

PzH 2000

KMW
KRAUSS-MAFFEI WEGMANN

PzH 2000 – The Euro Howitzer



PzH 2000

The Project

The contract awarded on 14 March 1996 for series production of 185 armoured self-propelled howitzers PzH 2000 for the German Army marked a key event in the success story of this weapons system.

The stringent requirements imposed by the German customer on a tube artillery system and still applied throughout the world have even been surpassed in some key areas. It became clear very early on that the PzH 2000, on top of that, also boasted a high growth potential for future users.

Concurrently with the development phase, the performance spectrum was demonstrated to the NATO partners in numerous international presentations. Amongst other capabilities, the engagement of moving sea targets with precise single shots, was very successfully demonstrated in Sweden in 1996, which opened up an entirely new operational spectrum for the classic tube artillery.

Successful trials, including the demonstration of an MRSI capability in 1997 (firing different shell-charge combinations from one gun so that the shells impact the same target at the same time) as well as effective range demonstrations of > 40 km, when the system was on the short list for Greece, underpin the demanding claim to establish the PzH 2000 as the future NATO-wide 155 mm/52 cal standard gun.

The PzH 2000 meets all international requirements on a tube artillery system and may be regarded as the top product of the German defence industry, with KMW as the system lead contractor.

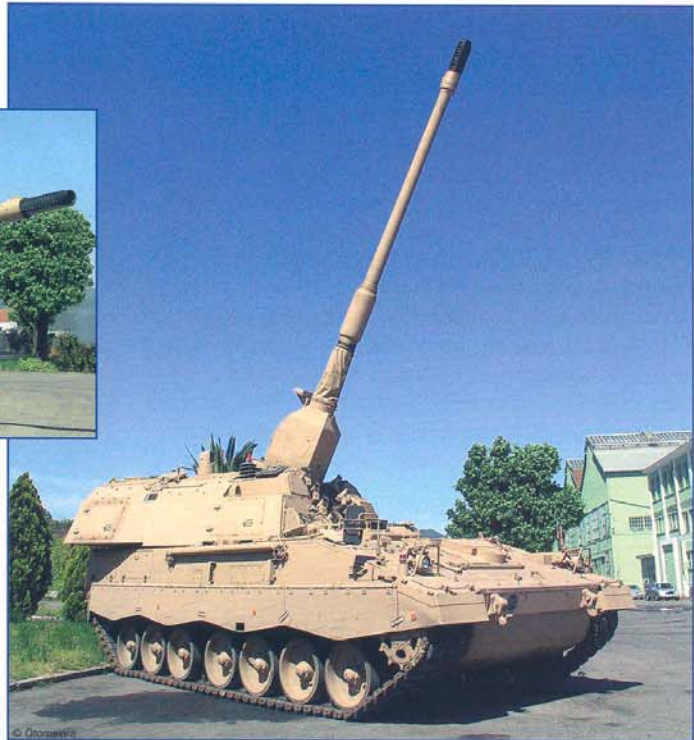


PzH 2000 IT



First PzH 2000 production system for Italy

With the delivery of the first PzH 2000 GR production system for Greece in late May 2003, the PzH 2000 is now set to establish itself as the EURO howitzer. Other than with Greece (24 PzH 2000), contracts exist with the Netherlands (57) and Italy (70).



PzH 2000 GR



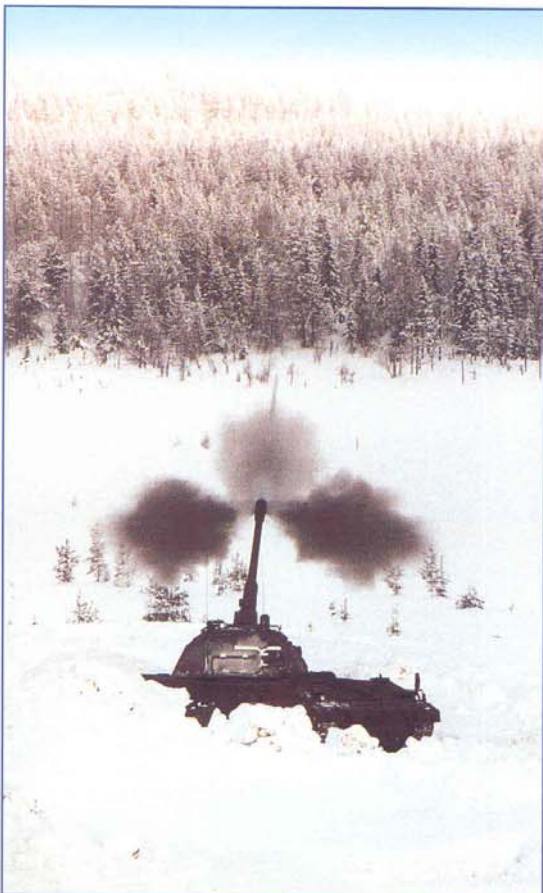
First PzH 2000 production system for Greece

