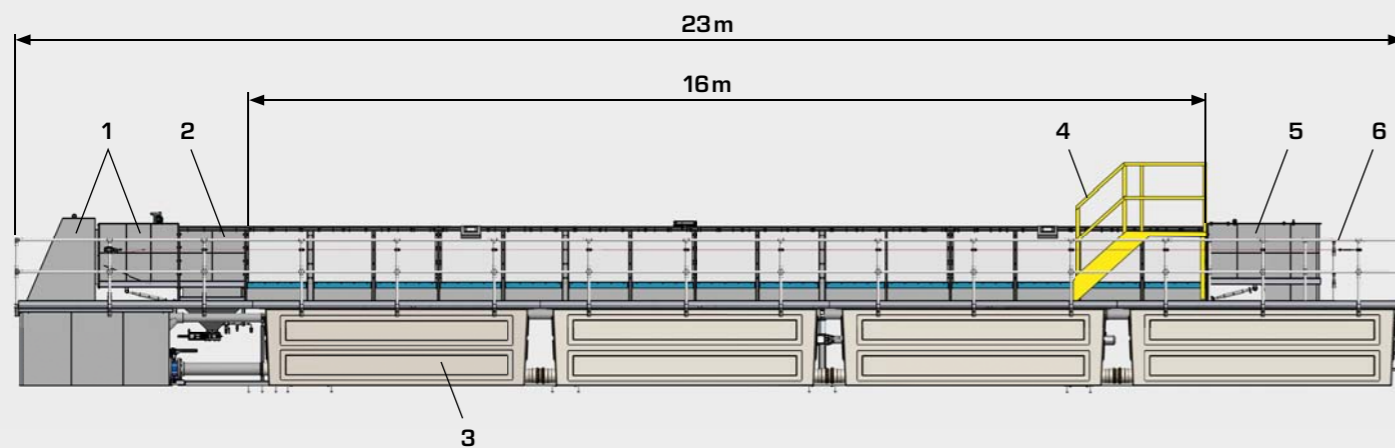


HM 161 Experimental flume 600 x 800 mm

HM 161 has an experimental section of 16 m and a cross-section of 600 x 800 mm, making it the largest experimental flume in the GUNT range. Thanks to its large size, HM 161 is ideal for your own research projects. The results of experiments are very close to what happens in nature. The water forces occurring in this experimental flume are impressive.

Used together with the comprehensive selection of additional accessories a wide range of topics within the field of open-channel flow can be demonstrated and investigated. These accessories include control structures, discharge measurement, losses due to changes in cross-section, waves and sediment transport. Additional accessories allow measuring the discharge depth and flow velocity.



Front view

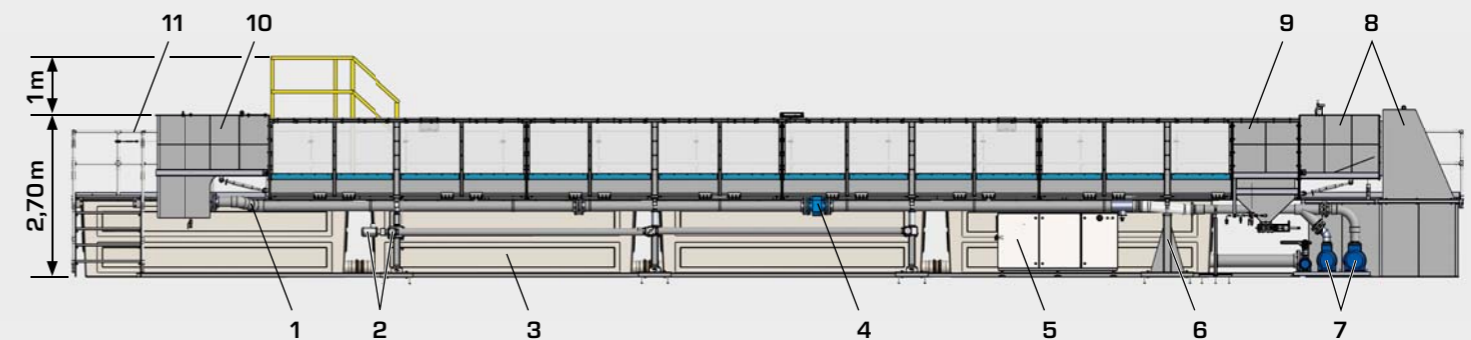
1 outlet element, 2 sediment trap HM 161.72, 3 water tank, 4 platform for sediment feeder (HM 161.73), 5 inlet element, 6 gallery



