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BODY SHOP

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BODY SHOP

PRESENTATION

The metalworking activity in TAM started 44 years ago. In the intervening years, the Body Shop has earned a considerable reputation in the domain of automotive components manufacture, using metal forming and welding techniques; its product range includes a wide variety of items, from individual parts to entire units destined for cab manufacture, sheet metal parts for air-cooled engines as well as diverse 6 to 2 mm tubes for the application in vehicles and elsewhere.

The offer comprises the following services:

- complete services from technology and tool engineering to product manufacture using metalworking processes on 500 kN to 16000 kN presses and 700 mm x 700 mm to 2500 mm x 3500 mm worktables;
- 0.2 - 12 mm sheetmetal slitting on parallel 1000 to 3500 mm shearing machine;
- bending of diverse sections on hydraulic bending machines with maximum length of 4000 mm;
- cutting out and manufacture of most demanding sheetmetal products on CNC machining centres;
- manufacture of products with Ø 8 to Ø 120 mm tube bending on conventional and CNC machines;
- spot and CO_2 are welded products;
- full surface protection of above mentioned products using various materials and procedures:
  - prime coating - anaphoresis and traditional finish coatings - two-component systems
  - protection against noise and impact
  - galvanic and chemical coatings.

Considering the above production capacity our services include all the necessary know-how for the manufacture of the desired products from engineering drawings and prototypes to finished products.

In view of assuring and maintaining the quality of our products we have developed in parallel with the development of production facilities, also our own quality control system by erecting laboratories specialised in incoming materials and semi-finished products inspection. In addition, we have introduced inspection points and centers equipped with appropriate measuring instruments. Currently, the process is being under way to bring our existing quality assurance system in compliance with ISO-9000-9004 standards.

The shop floor surface covers 19,000 sq.m. housing about 290 different machines to assure a wide range of operations from metal cutting, metal working and welding to assembly thus offering a great variety of products of more than 14,000 different items.

As far as the computer-supported information system is concerned the Body Shop has an on-line connection with the TAM computer center and through it with a broader computer network - JUPAK associating universities, research institutes and other users.

Successful and efficient operation is ensured through different production departments and related services.

1. SHEETMETAL FORMING PLANT

Carried out in this plant is the manufacture of very complex pressings. The production processes range from preliminary material preparation and slitting to the final stage of extrusion, trimming and finishing.

The presses are arranged systematically with special attention being paid to individual technological procedures - heavy-duty and medium-duty lines are separated, extrusion system is unified and clamping tables are of equal dimensions so as to reduce downtime to the minimum by immediately substituting a broken-down press with another.

With regard to diverse production processes, the presses are arranged in groups:

1.1. Sheetmetal Working Equipment

The equipment available in this sector includes:

- six shearing machines

plate thickness	0.1 - 12 mm
plate length	up to 3100 mm

One shearing machine allows setting of cutting angle to 1°, 2°, or 3°.

- Kneading/straightening machine BRONX

max thickness of material	1.6 mm
max width	2250 mm
max/min feed rate	45/22.5 m per min

- Bending/straightening machine LISSE

min plate thickness	0.4 mm
max plate thickness	2.5 mm
max plate width	1600 mm
feed rate	15 m/min
plate length	up to 7000 mm

- Levelling machine SCHUBERT

plate thickness		1.5 - 15 mm
max plate width		630 mm
feed rate	-	3 - 15 m/min

- Three hydraulic bending machines

ram force	1600 - 2000 kN
plate length	3100 mm
plate thickness	up to 15 mm

- Two flame cutting machines

- Strap cutting and straightening machine GEORG

max cross-section of material	150 x 5 mm

1.2. Light-duty Presses

The manufacture of smaller parts using the cutting, punching, bending and extrusion processes (lower depths) is provided by eighteen presses having the features as follows:

- ram force	ranging between 350 and 1600 kN
- max ram size	800 x 500 mm
- max worktable size	1000 x 700 mm
- max extrusion depth	80 mm

1.3. Medium-duty Presses

Available for the manufacture of medium-size parts featuring greater extrusion depths are eight presses with the following specifications:

- ram force	from 1000 to 10000 kN
- ram size	from 700 x 700 to 1250 x 1600 mm

- table size	from 700 x 800 to 1250 x 1600 mm
- division of ejectors on the table is standard	100 x 100 mm,
except with two presses having a division	70 x 70 mm
- max extrusion depth	350 mm

Two of the above mentioned presses are of the drop-type allowing also forging and hot drawing operations. All presses are of double-action type.

1.4. Heavy-duty Presses

Six presses used for the manufacture of larger parts and greater depths feature the characteristics as follows:

- ram force	5000 to 16000 kN
- ram size	2700 x 1300 to 3500 x 2500 mm
- table size	2700 x 1300 to 3500 x 2500 mm
- max extrusion depth	500 mm

One of the presses is of the triple-action type and two are double-action presses.

