

# CERN - GREECE INDUSTRY DAY

31 March 2014 NCSR DEMOKRITOS



**DEMOKRITOS**

NATIONAL CENTER FOR SCIENTIFIC RESEARCH

# TEMMA

PRECISION ENGINEERING AND MANUFACTURING

# A. The Company

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# A. The Company

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TEMMA was founded in 1961 for the purpose of manufacturing mechanical parts of high precision. Soon the company became known as one of the most consistent and reliable companies in the field. A stable development resulted in becoming a dynamic manufacturer of high quality, in industrial manufacturing precision, meeting European standards.

The company has been specializing in the manufacturing of high precision metal components ever since. Its headquarters and production plant are situated on self-owned, 4000 meters squared, premises in Athens.

The company's goal has always been to satisfy the needs and requirements of its clients. The continuous investment in state of the art technology and new production systems has distinguished TEMMA as a leading force of the Greek industry.



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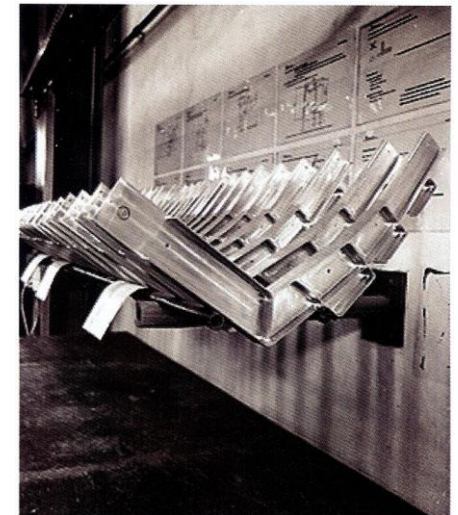
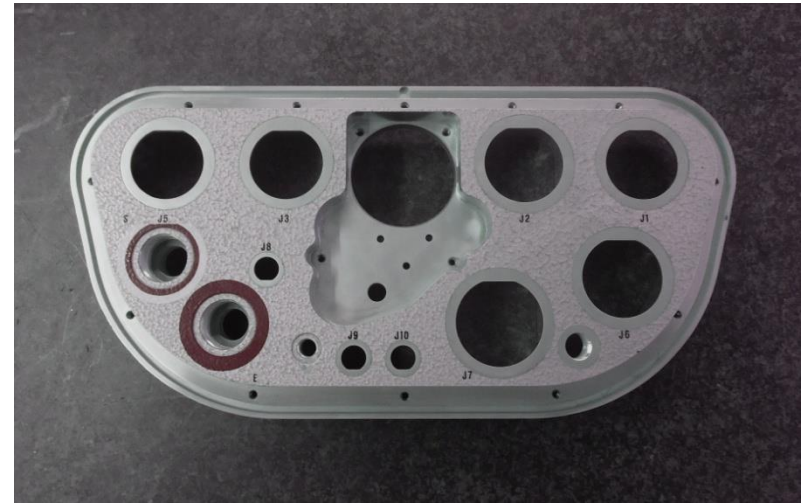
# A. The Company

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Its pioneering machining equipment and excellent know-how allow it to undertake, in strict compliance with international standards and norms, projects of the following sectors:

- Traditional Civil industry
- Defense and Aerospace industry
- Telecommunications industry
- Energy industry

TEMMA's collaboration with top clients, in Greece as well as abroad, have benefited the company in terms of knowledge and experience, making it today capable to carry out the most demanding projects, with absolute consistency and reliability.



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# B. Our People

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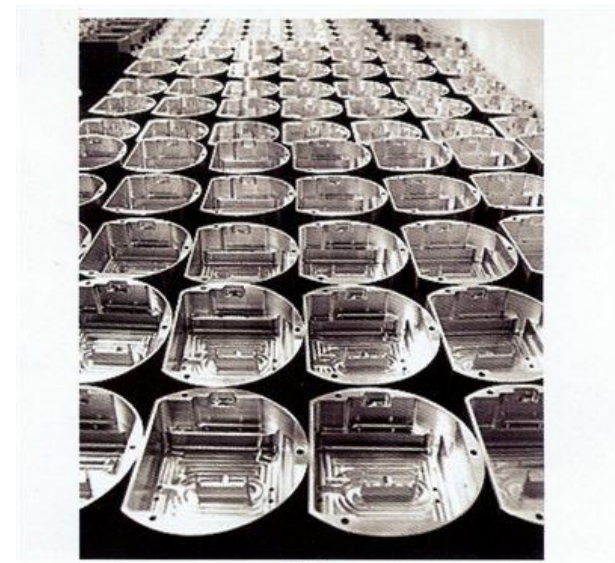
# B. Our People

