10(1))

6. Basic Requirements for Packed Drawing Preparation

- (1) Packed drawing is computerized by CAD as follows:

- (a) Parts shapes consist of GNC data (three-dimensional shape data).
- (b) Packed drawing is outputted by GNC or CADAM data

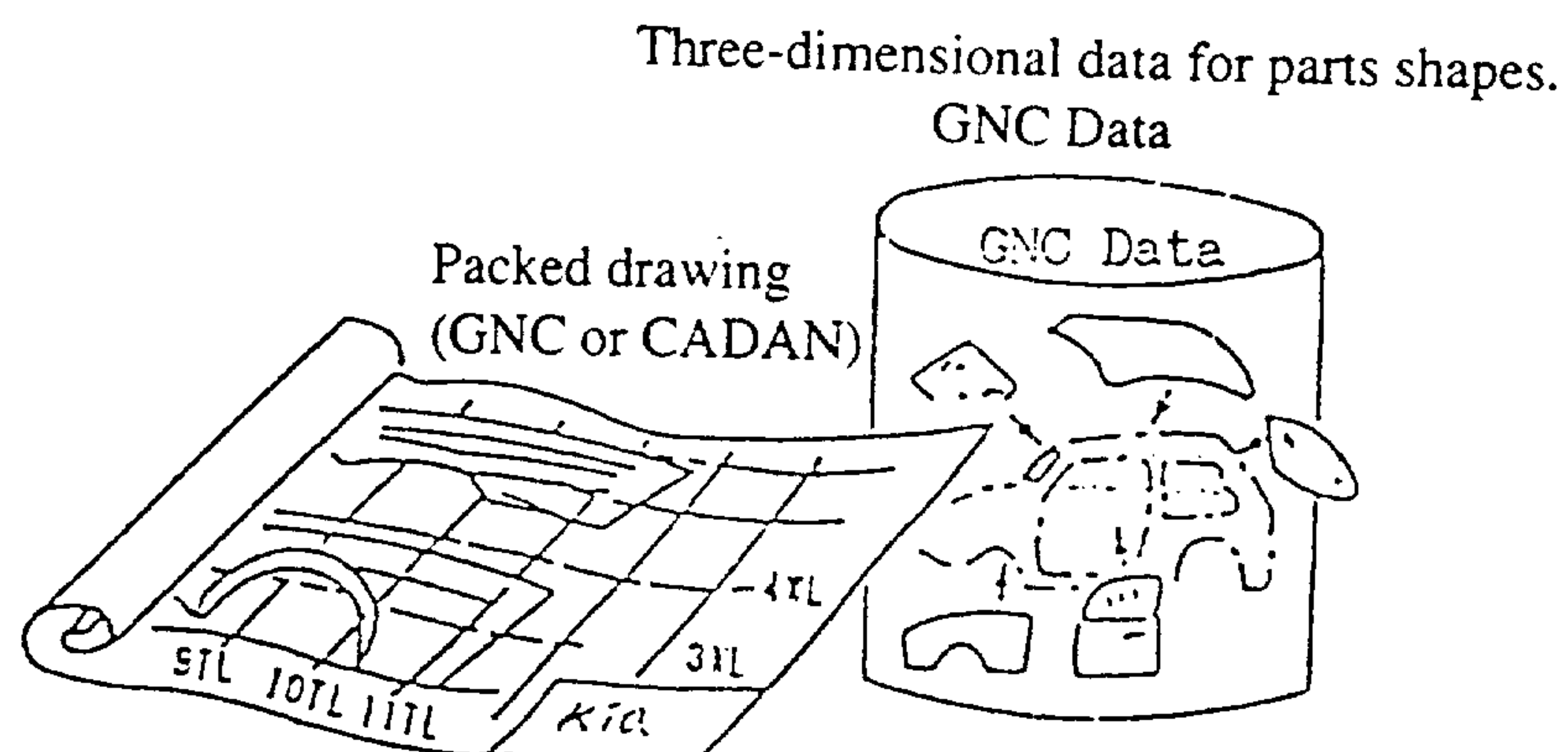
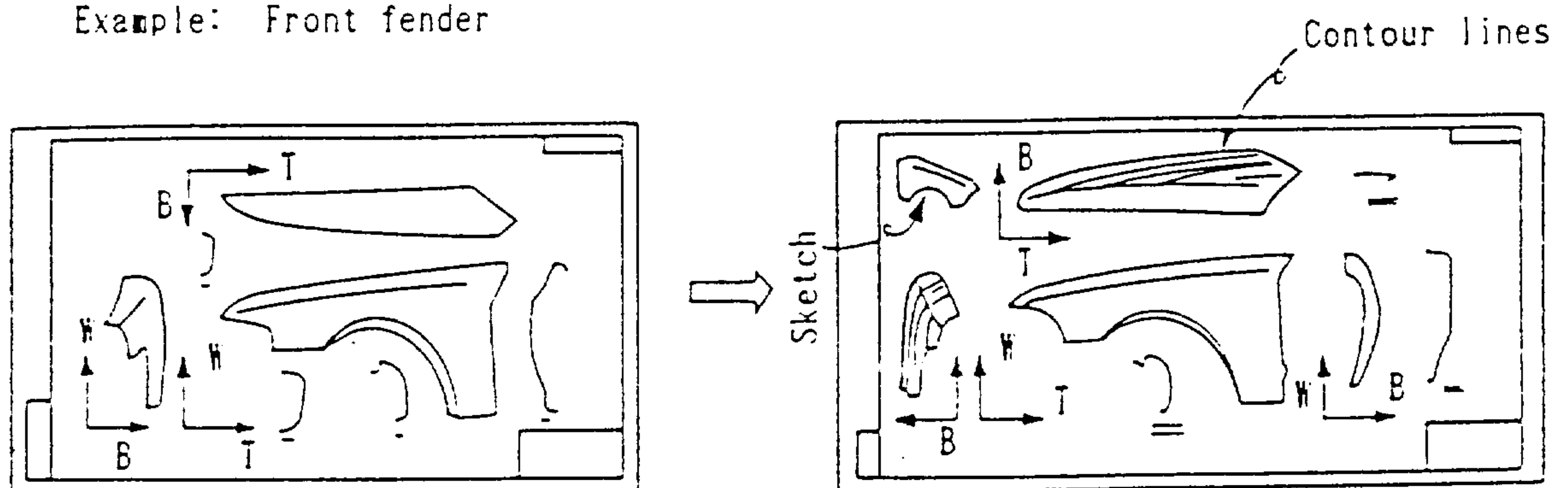