1.5. Made to Order Manufacture

Combined BOSCHERT machine: cutting force 300 kN

I. station - angle cutting
310 x 310 x 5 mm

II. station - rectangular cutting
310 x 40 x 5 mm

III. stamping and pressing - max force 300 kN
IV. edging and bending 500 mm

EDEL stamping machine:

press force 300 kN
number of stations 20 + 1
max tool diameter 150 mm

BOSCHERT combined machine:

cutting force 600 kN
max cutting length 310 x 310
max plate thickness 10 mm

1.6. CNC Sheet Metal Forming Machines

- TRUMPF CNC center designed for gas trimming, tool trimming and tool punching.

Technical characteristics:	
- max pressing force	300 kN
- material thickness	1 - 6 mm (option: up to 12 mm)
- plate size	min 500 x 500 mm
	max 1500 x 5000 mm
- cutting gas	N2 or 02
- cutting width	2 - 3.5 mm
- max cutting-off diameter	105 mm
- number of tools in tool magazine	18
- repeatability	± 0.01 mm
- cutting accuracy	± 0.1 mm
- work piece material (for plasma cutting)	all electroconductive materials
- max speed of idle stroke	60 m/min
- max nibbling speed	6.5 m/min
- max cutting speed	12 m/min

Also belonging to the CNC center is ERNST deburring machine which has the following features:

- plate thickness	1 - 12 mm
- plate dimensions	from 100 x 100 mm
	to 1200 x 2500 mm