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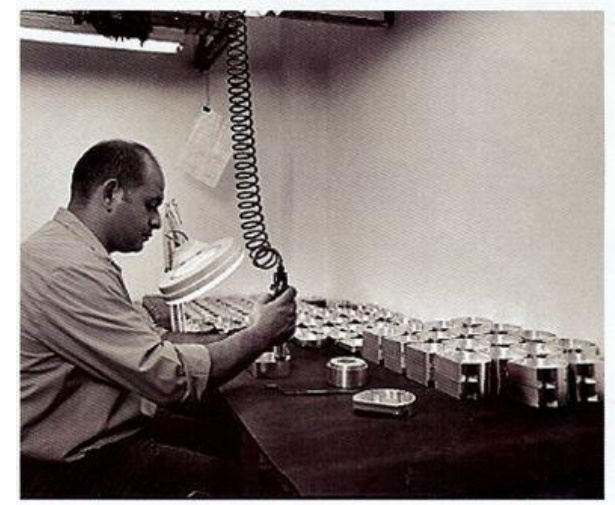
In addition to its state of the art mechanical equipment, TEMMA also boasts its exceptional know-how. This was acquired following 40 years of technological experience constant striving for perfection in both design and application.

TEMMA's personnel, with its unparalleled skill and international experience, is the company's major factor of growth.

On our self-owned premises, designers, engineers, specialized workers and operators constantly develop their expertise in order to respond to our industry's ever increasing demands and face future challenges.



A04.jpg



## B. Our People

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## B. Our People

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5-axis MAZAK VORTEX 1400

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# C. Products and Services

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## C. Products and Services

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TEMMA manufactures products on request, with quantities and delivery dates that are agreed upon with the client.

Always keeping up with developments in technology and constantly investing, TEMMA now boasts a perfectly equipped production unit, featuring state of the art CNC machining centers as well as reliable conventional machining centers, lathes and grinding machines.

The range of materials that TEMMA works with, apart from aluminum alloys that are its main expertise, also includes titanium, inconel, cast iron, steel , bronze , brass and copper as well as plastic and synthetic materials.

TEMMA's production stages are: designing the process, programming the CNC machines, manufacturing the sub-parts and assembling them to a final product. All surface treatments, when required, are carried out by certified partners, in Greece and abroad.



4-axis **CME BF - 05**

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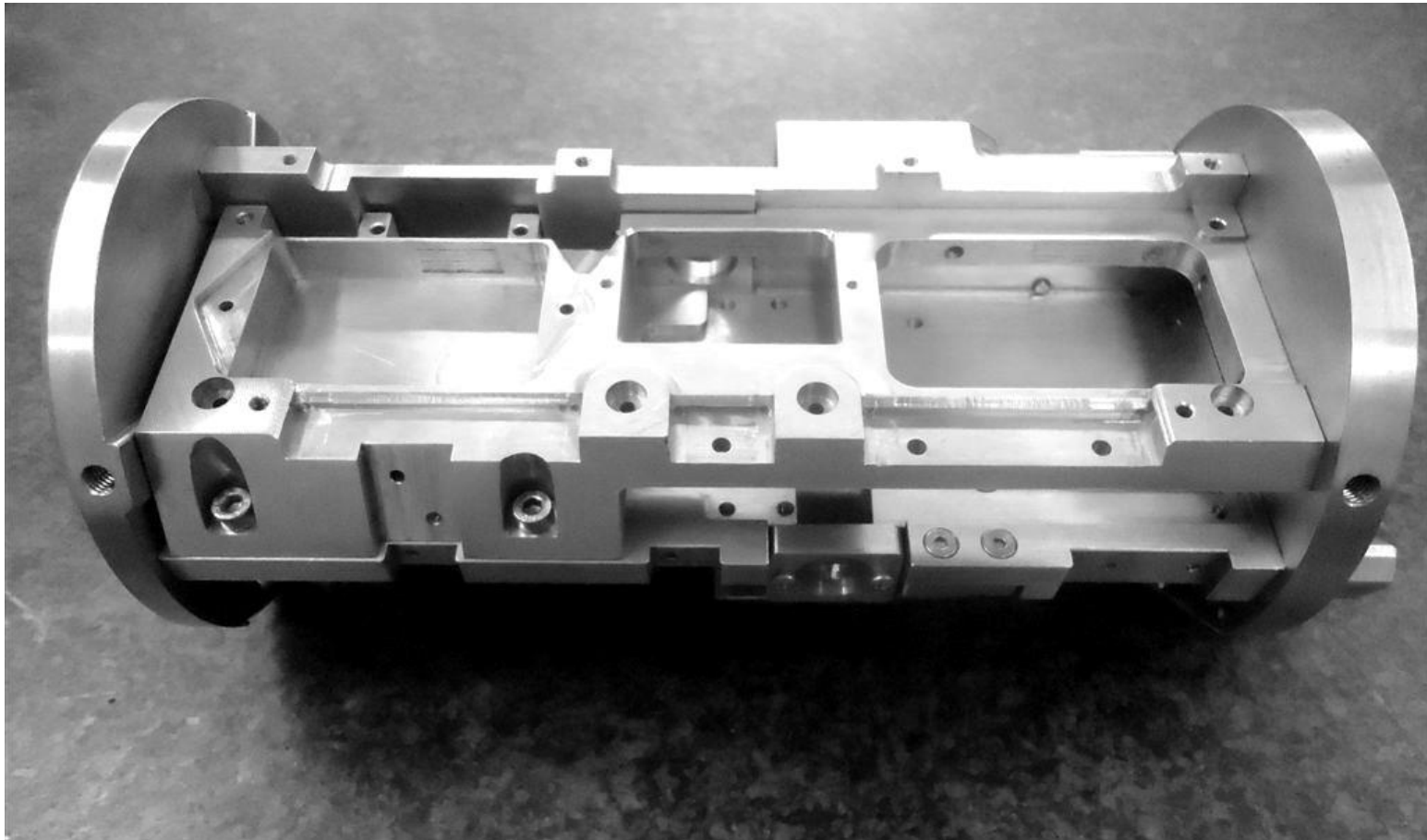
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# C. Products and Services