Bilateral discussions are currently under way for the take-over by Norway of 18 units PzH 2000 from the Dutch order volume. This would increase the number of user countries to five.

PzH 2000

The Concept

The 30 km range requirement with NATO standard shells and the 40 km requirement with base-bleed shells has been met with the development of a new 155 mm 52 cal barrel. The ordnance which features a chrome-plated and laser-hardened barrel bore reflects state-of-the-art technology and fully conforms to the "Joint Ballistics Memorandum of Understanding", an international memorandum which defines the design and ordnance parameters and thus permits firing of all NATO-standardized charge systems. The stable firing platform and high-precision gun laying system of the PzH 2000 make it possible to meet the effective range requirements at all elevation angles, 360 degrees all-round, with great hit accuracy even at firing rates of 10 rounds/minute.



The short barrel overhang, which results from the rearward positioning of the turret on a front-sprocket-driven chassis powered by a 736 kW (1,000 HP) engine, provides excellent tactical and operational mobility comparable to a medium battle tank.

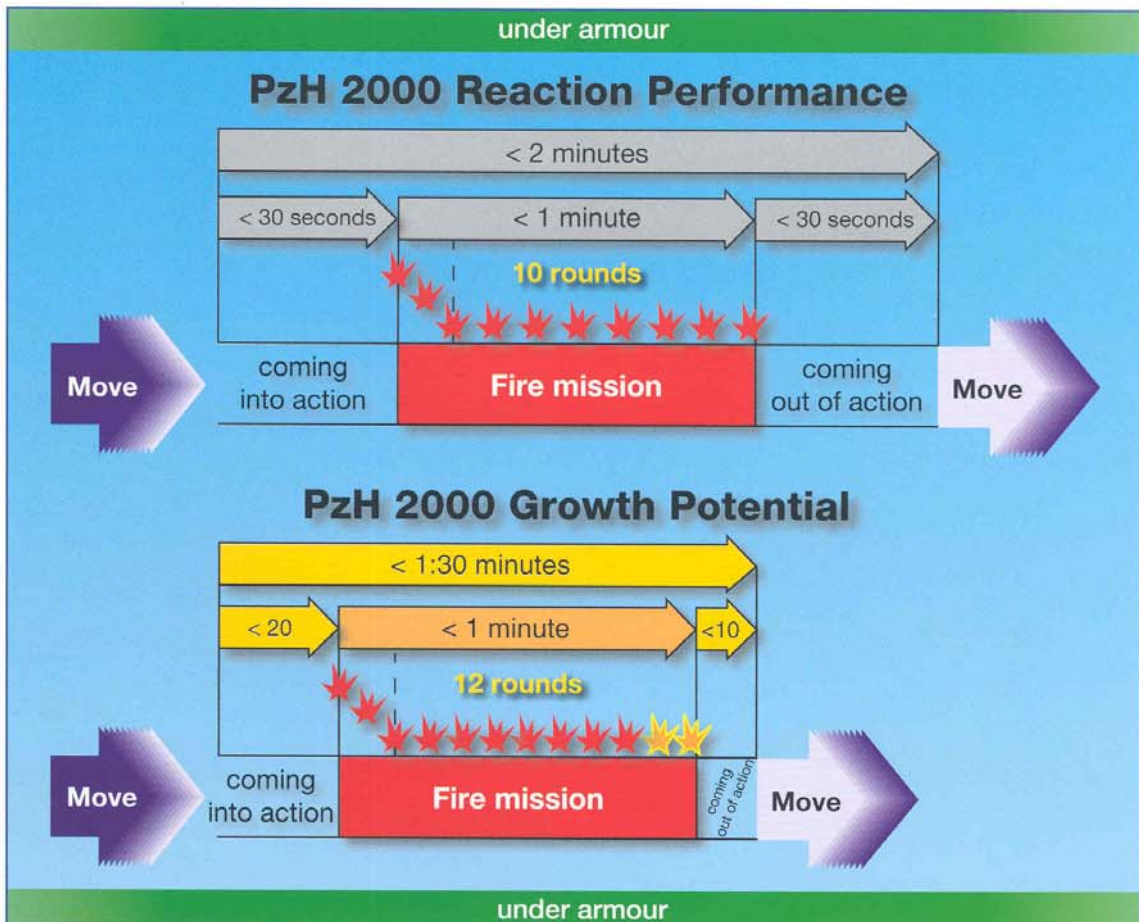
An on-board ballistics computer, a muzzle velocity measurement and management system as well as a GPS-based inertial navigation system determining position, bearing, elevation above sea level and spatial position of the barrel make the PzH 2000 a fully stand-alone weapons system.