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Inspection department

Sheetmetal shop products

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Cutting machines

Bending machines

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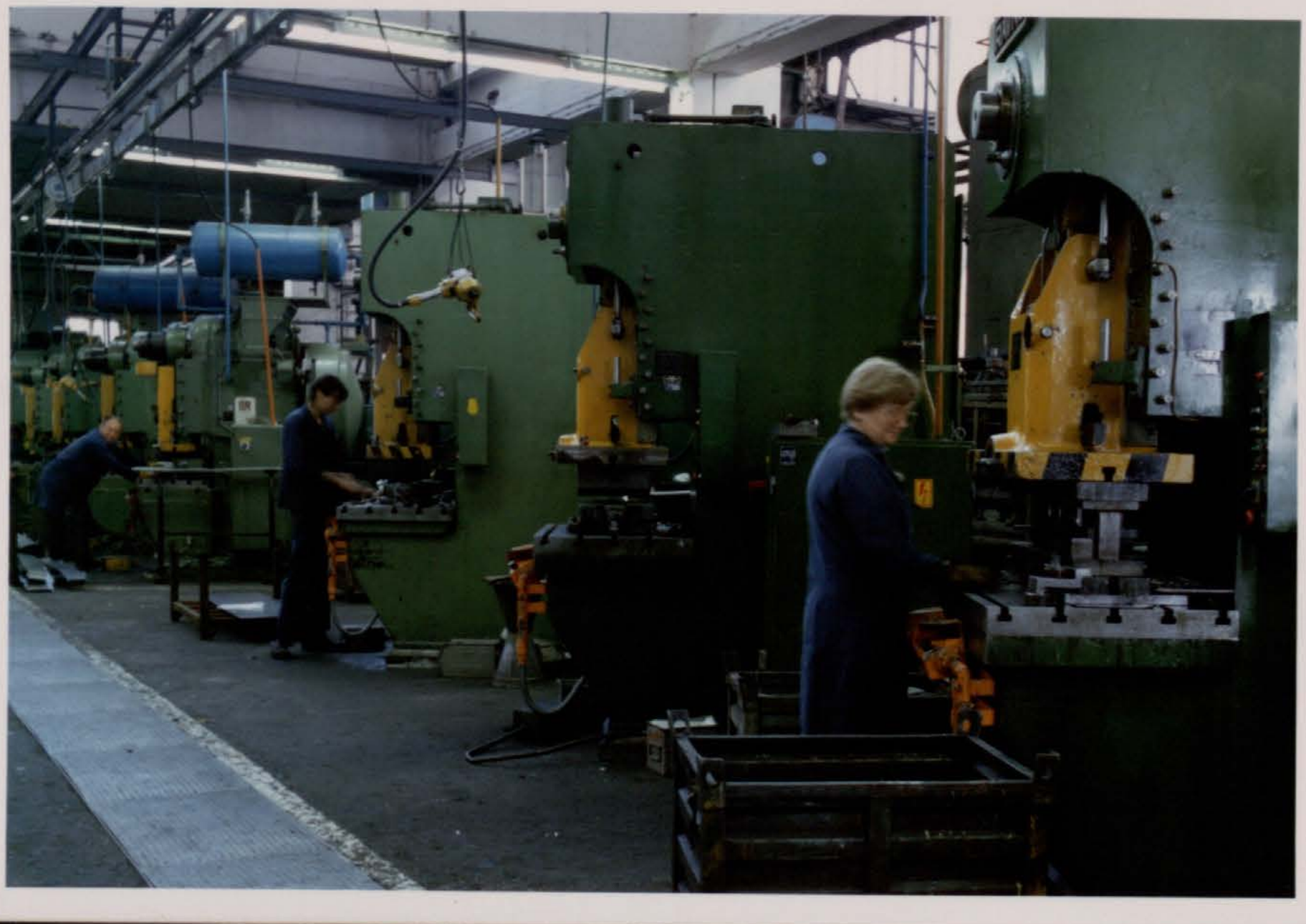
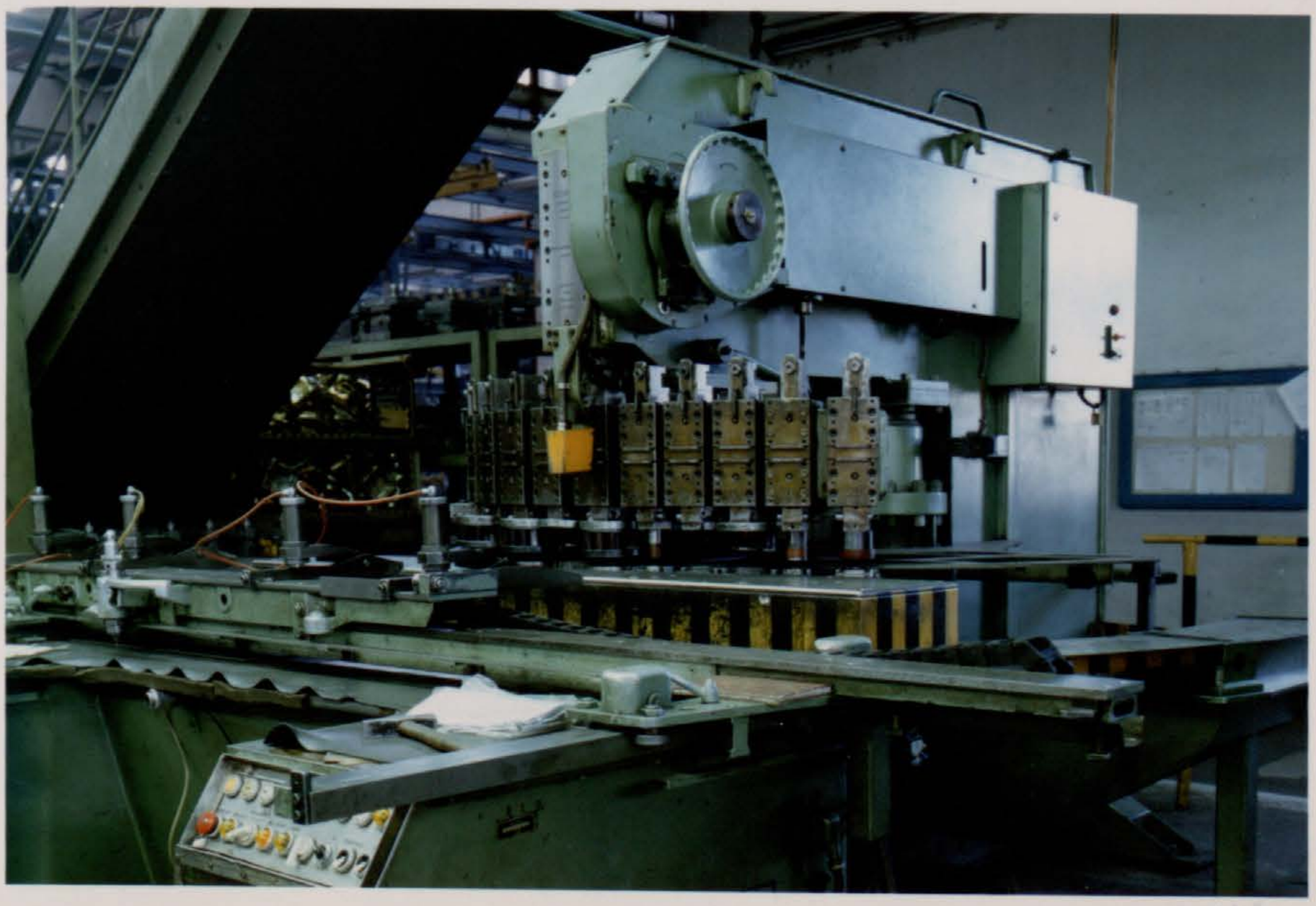


Light-duty press line

Medium-duty press line

Heavy-duty press line



Punching machine

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CNC plasma cutter

2. CAB ASSEMBLY LINE

The operations included in this line cover cab assembly from plating to complete outfit.