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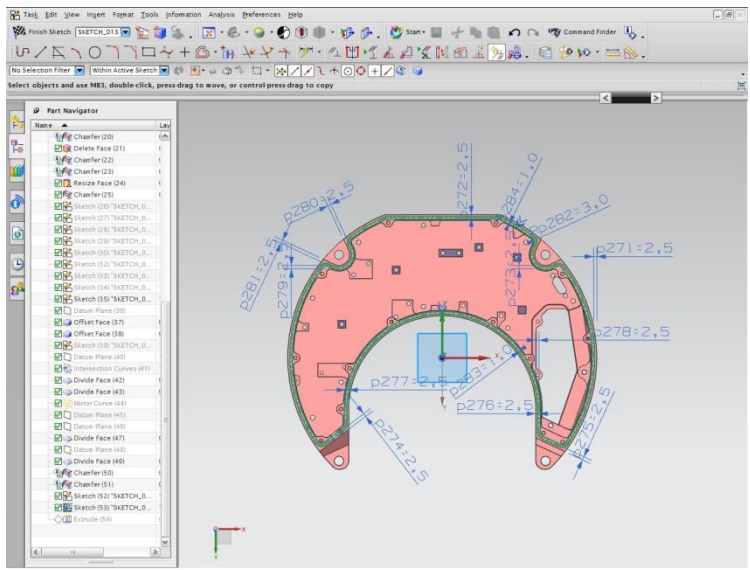
# C. Products and Services

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The production process design is realized by experienced engineers using CAD/CAM systems, with 3D processing and 5-axis programming capabilities.

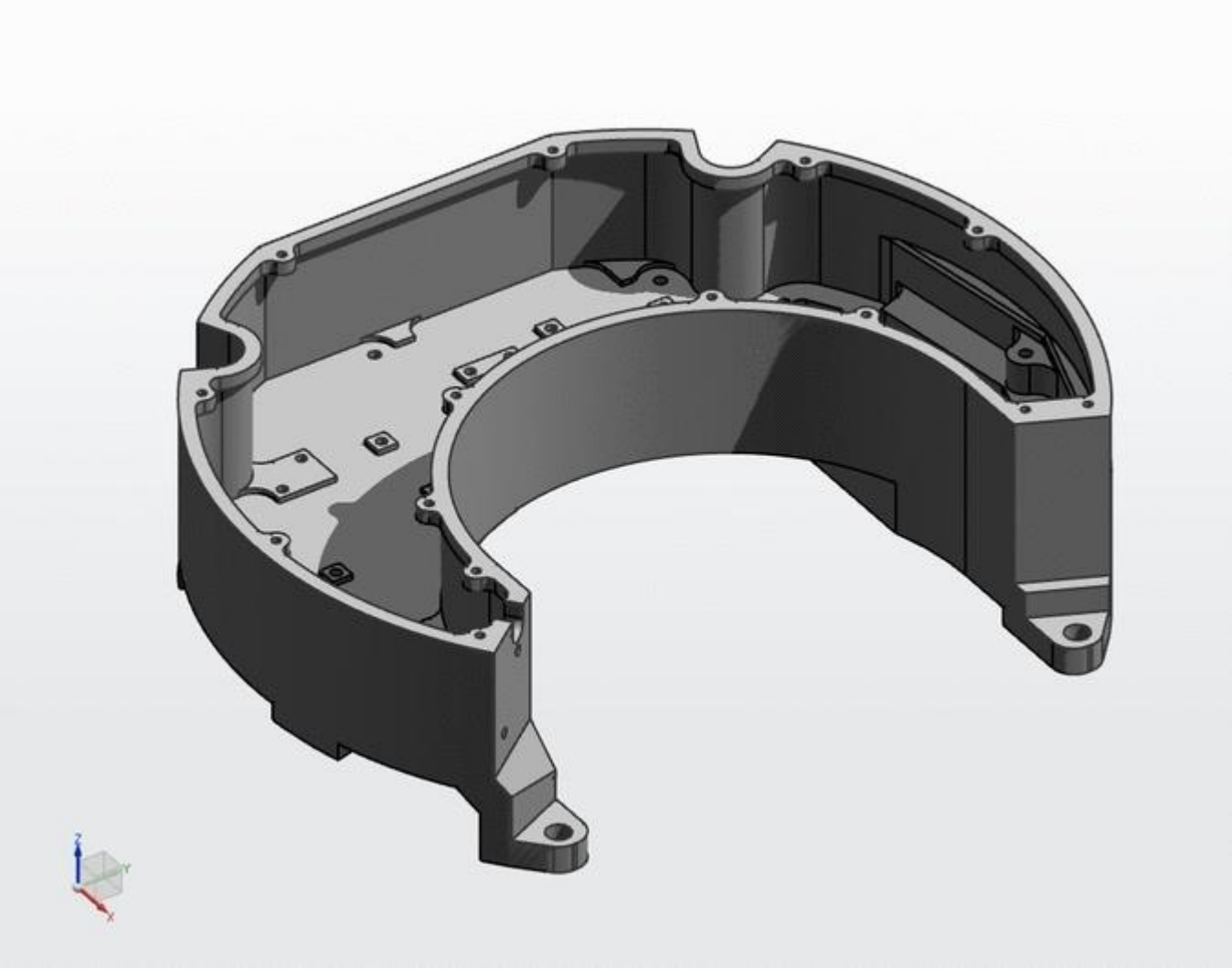
The programs' digital guidance is carried out with the *Edgcam* and *NX (Unigraphics)* software with *CATIA* translator. The INTRANET – DNC wireless network takes care of their transfer and filing at the corresponding machines.