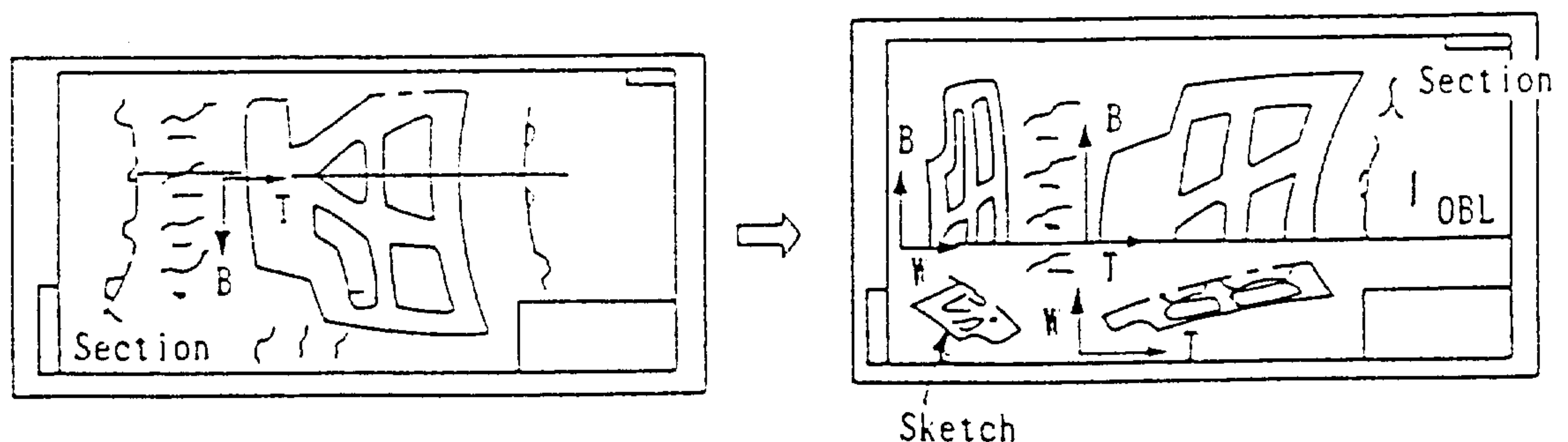
Fig. 5

- (2) GNC and CADAM data are related each other.
- (3) Packed drawing describes the right-hand side of a part basically. GNC data shows the portion on the right-hand side from OBL (See the Paragraph 12). However, conventional part drawings of such part as an outer body panel describe the left-hand side, as shown in Fig. 1. packed drawing has no thickness or hidden-outline description because-of the line drawing technique, unlike the conventional part drawings. Therefore, packed drawing describes the right-hand side which carries data as shown in Fig.2.
- (4) A sketch is added unlike the conventional part drawings, the shape in packed drawing is hard to understand because packed drawing is prepared by the line drawing technique. Therefore, a sketch is added, as illustrated in Fig.2.

Example: Front fender



Example: Bonnet reinforcement



- (5) The line name is entered

Unlike the conventional part drawings, the shape in packed drawing is hard to understand because Pack drawing is prepared by the line drawing technique. Therefore, lines in each projection drawing and sectional view are named.

- (6) Basically, 3 projection drawings, i.e., a front, a top and a side view, are described. However, when a part is described as one line on a plane of the projection (for example, side sill inner whose line constituting its shape is parallel with TL), only 2 views excluding that projection are provided.

- (7) Surface shape is described in contour line sections (See the Paragraph 9. Surface Description) Section groups, are formed at regular intervals to show a curved surface, which expresses the three-dimensional shapes between master curves. (This drafting technique is similar to description by contour lines in maps and isobaric lines in weather maps.) A TL and a WL sectional view are entered as in the below example of a filler lid. If a sectional view causes confusion of lines, it is shifted to a different location.