Besides, various sheet-metal parts and units for cab and engine mounting are manufactured and finish treated.
A special group of machines is arranged for carrying out special orders related to sheetmetal forming.

Available are the machines as follows:

- 56 hanging spot welders	tongs with a power range from 60 to 185 kVA
- 6 fixed spot welders	with a power range from 60 to 200 kVA
- 26 CO2 200 - 450 A welders	
- 3.2 kW KALTENBACH circular saw:	power output 3.2 kW max bore Ø 95 mm cutting angle: 10° - 90°

and various other small sized machines designed for such application.

The available equipment also includes a 1.5 kW LASER-HELD 5-axis laser trimming system:

- laser power, permanent	1500 W
- cutting range	X axis = 3200 mm Y axis = 2200 mm Z axis = 900 mm B axis = $\pm$ 90° C axis = 360°
- cutting speed	3000 mm/min
- plate thickness	0.2 - 7 mm
- cutting accuracy	$\pm$ 0.1 mm

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Five-axis laser trimming machine

3. METAL-CUTTING, WELDING AND METAL FORMING

The machinery for metal-cutting, welding and metal forming includes:

4 special-purpose milling machines:	
- power ranging	from 5.1 to 13.2 kW
- worktable	300 to 400 mm wide
	1250 to 1600 mm long
- table/spindle axis distance	from 20 to 450 mm
3 universal lathes:	
- power output	1.4 to 11 kW
- distance between points	from 500 to 1050 mm
- distance between carriage and points	from 120 to 250 mm
2 column drilling machines:	
- power output	3 kW
- worktable	450 x 560 mm
- max distance between spindle and table	720 mm
- distance between spindle center and column	315 mm
- drilling depth	200 mm
9 radial drilling machines:	
- power ranging	from 4.3 to 7.4 kW
- spindle/clamping table distance	from 400 to 1500 mm
- clamping table	from 900 to 1500 mm
- max drill diameter	Ø 50

2 ECKOLD metalforming machines :	
- power output	4.1 kW
- horizontal opening - depth	675 mm
- vertical opening	450 mm
- ram stroke	8 mm
- number of strokes	150/300/600 per min
- material thickness	up to 2 mm
8 spot welding machines :	
- amperage	80 to 120 A
- max distance between electrodes and housing	700 mm
- max thickness of spot welds	up to 5 mm
- electrode force	up to 10000 N at 6 atm
13 welding units for semi-automatic CO2 welding :	
- mains power	11.3 kW
- maximum current	450 A
- welding wire diameter	0.8 to 1.2 mm
- wire feed speed control	from 0.4 to 6 m/min
- material thickness	up to 15 mm