TEMMA can take up single-piece projects (prototypes) as well as small and large batches. This flexibility is due to its machines architecture (pallets, towers, etc.) and the possibility of two extra daily shifts.



# C. Products and Services

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# D. Equipment

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## D. Equipment

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In order to meet its clients' strict standards for the manufacture of high precision metal parts, the company has invested in cutting-edge technology.

TEMMA's modern and pioneering mechanical equipment includes:

[Machining Centers CNC](#)

[Turning Centers CNC](#)

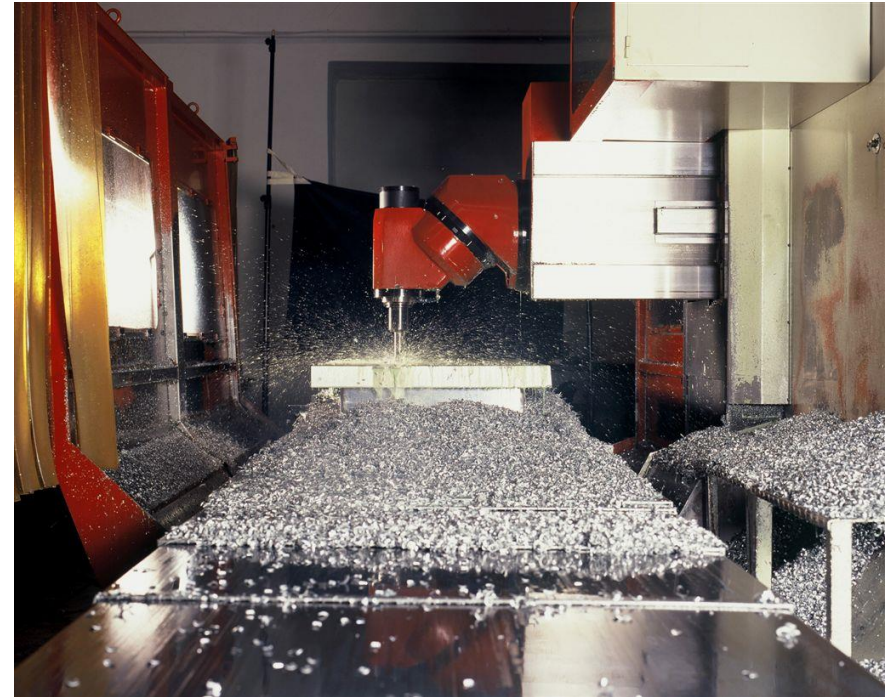
[Conventional Lathes](#)

[Conventional Machining Centers](#)

[Drilling/Cut etc](#)

[Grinding Machines](#)

[EDM](#)