The PzH 2000 is the only 155 mm 52 cal artillery weapons system to feature a fire control computer with integrated NABK (NATO Artillery Ballistic Kernel) for autonomous computation of firing commands. Downloading of FCI data and the corresponding ammunition designations simplifies the integration of new country-specific types of ammunition into the on-board fire control computer.



On the move or in defilade positions, the PzH 2000 receives target data with engagement inputs from a higher-level command post via data radio link. After onboard laying and loading data computation, the firing command is executed, whereupon the vehicle leaves its firing position immediately after the last round is fired. This so-called shoot & scoot capability makes it next to impossible for hostile reconnaissance to respond in time with counter-battery fire.

Shoot & Scoot



PzH 2000

Ammunition Flow

The core element of the PzH 2000 is the electrically powered and digitally controlled automatic shell loading system designed to handle the 155 mm shells when loading and unloading the 60-round magazine, loading the gun from the magazine and loading from outside, including inductive fuze setting.

The shells are rammed into the breech by means of a pneumatically operated flick rammer with elevation-angle-dependent ramming pressure control over the entire gun control range.

It takes two crew members less than 11 minutes to take over the full combat load consisting of 60 x 155 mm shells and the corresponding amount of charges.

In addition to the fully automatic modes of operation, degraded modes all the way to manual operation are possible so that a high rate of fire and reaction capability can be maintained even in back-up modes.

