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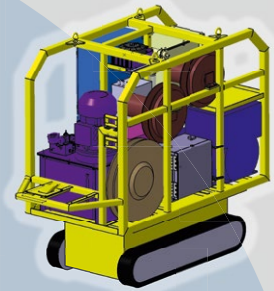
Highly Flexible Manipulator System (HMS)

iABG

Main HMS components

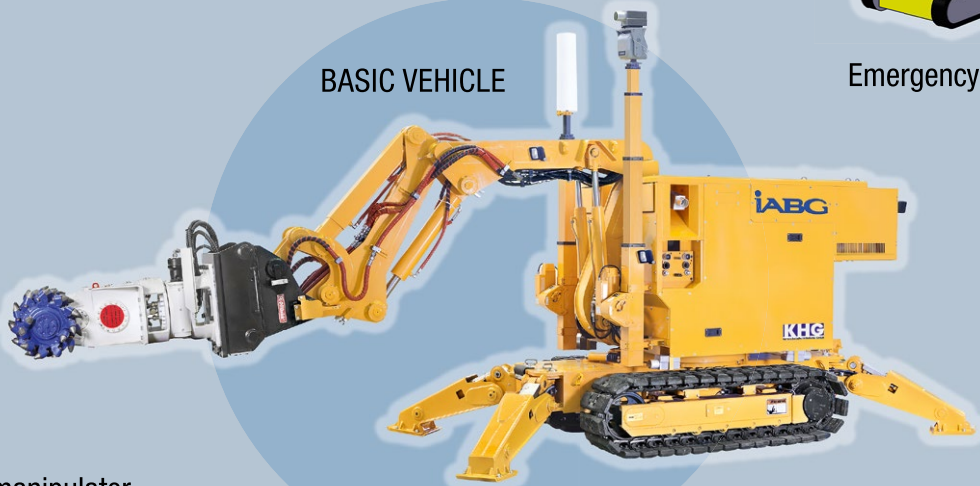


Transport and control centre vehicle



Emergency recovery system

BASIC VEHICLE



Tools/manipulator



Manual operating unit



Highly Flexible Manipulator System (HMS)

The disaster of Fukushima Daiichi in 2011 increased worldwide awareness of the risks and problems posed by nuclear accidents and the value of a specialised in-house emergency protection system. In Germany, this service is provided by Kerntechnische Hilfsdienst GmbH (KHG) in Karlsruhe. KHG provides remote-controlled manipulator systems of different sizes and can perform on-site recovery tasks where dose rates (contamination levels) are extremely high. IAGB developed the HMS for KHG based on a standard small-sized remote-controlled excavator, which has often been deployed for dismantling nuclear plants.

HMS Features

The HMS is a remote-controlled manipulator system devised specifically for use in nuclear environments with extremely high local dose rates. Signals between the mobile control centre and the HMS are transmitted via radio or cable. The HMS can be combined with various tools, including a hydraulic manipulator, and can be used for a wide range of tasks monitored by a cross-linked video system.

HMS TECHNICAL DATA

- Supported temperatures: -40°C to $+55^{\circ}\text{C}$
- Supported dose rates: up to 100 Gy/h (cumulative dose rates of up to 10,000 Gy)
- Maximum speed: 5 km/h
- Fording ability of basic vehicle: 550 mm. Climbing ability: 29°
- Applicable with various tools, e.g. manipulator, rotary drum cutter, excavating bucket, fork lift, concrete pulveriser, hammer, scrap shears, sorting grapple and drum gripper
- Integrated emergency recovery system for the basic vehicle in the event of a technical defect
- 12 cameras and various sensors for radiological, thermal and atmospheric measurements

HMS Components

The HMS is based on a modular design comprising the following components:

- Basic vehicle with tools and manipulator
- Transport and control centre vehicle
- Emergency recovery system
- Manual operating unit

The entire system was developed largely using conventional, industry-standard components. A containment comprising a 65 mm thick lead casing and a 10 mm thick steel layer protects sensitive control unit components against ionising radiation.

HMS Communication Structure

Due to the high complexity of the HMS and the security requirements for the electric/electronic systems, IAGB decided to follow the guidelines of IEC 61508 and adjusted the development process and corresponding development methods accordingly.

The HMS control system uses a complex communication structure which partly employs redundant signalling pathways (LAN, WLAN). Protocols enable the transmission of images and control data for tools and the manipulator as well as the application of safety-critical features.

Customer Benefits

- The HMS will serve Kerntechnische Hilfsdienst GmbH as an additional very versatile manipulator system.
- Its modular design and the use of industry-standard components guarantee the continued availability of replacement parts during the required lifetime of 15 years and facilitates upgrades or modifications when necessary.



AUTOMOTIVE



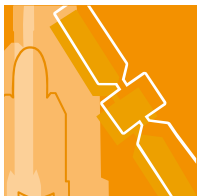
INFOCOM



MOBILITY, ENERGY & ENVIRONMENT



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DEFENCE & SECURITY

About IABG

We are a closely networked business group and offer integrated, future-oriented solutions in the sectors Automotive • InfoCom • Mobility, Energy & Environment • Aeronautics • Space • Defence & Security. We understand the requirements of our customers and support them independently and competently. We implement effectively, efficiently and with target orientation. We operate reliably and sustainably. Our international market presence and our success are based on technological excellence and a fair relationship to our customers and business partners.

In our role as development partner we take on the tasks of technical qualification and solve problems arising from the fields of functional efficiency, quality, design and materials.

We offer a broad spectrum of products and services, ranging from numerical analysis and experimental testing to the realisation of turnkey, customised test systems that we operate for the customer.

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