4-axis CME BF - 05

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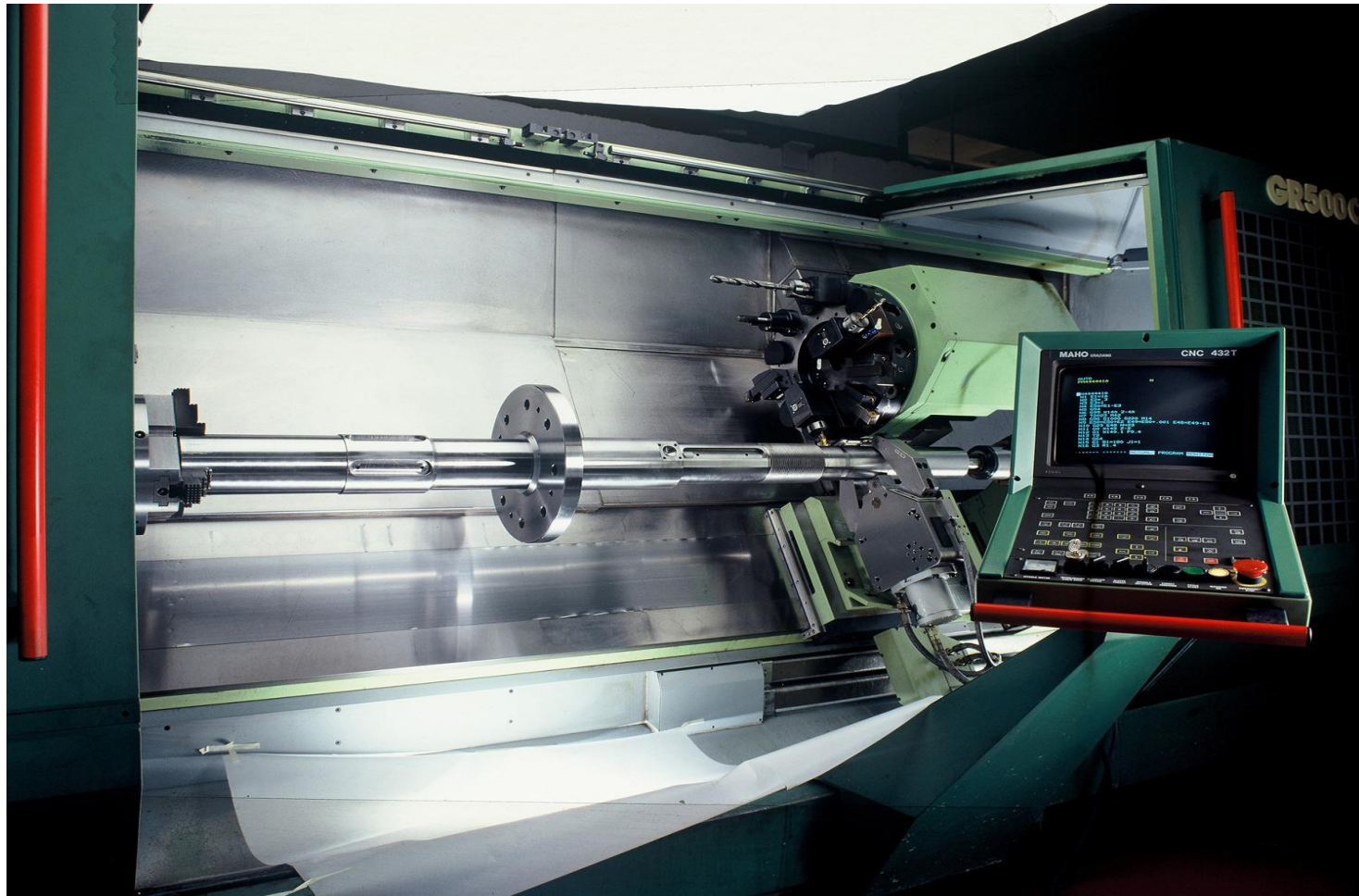




5-axis MAZAK VORTEX 1400

# D. Equipment

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MAHO GR 500C

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# D. Equipment

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NR	CODE	DESCRIPTION	TYPE	YEAR	TECHNICAL CHARACTERISTICS	POWER
<b>MACHINING CENTRES (C.N.C.)</b>						
1	MC1	4 AXIS Bed type milling machine	CME BF - 05	1997	X 3000mm, Y 1200 mm, Z 1500mm A $\Phi$ 800- Automatic rotating head	22 KW
2	MC3	4 AXIS Vertical machining centre	DECKEL MAHO-DMU 60 E	1998	X 600mm, Y 525mm, Z 500mm 4 axis	17 KW
3	MC5	4 AXIS Universal machining centre	DECKEL MAHO DMC 60 U	2000	X 600mm, Y 700mm, Z 550mm 4 axis Rotary pallet changer	16 KW
4	MC6	Vertical machining centre	DECKEL MAHO DMC 65 V	2000	X 650mm, Y 500mm, Z 500mm Automatic worktable indexer	15 KW
5	MC7	5 AXIS Machining Centre for large Aerospace Components	MAZAK VORTEX 1400	2002	X 4200mm, Y 1400mm, Z 610mm, A $\pm$ 30°, B $\pm$ 30°	37 KW
6	MC8	Universal milling machine	MH 1000S / CNC 432	2006	X 1000mm, Y 800mm, Z 600, 4000rpm	22 KW
<b>TURNING CENTRES (C.N.C.)</b>						
7	TC1	Turning centre	MAHO GR 500C	1991	Max turning dia 620 mm, D.B.C. 2250mm, equipped with driven tools	53 KW
8	TC2	Turning centre	PPL - GALAXY	1988	Max. turning dia. 220mm, D.B.C. 600mm, 7 position turret	11 KW
<b>BORING MACHINES</b>						
9	B1	Boring machine	UNION BFT 80/2	1985	X 2000mm, Y 1500mm, Z 1500mm, Linear scale measuring device	8,5 KW
<b>LATHES WITH COPYING ATTACHMENT</b>						
10	LCA1	Lathe with copying attachment	H. ERNAULT Jupiter 920	1980	Max turning dia 970 mm, Distance Between centres 4000mm	17 KW
11	LCA2	Lathe with copying attachment	H. ERNAULT Cholet 435	1980	Max turning dia 410 mm, Distance Between centres 1266mm	9.5 KW
12	LCA3	Lathe with copying attachment	H. ERNAULT Cholet 435	1980	Max turning dia 410 mm, Distance Between centres 1266mm	9.5 KW
13	LCA4	Lathe with copying attachment	H. ERNAULT 350	1972	Max turning dia 410 mm, Distance Between centres 1266mm	9.5 KW
14	LCA5	Lathe with copying attachment	ERNAULT Cholet435LH3	1972	Max turning dia 410 mm, Distance Between centres 1266mm	9.5 KW
<b>CONVENTIONAL LATHES</b>						
15	L1	Conventional lathe	TOS - SU125H/3000	1998	Max turning dia 1250mm, Distance between centres 3000mm	31 KW
16	L2	Conventional lathe	TOS - SN 50 C	1998	Max turning dia 500mm, Distance between centres 1500mm	5.5 KW
17	L4	Conventional lathe	TARNOW - TUR 50	1980	Max turning dia 500mm, Distance between centres 2000mm	11.7KW
18	L5	Conventional lathe	TARNOW - TUJ 48P	1970	Max turning dia 500mm, Distance between centres 1600mm	5.7 KW