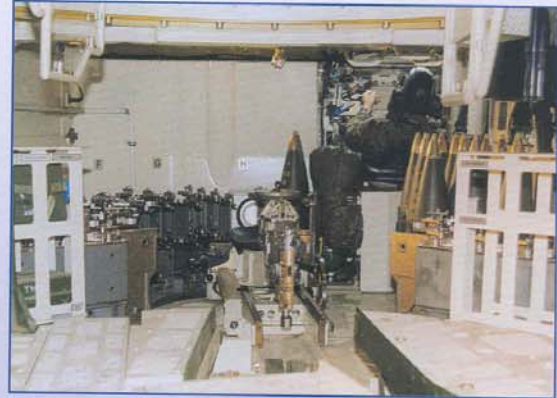
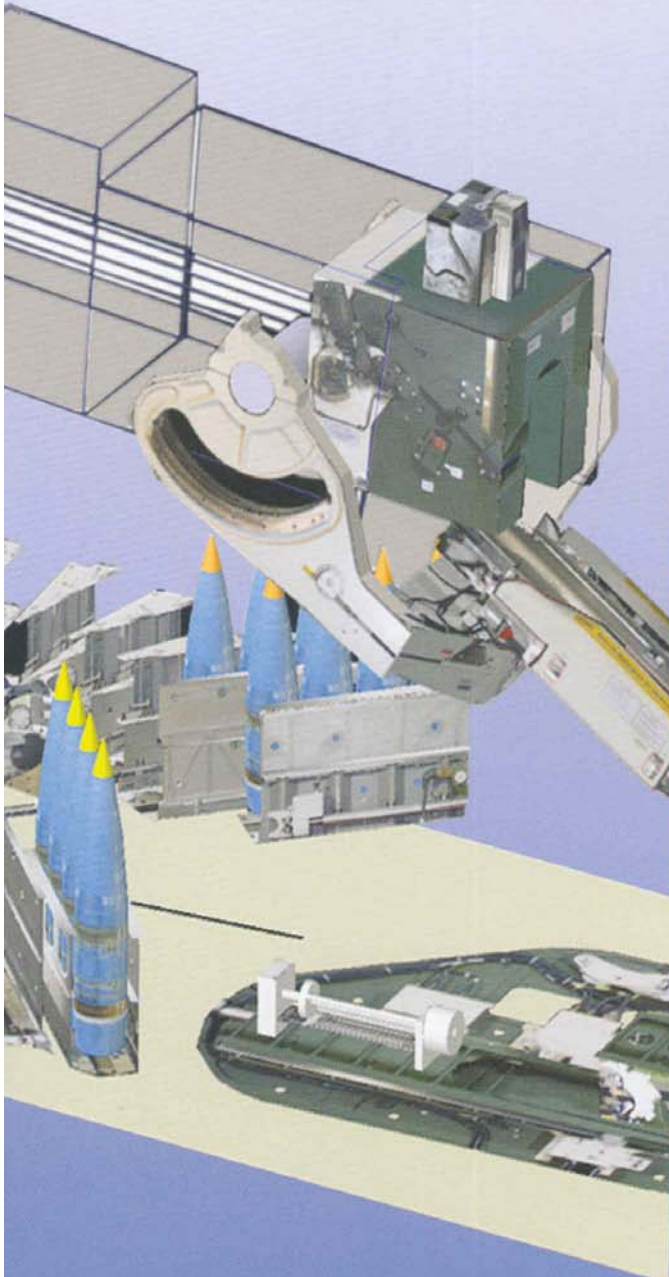


Replenishment from vehicle rear end

Demonstrated Performance:

- > 18,500 rounds fired with prototypes, 41,000 rounds with production guns and 42,000 rounds with training equipment.
- >30 km range with NATO-standard ammunition and >40 km with base-bleed ammunition
 - 3 rounds in 9.2 seconds
 - 10 rounds in 56.2 seconds
 - 20 rounds in 2 minutes and 10 seconds
- Growth potential with upgraded loader components:
 - 3 rounds in 8.4 seconds
 - 12 rounds in 59.7 seconds
 - 20 rounds in 1 minute and 47 seconds
- Fully loading, combat load (60 complete shells including 288 charge modules) with two crewmen in 10 minutes and 50 seconds
- > 29,830 km on and off-road with prototypes and 370,000 km with production vehicles
- > 45 km/h speed demonstrated on an off-road tank test track and > 61 km/h speed on road
- Firing tests successfully completed with Swedish coastal artillery against moving sea targets with high hit accuracy.
- Multiple Round Simultaneous Impact (MRSI) firing (5 rounds MRSI at 17,000 metres)

Status: August '03



Shell magazine at vehicle centre



Shell transfer arm with flick rammer



Placement of charge in breech



PzH 2000

PzH 2000 – Concept-Inherent Protection

**Minimal muzzle flash, no visible gases =
protection from visual reconnaissance**

**Newly developed passive roof protection =
protection from bomblets**

**Smoke grenade launcher assembly =
protection from visual reconnaissance**

**Shoot & scoot capability = makes reconnaissance by opposing
forces more difficult, minimum dwell time in firing position**