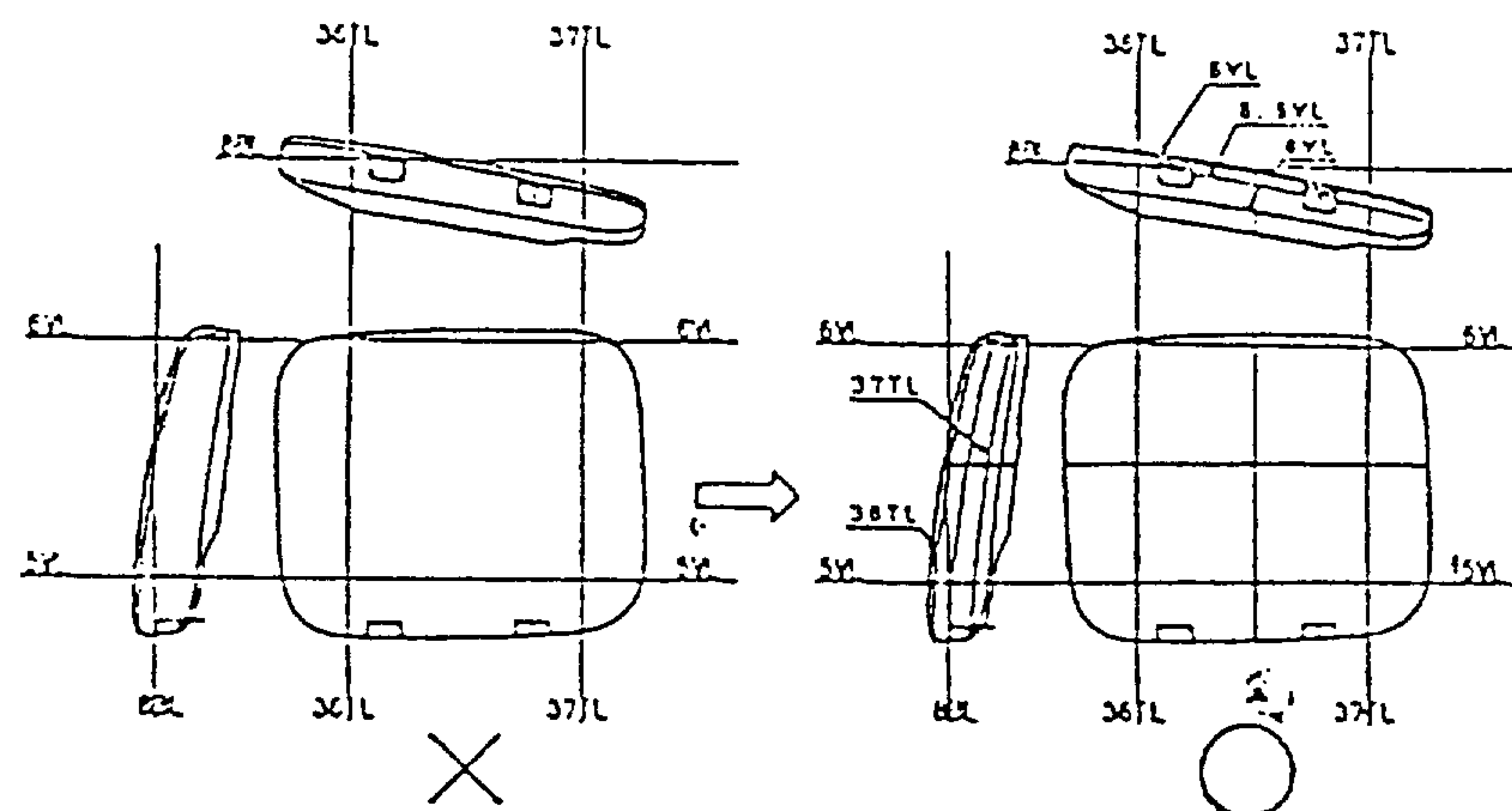


Fig. 9

(8) Sheets for drafting Packed drawing are as follows:

(8.1) Sheets for automatic drafting machine

(a) Mylar which is matted on both sides and 125 m in thickness

(8.2) Sheets for electrostatic plotter

(a) Electrostatic plotter paper

7. Format

(1) Classification of Packed drawing

(a) Type A

Applied mainly to sheet metal parts, containing information on shapes, dimensions, etc. plus comments, specifications, etc. in one sheet.

(b) Type B

Applied mainly to plastic parts, consisting of several sheets. The priority of each sheet is as follows:

Sheet 1/3 : A specification drawing

sheet 2/3 : A drawing that shows the reverse shape and installation structure, etc.

Sheet 3/3 : A drawing that primarily gives information on shapes (Loft drawing)