# D. Equipment

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NR	CODE	DESCRIPTION	TYPE	YEAR	TECHNICAL CHARACTERISTICS	POWER
<b>MILLING MACHINES</b>						
19	M1	Universal milling machine	SHW - UF 2	1980	X 1000mm, Y 470mm, Z 500mm	4 KW
20	M2	Vertical milling machine	ARBOGA - U1 COMBI	1990	X 370mm, Y 165mm, Z 550mm	1.5 KW
21	M3	Horizontal milling machine	RUMAG - REG S 300	1975	X 400mm, Y 150mm, Z 325mm	1.6 KW
22	M4	Horizontal milling machine	RUMAG - REG S 374	1975	X 400mm, Y 150mm, Z 325mm	1.6 KW
23	M5	Vertical milling machine	ARBOGA - FM 825	1962	X 200mm, Y 150mm, Z 400mm	0.8 KW
24	M6	Vertical milling machine	ZX7045	2006	X 800mm, Y 400mm, Z 600mm	1 KW
<b>SAWS</b>						
25	S1	High performance bandsawing machine	KASTO - SBA 260 AU	1996	Cutting ability: Round 260mm, Square 260mm X 260mm	4 KW
26	S2	Electro/hydraulic automatic power hacksaw	KASTO - VBS 242	1980	Cutting ability: Round 240mm, Square 210mm X 280mm	1.9 KW
27	S3	Electro/hydraulic automatic power hacksaw	KASTO - PBS 180 AU	1973	Cutting ability: Round 180mm, Square 160mm X 200mm	1.9 KW
<b>GRINDING MACHINES</b>						
28	G1	Surface grinding machine	CHURCHILL- NB18"x6"x9"	1977	Face table: 18", Max capacity under new wheel: 9"	3.75KW
29	G2	Cylindrical grinding machine	CHURCHILL - AW	1970	Max length: 500mm, Max dia under new wheel: 100mm	3 KW
30	G3	Cylindrical grinding machine	NORTON - DAYTON C75	1960	Max length: 2000mm, Max dia under new wheel: 300mm	7 KW
<b>SHAPING MACHINES</b>						
31	SCA1	Shaping machine with copying attachment	ESZTERGOM - GH710/U	1973	Travels:780mm	6.3 KW
32	SCA3	Shaping machine with copying attachment	ESZTERGOM - GH710/S	1962	Travels:780mm	5.8 KW
<b>DRILLING MACHINES</b>						
33	D1	Radial drilling machine	CSEPEL - RF 20	1961	Speed range: 45 - 2000 rpm	2.8 KW
34	D2	Drilling machine	GENKO - W. GERMANY	1974	Speed range: 40 - 1800 rpm, travels: 240 mm	0.8 KW
35	D3	Drilling machine	ARBOGA - E 830	1972	Speed range: 80 - 890 rpm, travels: 180 mm	0.9 KW
<b>CENTERING MACHINE</b>						
36	C1	Centering machine	CUMAT - BLITZ 50 A	1988	Max diameter to face and centre: 65 mm	0.56KW
<b>EDM</b>						
37	CO1	EDM	CHARMILLES - Form 20 ZNC	2002	X 300 mm, Y 200 mm, Z 300 mm	--