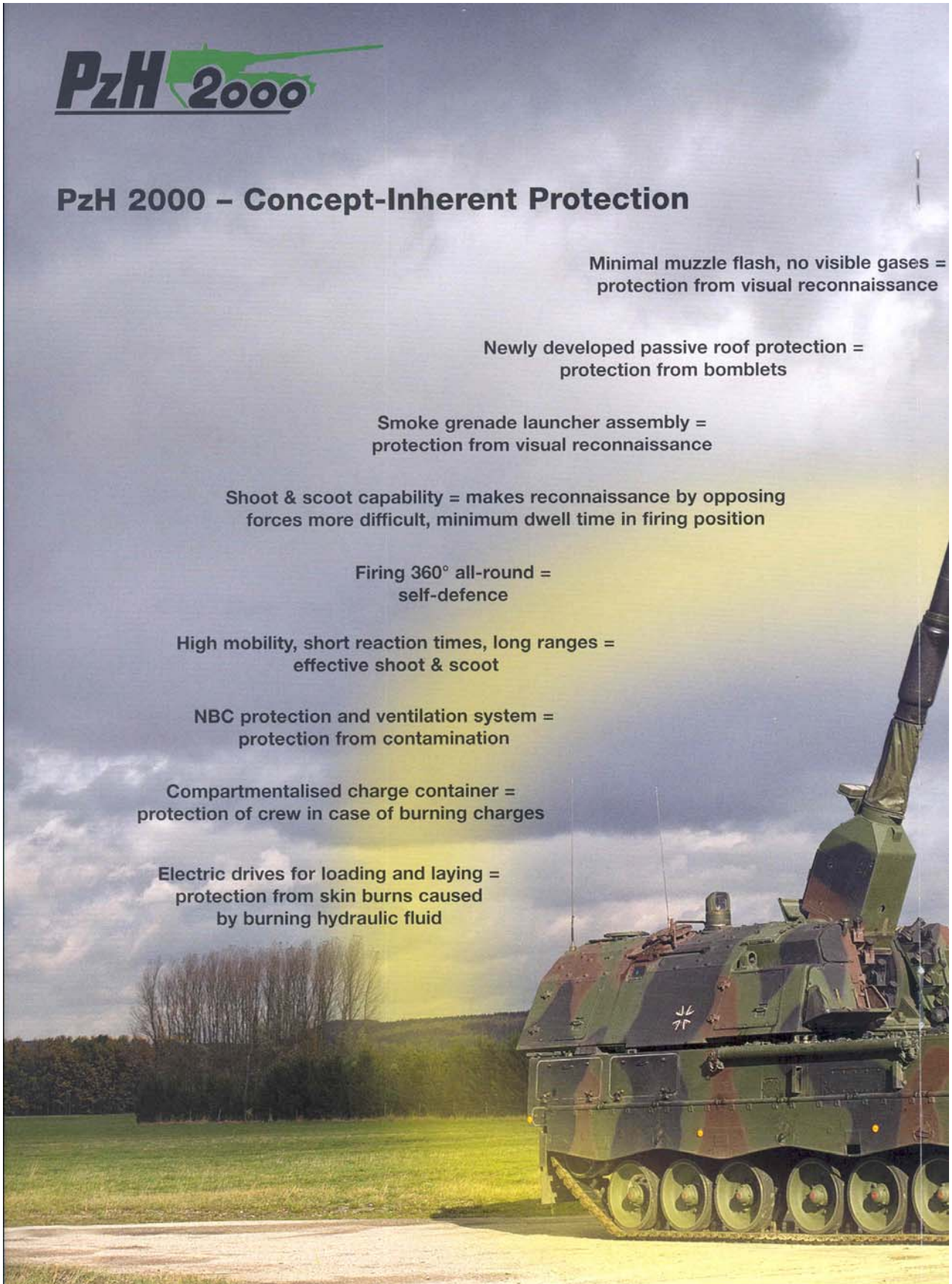
**Firing 360° all-round =
self-defence**