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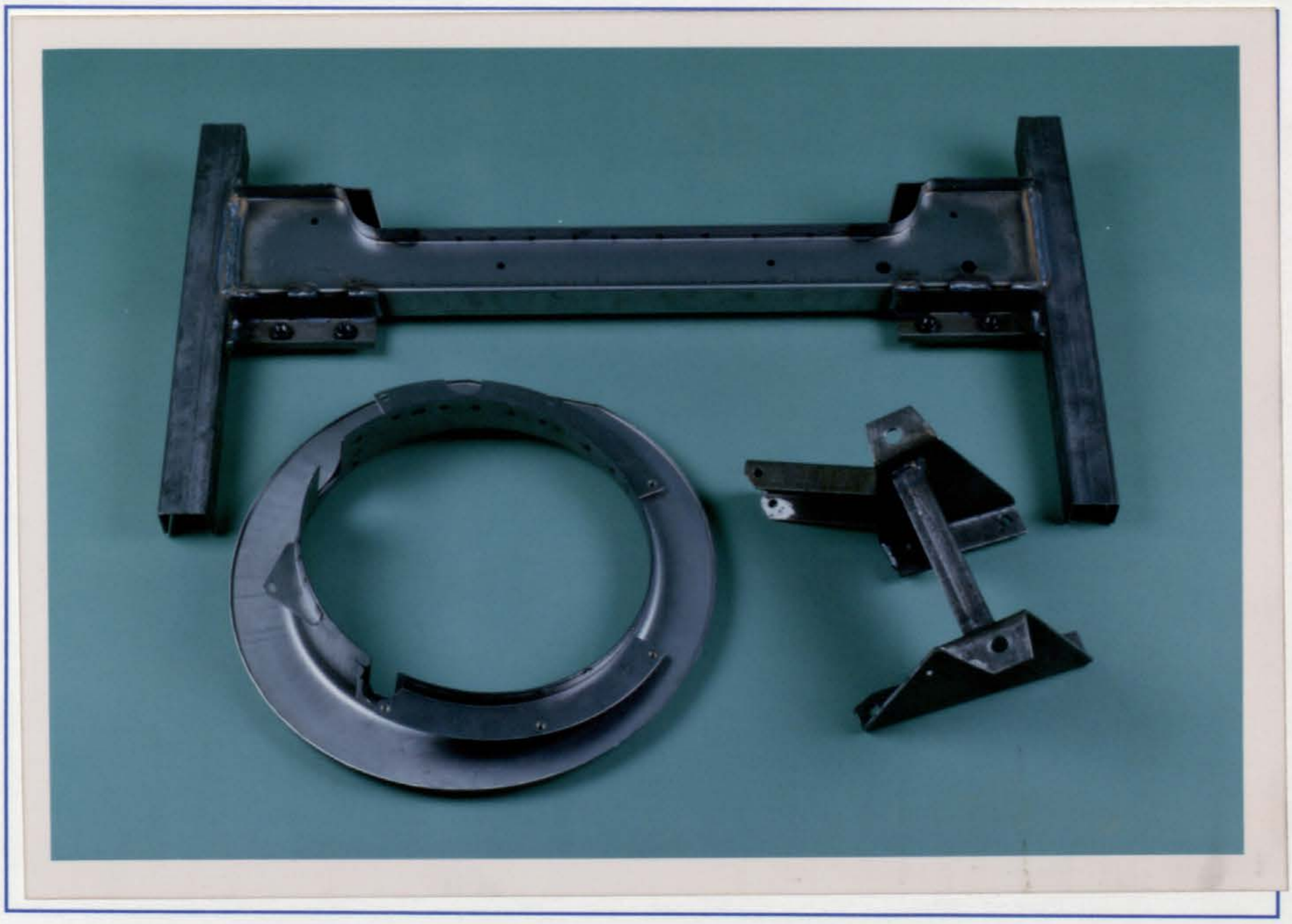
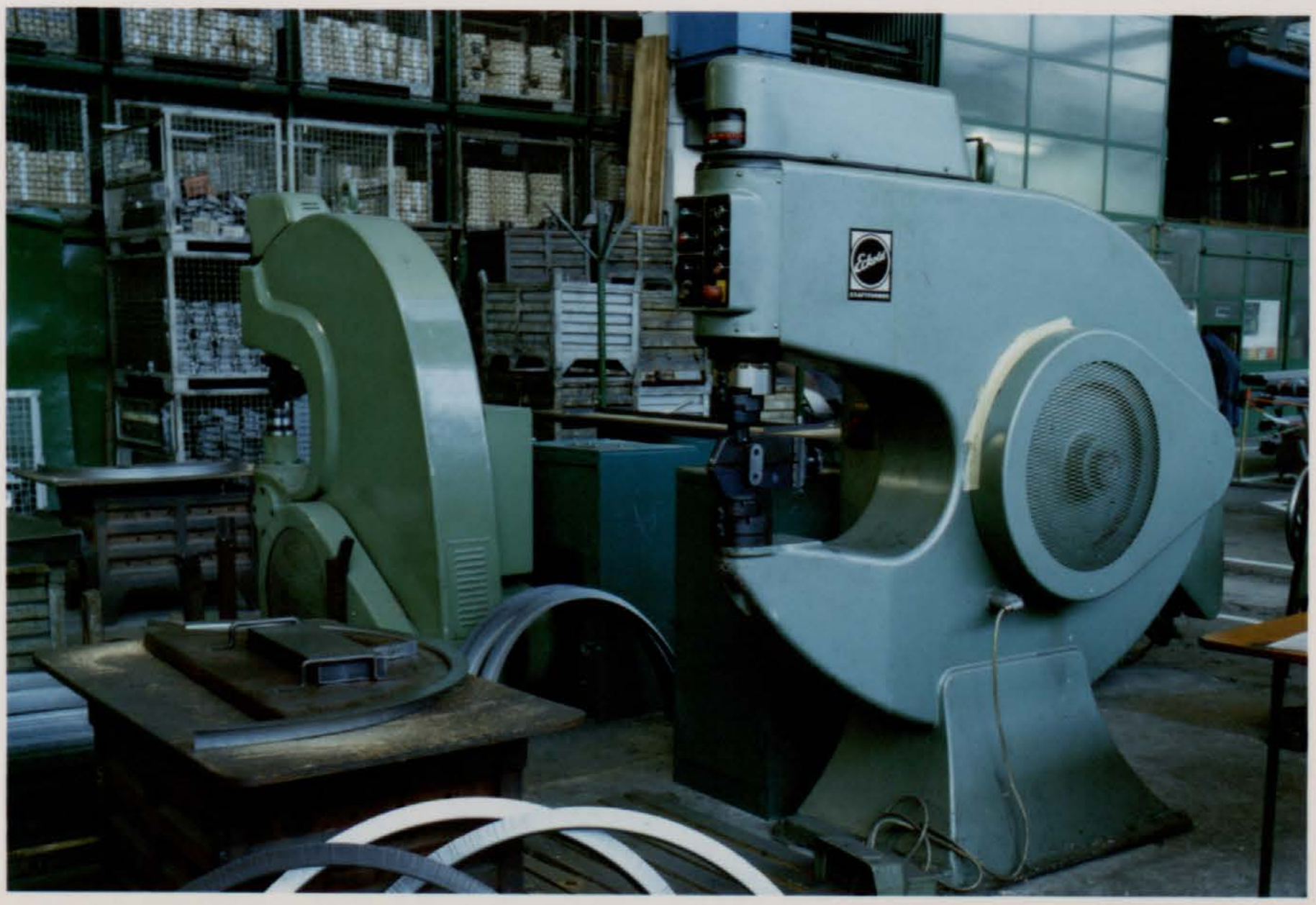