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# E. Quality

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## E. Quality

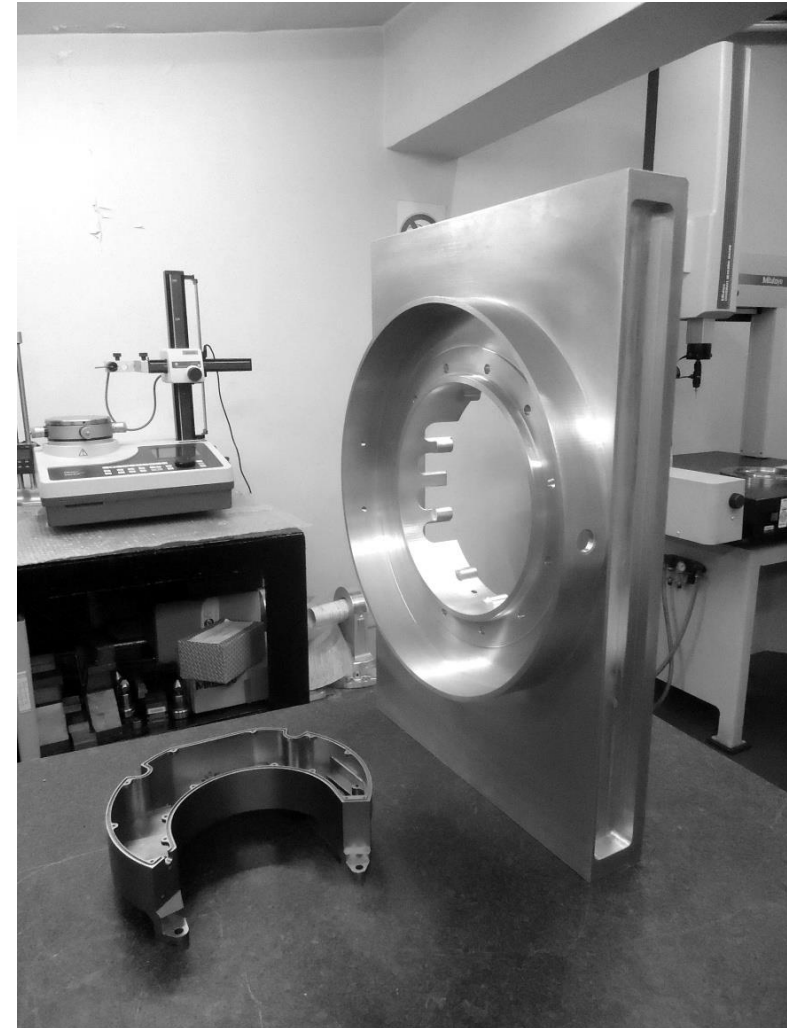
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Quality is integrated in the philosophy of TEMMA as a primary objective of the company, as they continually have to satisfy their customers ever increasing requirements.

For the first time in 1998, the company certified that the Quality Control System they have in place complies with the *ISO 9002:1994 standard*. Nowadays, TEMMA is certified to *DIN EN ISO 9001:2000 of TUV NORD*.

Furthermore, frequent audits performed on our premises by our customers (Second Party Audits), confirm the actual and thorough implementation of the TEMMA's Quality System.

Within the framework of this System, we create customized - by Customer or by Project - Quality Plans, which are approved by the product's end users and help our people achieve high quality results.



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### Quality Control Department:

The same philosophy governs the Quality Control department, with specialised personnel carrying out measurements and tests thoroughly, throughout the production process, from procurement of raw material to delivery of the final product. The department is equipped with hi-spec measuring instruments, calibrated in third-party metrology labs (e.g. Algosystems, C3T, and Metrology).



CMM MITUTOYO EURO-M 544

# E. Quality

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NR	CODE	DESCRIPTION	TYPE	TECHNICAL CHARACTERISTICS	QUANTITY
<b>QUALITY CONTROL EQUIPMENT</b>					
1	CMM 1	EURO-M 544	MITUTOYO	X 500, Y 400, Z 400	1
2	YГ1	HEIGHT GAUGE 570-223	MITUTOYO	"Digimatic" Height Gauge 0-300 mm	1
3	YГ2	HEIGHT GAUGE	MITUTOYO	"Digimatic" Height Gauge 0-300 mm	1
4	ГP	Granite Plate 901-115	MITUTOYO	Granite Plates 1000*630*100	3
5	KB...	Ceramic Blocks	MITUTOYO	Series of Gauge blocks made of ceramic	13
6	XP1	"Digimatic Digi Derm"	MITUTOYO	Portable Coating Thickness Measuring Tester	1
7	TP1	Surftest 211	MITUTOYO	Portable "Digimatic" Surface Roughness Tester	1
8	RT1	ROUNDTTEST RA-114	MITUTOYO	Roundtest	1
9	M...	Outside Micrometers	MITUTOYO	Outside Micrometers 0-600 mm	40
10	MT...	Inside Micrometers	MITUTOYO	Inside Micrometers 0-800 mm	8
11	M3T...	3 Points Inside Micrometers	MITUTOYO	Three - Point Inside Micrometers 0-200 mm	20
12	B...	Dial Dept Gage	MITUTOYO	Dial Depth Gauges 0-300 mm	2
13	HP...	Digital Calipers	MITUTOYO	"Digimatic" Caliper 0-600 mm	4
14	П...	Calipers	MITUTOYO	Caliper 0-2000 mm	45
15	TH2	Internal Humidity -Temperature Sensor	MITUTOYO	Measur. Range 0 to +100% RH -10 to +50°C	1
16	DMT	Three Point Internal Micrometer Digimatic-Holetest	MITUTOYO	Measur. Range 6-8mm	1
17	PG	Plung Gauge	P.MULLER GmbH	Plung Gauge GO-NO-GO ,measur.Range .2505"-3.1870"	6

# F. Clients

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A large number of Greek and foreign companies have proven their trust towards TEMMA, through concrete, long-term partnerships.