**High mobility, short reaction times, long ranges =
effective shoot & scoot**

**NBC protection and ventilation system =
protection from contamination**

**Compartmentalised charge container =
protection of crew in case of burning charges**

**Electric drives for loading and laying =
protection from skin burns caused
by burning hydraulic fluid**



le gases =
naissance

**Anti-aircraft MG =
defence capability against air threats**

**60-round combat load = lower replenishment rate and ammunition
resupply requirement = lower general threat level**

**Spall liner in turret and hull area =
protection from secondary fragments**

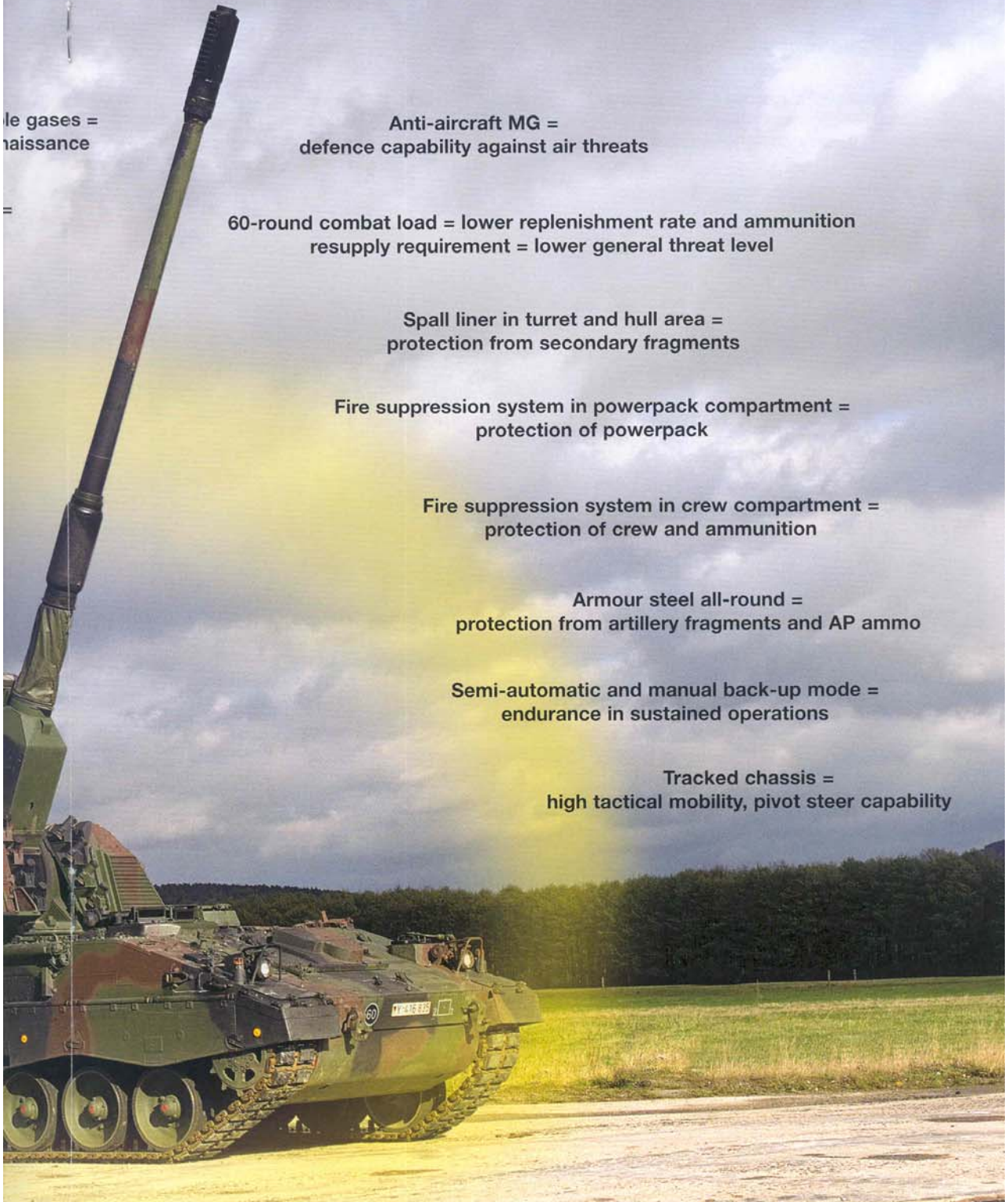
**Fire suppression system in powerpack compartment =
protection of powerpack**