Welding, metal cutting and fabrication products



Sheetmetal forming machines

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Welding shop for semi-automatic CO_2 welding

Fixed spot welders line

4. TUBE SHOP

A sector designed for cutting and bending of Ø 6 to Ø 110 mm drawn and seamless tubes as well as tube welding.

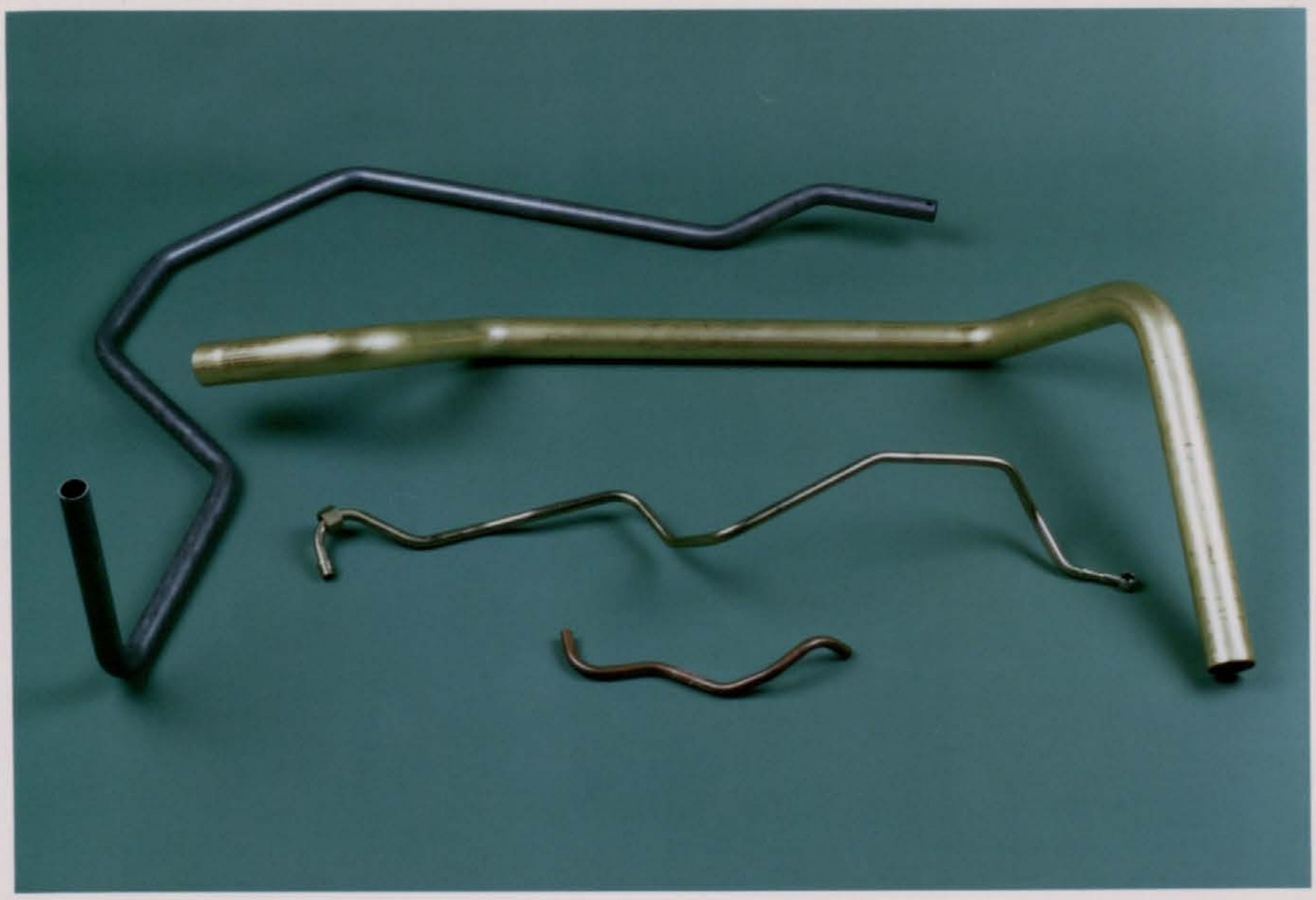
Tubes are manufactured either on the basis of design drawings or samples for the purpose of which a modern sample inspection room is available.