Mylar (Handwriting impermissible)
and electrostatic plotter paper

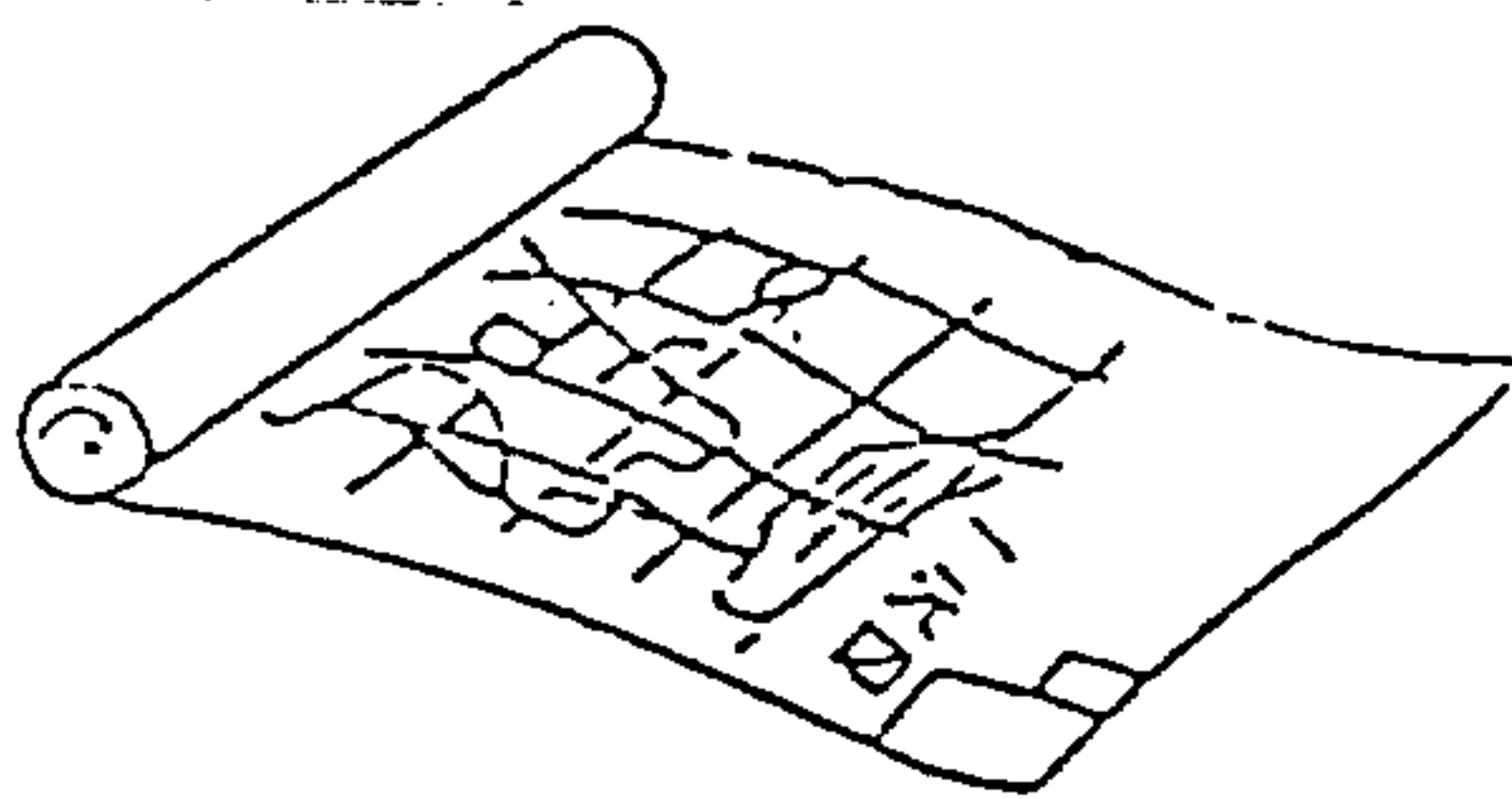


Fig. 12

Type A

(Applied mainly to sheet metal parts)