**Fire suppression system in crew compartment =
protection of crew and ammunition**

**Armour steel all-round =
protection from artillery fragments and AP ammo**

**Semi-automatic and manual back-up mode =
endurance in sustained operations**

**Tracked chassis =
high tactical mobility, pivot steer capability**



PzH 2000

Training Philosophy

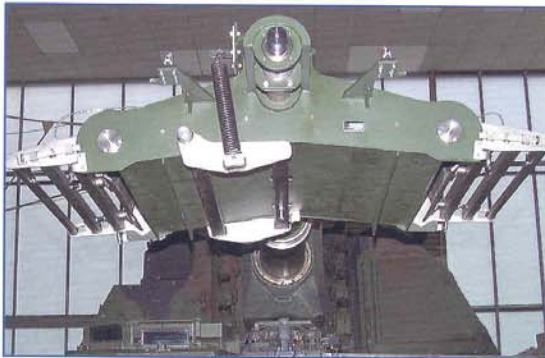
The PzH 2000 concept is rounded off by a holistic training philosophy for crews, drivers and maintenance personnel all the way to familiarisation courses for foreign users.

In view of the short period of training available to a conscript army and the necessity for cost optimisation, any virtual simulator environment was completely dispensed with. With specially developed training



Training courses on the operational use and deployment of the PzH 2000 weapons system are conducted on the operational hardware at the artillery school based in Idar-Oberstein and at the battalions equipped with the PzH 2000.

modules and the associated training software fitted to a production PzH 2000 (embedded training), commanders and crew at all user bases are provided with a means enabling the whole bandwidth of artillery training in a real-world environment, ranging from initial training to gun drill exercises all the way to networking several PzH 2000 to form an artillery system. From outside, an instructor is able to follow, record and control all operations carried out inside the PzH 2000. In this way, it is possible to create artificial incidents which force the crew to quickly and properly react to unexpected failures and to continue operating in degraded modes. Using the complete automatic ammunition flow system with the ability to "fire" simulated rates of up to 8 training shells round off near-realistic training with the real weapons system.



Driver training is conducted in a driver training centre with the assistance of PzH 2000 driver training vehicles and PzH 2000 driver training simulators.

Repair and maintenance training has so far been carried out at industry facilities. Upon completion of the introduction phase of the PzH 2000, these tasks will be handed over to organisational maintenance personnel of the Technische Schule (Ordnance School). The necessary training equipment will also be available for this type of training.



Embedded training



PzH 2000

Logistic Support

Industry logistic support for the introduction phase of a new major weapons system of the German Army under the lead responsibility of the prime contractor, Krauss-Maffei Wegmann, was ensured for a period of 5.5 years and provided for the first time within the "Overall Warranty" pilot programme.

The integrated BITE system for chassis and turret of the PzH 2000 as well as on-site support of the weapons system by skilled industrial personnel permit immediate fault diagnosis, the results of which are transmitted online to the service centre via an integrated data network and directly leads to the necessary maintenance action and the associated spare part shipments.

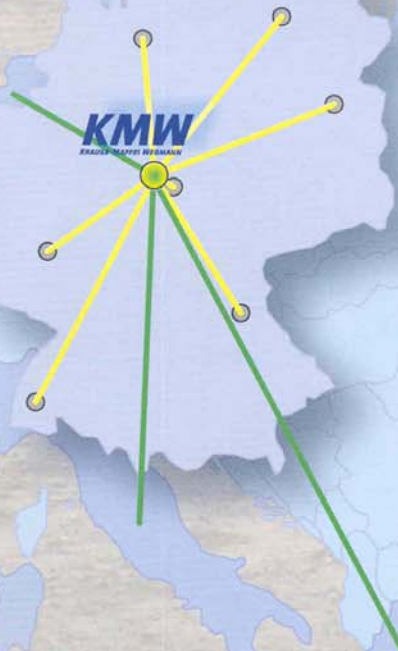
Apart from time-optimized processing of damage cases right at the site of the guns, a complete database with usage, failure and configuration data covering the entire life cycle is maintained for the first time.

This permits continuous evaluation of operations by user and industry and guarantees a highly effective configuration control system to optimize the weapons system which, shortly after its introduction into service, has demonstrated a high level of reliability and availability never before experienced.

The decision to largely dispense with extensive spare part provisioning by the user is a logical consequence and reduces life cycle costs by a considerable amount.

Each NATO-equivalent nation opting for the PzH 2000 as its main means of combat support thus fully benefits from the experience and technical progress gained by the German user and industry.