- 2 CNC machines: BLM B/32	power output	9 kW
	tube diameter	Ø 6 to Ø 30 mm
	max number of bends	24
	max tube length	3500 mm
BLM B/63	power output	25 kW
	tube diameter	from Ø 16 to Ø 65 mm
	max number of bends	24
	max tube length	3500 mm
- KALTENBACH circular saw:	power output	1.25 kW
	max cutting diameter	Ø 130 mm
	max rectangular workpiece size	315 x 50 mm
- 2 conventional bending machines:	power ranging	2.2 to 20 kW
	tube diameter	Ø 6 to Ø 110 mm

- 3 welding units for semi-automatic CO2 welding:

mains power	up to 15.2 kW
welding wire diameter	from 0.8 to 1.2 mm
wire feed rate	from 1 to 14 m/min

- in-house built forming machines



Tube shop products

NC BLM machines

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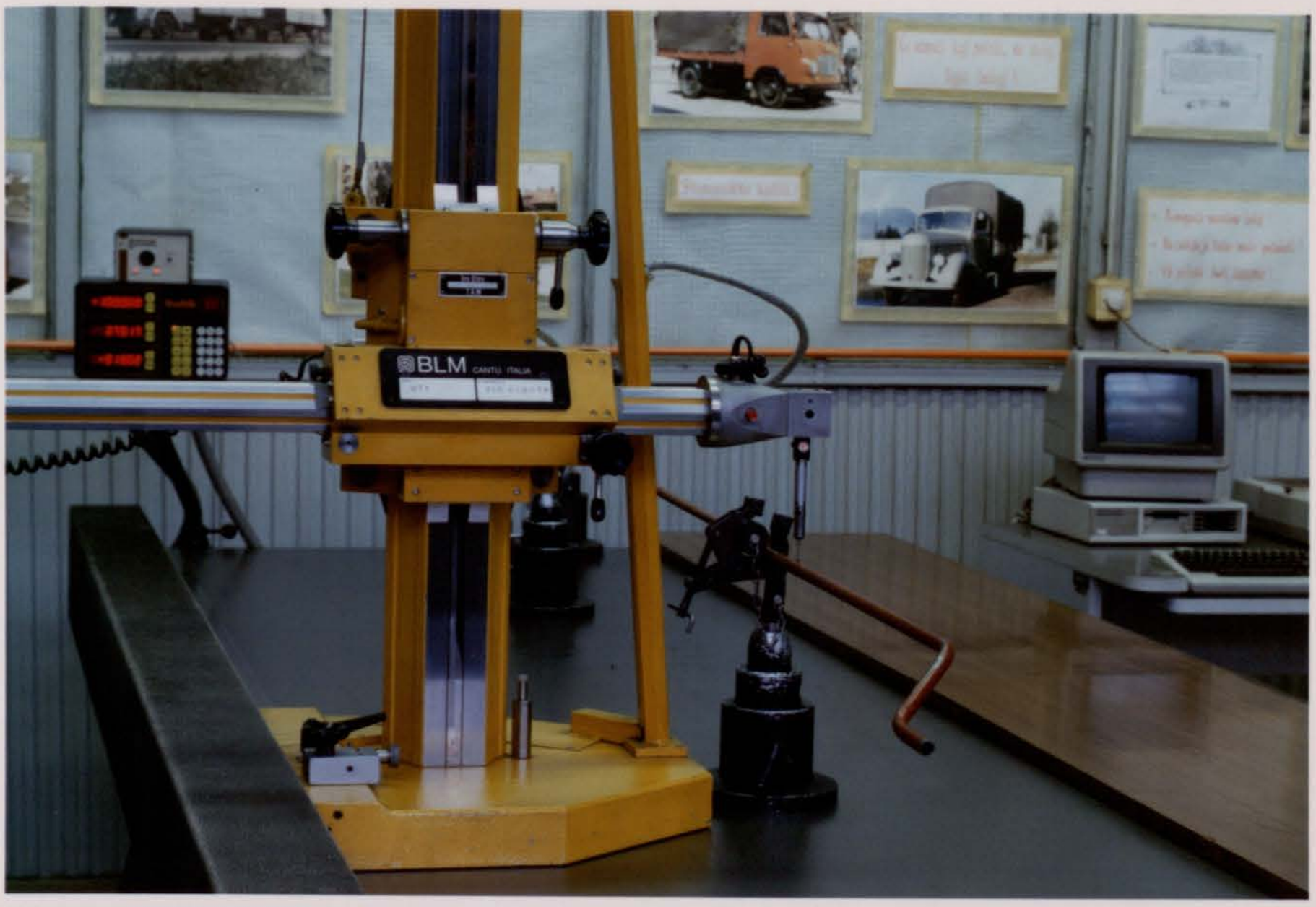