Our main direct and indirect customers according to sector order , are the following :

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## DEFENSE & AEROSPACE INDUSTRY

AIRBUS SAS (CARGO DOOR FRAMES *AIRBUS A320*)  
BOEING CORPORATION  
CERN (EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH)  
DASSAULT  
GENERAL DYNAMICS CORPORATION  
HELLENIC AEROSPACE INDUSTRY SA  
HELLENIC AIRFORCE  
HELLENIC DEFENSE SYSTEMS SA  
INTRACOM DEFENSE SA  
INTRAKAT SA  
KMW (KRAUS–MAFFEI-WEGMAN)  
METKA SA  
MILTECH HELLAS SA  
MOOG LTD  
PRATT & WHITNEY CORPORATION  
RAM EUROPE  
RAYTHEON CO  
RHEINMETALL LANDSYSTEMS  
SONAK SYSTEMS AND SOFTWARE  
THALES GROUP (SYSTEMES AEROPORTES)  
ZEISS OPTRONIK

## CIVIL INDUSTRY

ALUMINIUM OF GREECE SA  
BRIDGNORTH ALUMINIUM LTD  
CORINTH PIPEWORKS SA  
CROWN HELLAS CAN A.E.  
FAGE S.A.  
HALCOR SA  
HALYPS CEMENT SA  
HERACLES GENERAL CEMENT CO  
HELLENIC ALUMINIUM INDUSTRY SA  
HELLENIC PIPEWORKS SA  
HELLENIC STEEL COMPANY SA  
HELLENIC SHIPYARDS SA  
PUBLIC POWER CORPORATION SA  
ROKAS GROUP  
SOFIA MED SA  
SOVEL  
TEKA SYSTEMS SA  
TITAN CEMENT SA  
VIOMAL SA

## **ENERGY INDUSTRY**

METKA SA  
ROKAS GROUP  
TERNA SA

## **TELECOMMUNICATIONS INDUSTRY**

ANKO SA  
INTRACOM TELECOM SA  
INTRAKAT SA

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# G. Projects

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# G. Projects

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A/A	PROGRAM	YEAR	COMPANY
1	HAWK	2001	KONGSBERG
2	VT – 1 AMMUNITION TEST BENCH	2001	THOMSON CSF AIRSYS
3	TOOLING ENGINES G.E.	1998–2002	GENERAL ELECTRIC
4	PATRIOT	2000– present	RAYTHEON
5	RACK (ISOLATION TRAY AS.) <b>F 16</b>	2001–2002	LOCKHEED MARTIN
6	TITANIUM FITTING MOUNT ENGINE <b>F 4E</b>	2000-2003	BOEING
7	CROTALE	2001–2003	THALES ELECTRONIC SYSTEMS
8	ARMING DEVICE HOLDER / SUPPORTING RINGS	2002–2003	BOFORS
9	V – SHORADS PROGRAM	2002–2005	KMW – STN ATLAS
10	RADAR (MICROWAVE BOUND MODULE)	2003 – 2005	E.A.D.S.
11	SUBMARINES TYPE 214	2004–2005	H.D.W.
12	AWACS	2004–2005	BOEING
13	VHF	1999–2006	THALES ELECTRONIC SYSTEMS
14	PzH 2000/GR01	2002–2008	MOOG
15	LEOPARD GUN	2005-2008	RWM
16	LEOPARD II	2005-2009	KMW
17	IRIS – T	1998–2009	B.G.T.
18	SUBSYSTEMS RADAR MIRAGE	2001– 2010	THALES ELECTRONIC SYSTEMS
19	SUBSYSTEMS RADAR RAFALE	2002– present	THALES ELECTRONIC SYSTEMS
20	ESSM GUIDANCE SYSTEMS	2002– present	RAMSYS
21	NEURON-UCAV PLANE EXHAUST NOISE	2010 –present	DASSAULT

# Conclusion

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At the suggestion and with the assistance of Mr. Barone we visited CERN in 2007 which marked the initiation of a very sound cooperation and which we hope will continue and expand. The target for TEMMA S.A. is the incorporation of elements and methods of advanced technology to be derived for their implementation in the rest of the Greek Economy.

In this context we are available and willing to cooperate with other Greek and foreign associates of CERN.

To conclude, we wish to congratulate NCSR DEMOCRITOS and the Greek representatives of CERN for their intense and energetic activity in this field over the recent period.