Mylar (Handwriting impermissible)
and electrostatic plotter paper

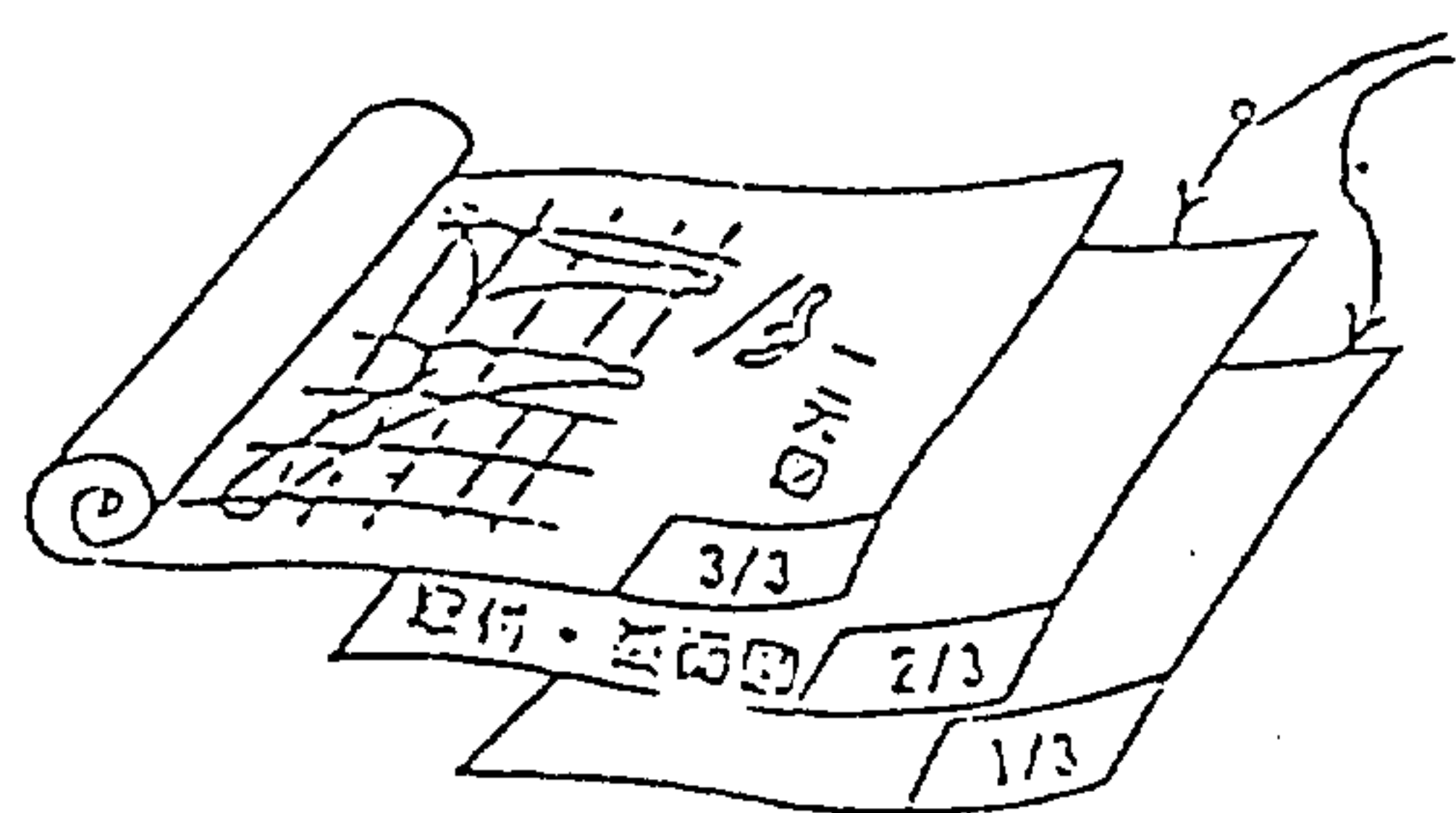


Fig. 13

Type B

(Applied mainly to plastic parts)

(2) Classification by output methods of packed drawing is drafted in two versions ; One is prepared by electrostatic plotter and the other by automatic drafting machine.

(a) Output by electrostatic plotter

Depending on the use conditions on a downstream process, e.g. in ordering molds, there are cases where a numerical data is not directly read from packed drawing. In such cases, drawings prepared by electrostatic plotter are used as master drawings.

(b) Output by automatic drafting machine

Drawing prepared by automatic drafting machine using a ball-point pen on Mylar mentioned in the Paragraph 6.(8).(8.1).(a) are master drawings.

8. Lines

(1) Thickness of lines

(a) The line drawn by electrostatic plotter are as follows:

Thickness Type	Application
Thin	Imaginary lines, center lines, shape line of mating part and contour lines
Medium	Shape lines dimension lines and leader lines
Thick	Section title and view
Extrathick	Part number in the title column

(b) The thickness of lines drawn by automatic drafting machine is the one drawn by a ball-point pen of 0.5mm in ball diameter.