Inspection room with programming computer

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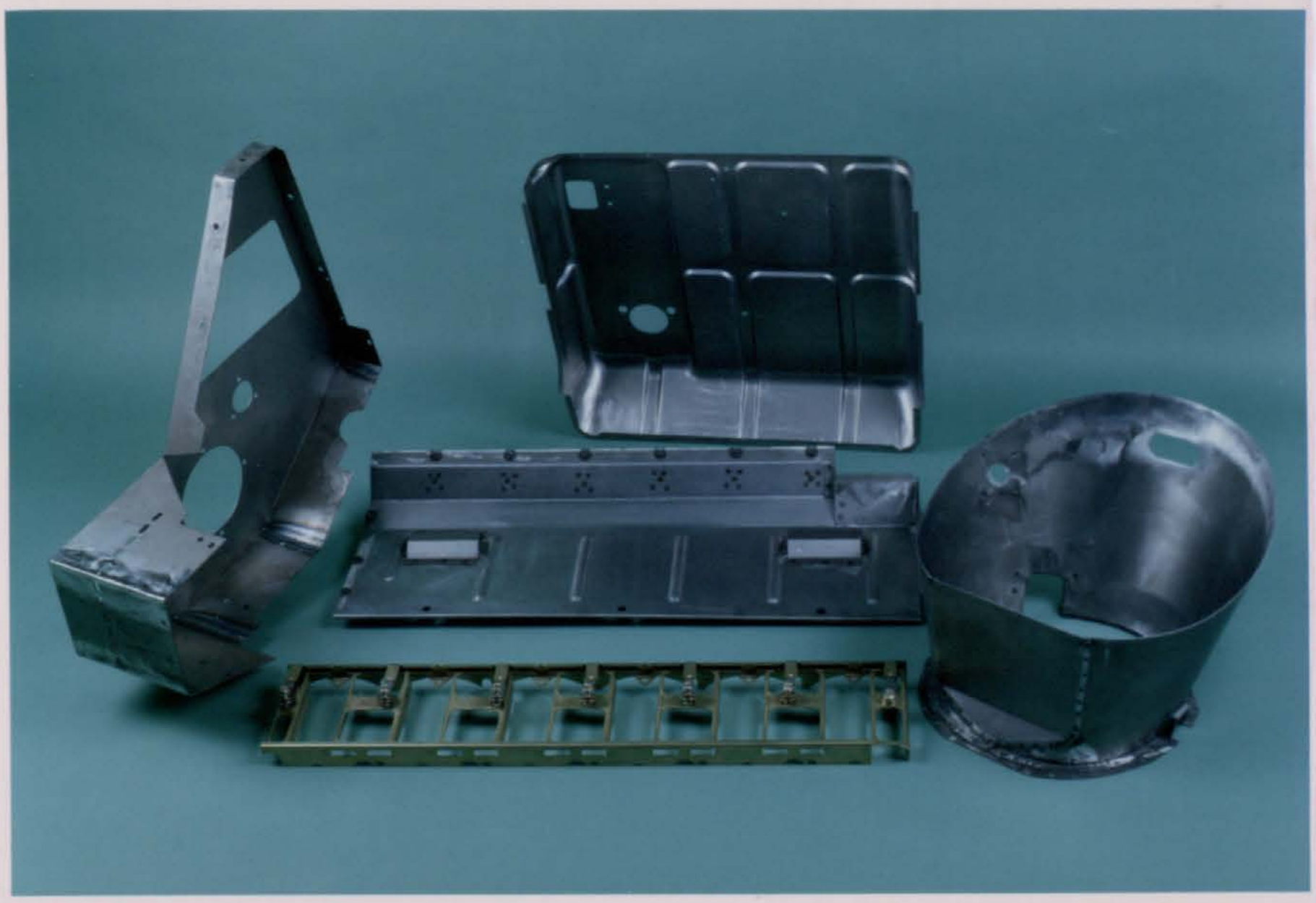

Various finished products

Bending machine