The building of a logistic network for all PzH 2000 user countries marks the beginning of a "Partnership in Logistics".

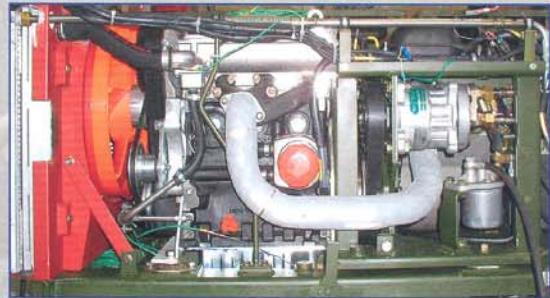


Realized and future improvements

- Integration of a 10 km Laser range finder into the PERI RTNL 80
- Integration of a charge cooling system
- Integration of a crew compartment cooling system
- Integration of a fire suppression system in crew compartment
- Software integration of ballistics for moving target engagement into on-board fire control computer (MICMOS)
- Interconnection with national command and control systems
- Integration of modern intercom system
- Integration of a fully automatic charge loader



Charge cooling system in turret bustle



Crew compartment cooling system



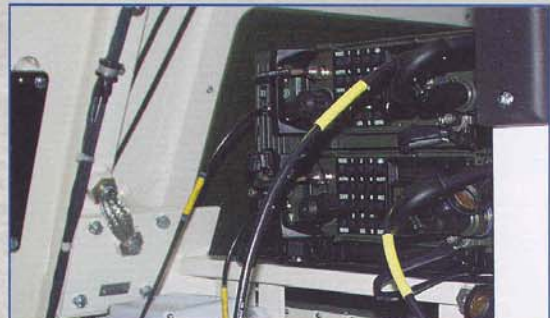
ACCS (Artillery Command & Control System)



Fire suppression system



Digital intercom



Radio data transmission equipment, Greece



Data Sheet PzH 2000

Main armament:	155 mm / 52 cal
Rate of fire (max):	3 rounds / 9.2 seconds 10 rounds / 56.2 seconds 20 rounds / 2 minutes and 10 seconds
Range:	30 km with NATO standard shells > 40 km with base-bleed shells
Gun control range:	Azimuth: 6400° Elevation: - 43° to + 1150°
Combat load:	60 x 155 mm NATO standard shells 288 x MTLs or bag charges Loading time < 11 min
Navigation:	Autonomous with inertial hybrid navigation system
Fire control:	Autonomous with muzzle velocity management and on-board ballistics computation
NABK:	Integrated in fire control software
Transport weight:	49 t
Combat weight:	55 t, MLC 60
Transport:	as per STANAG 2832, European tunnel profile, air transportable same as battle tanks
Speed:	61 km/h road, >45 km/h off-road
Radius of action:	>420 km
Engine power:	736 kW
Ground pressure:	9.8 N/cm ²
Grade ascending:	60 %
Trench crossing:	3 m
Vertical obstacle:	1 m
Protection:	Bomblets, artillery fragments and AP all-round, NBC
Crew:	3 (+2, back-up crew)

The individual details given in this publication are to be regarded as guaranteed qualities if they are, individually and in each case, expressly confirmed to be so in writing.

MONARC

Modular Naval Artillery Concept

Developed under the leadership of HDW, this concept calls for the integration of the gun turret and autoloader of the PzH 2000 self-propelled howitzer - the worldwide leading 155 mm artillery system - into the deck of a naval vessel.

Thus, MONARC is promising solution for a high-performance gun for use in frigates and corvettes whose advantages are not limited to its long range and high effectiveness.

Through a greater selection of available ammunition, naval units gain new capabilities for seaborne missions and effectiveness against land targets.



PzH 2000

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PzH 2000 – The Euro Howitzer



Germany
185 PzH 2000 in service
within the German Army



Greece
24 PzH 2000
contracted



The Netherlands
57 PzH 2000 contracted



Italy
70 PzH 2000 contracted



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ThyssenKrupp

EADS



ESW

ZEISS

Hensoldt Systemtechnik GmbH

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Luftfahrt und Sondertechnik

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