Front view with gallery

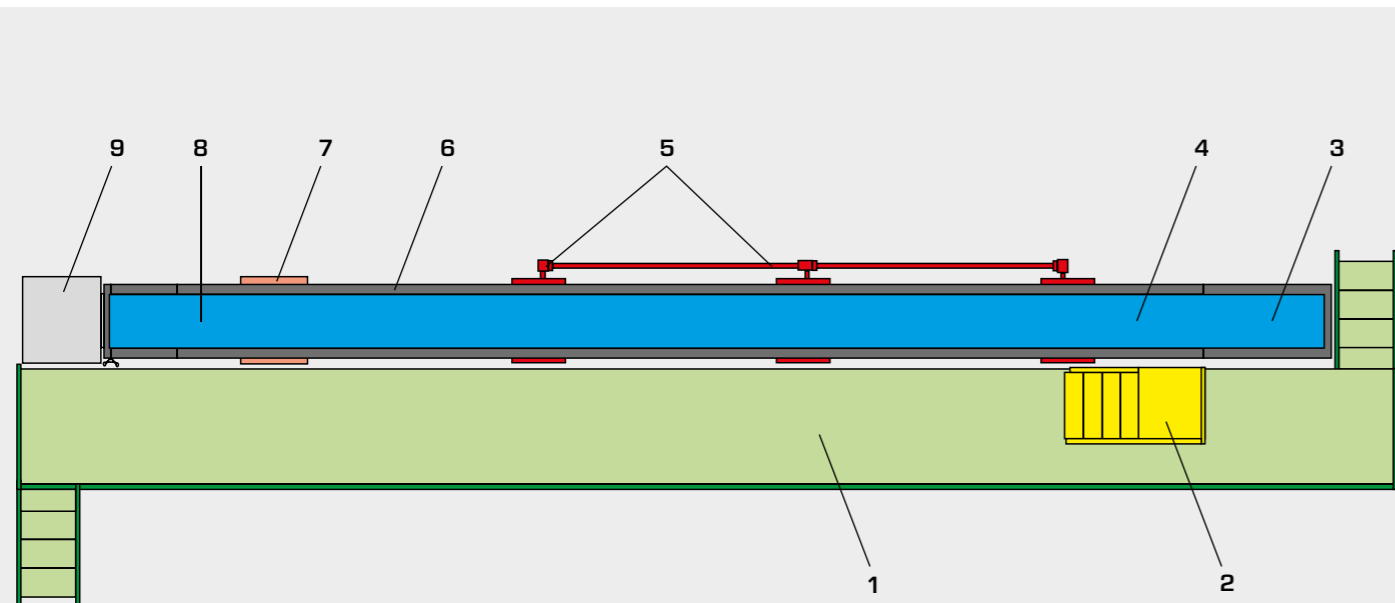


Rear view with jacking supports



Rear view

1 piping, 2 motorised jacking support (flume inclination adjustment), 3 water tank, 4 flow meter, 5 switch cabinet, 6 fixed support, 7 pump, 8 outlet element, 9 sediment trap (HM 161.72), 10 inlet element, 11 gallery



Plan view

1 gallery, 2 platform for sediment feeder (HM 161.73), 3 inlet element, 4 experimental section, 5 jacking supports, 6 rails for instrument carrier, 7 fixed support, 8 sediment trap HM 161.72, 9 outlet element



Operation is via touchscreen with intuitive user interface. By means of an integrated router, the experimental flume can alternatively be operated and controlled via end device. The user interface can also be displayed on other end devices (screen mirroring).

HM 161 is equipped with two freely positionable touch panels. They display measured values and operating states and enable system operation. At the same time, the measured values can be transmitted directly to a 32" monitor for distant reading and to a PC via LAN where they can be analysed with the software.



Gallery

HM 161 Experimental flume A few impressions



Experimental flume HM 161 with sediment transport. The sediment feeder HM 161.73 sits on the inlet element. At the end of the experimental section, the sediment trap HM 161.72 separates the sediment.



View towards the inlet element



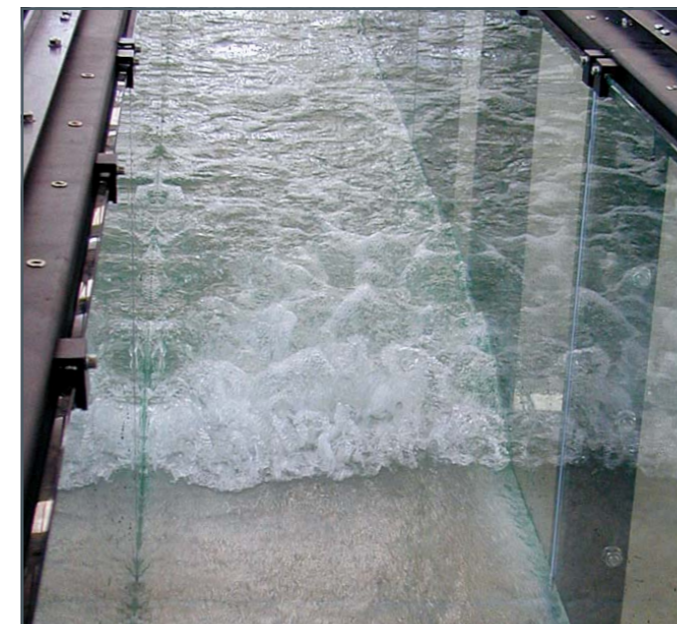
Side view during discharge over the ogee-crested weir HM 161.34



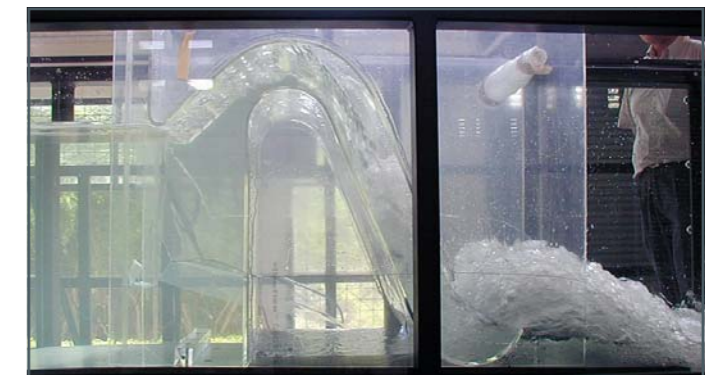
Hydraulic jump



Plan view during discharge over the ogee-crested weir HM 161.34



Positive surge wave



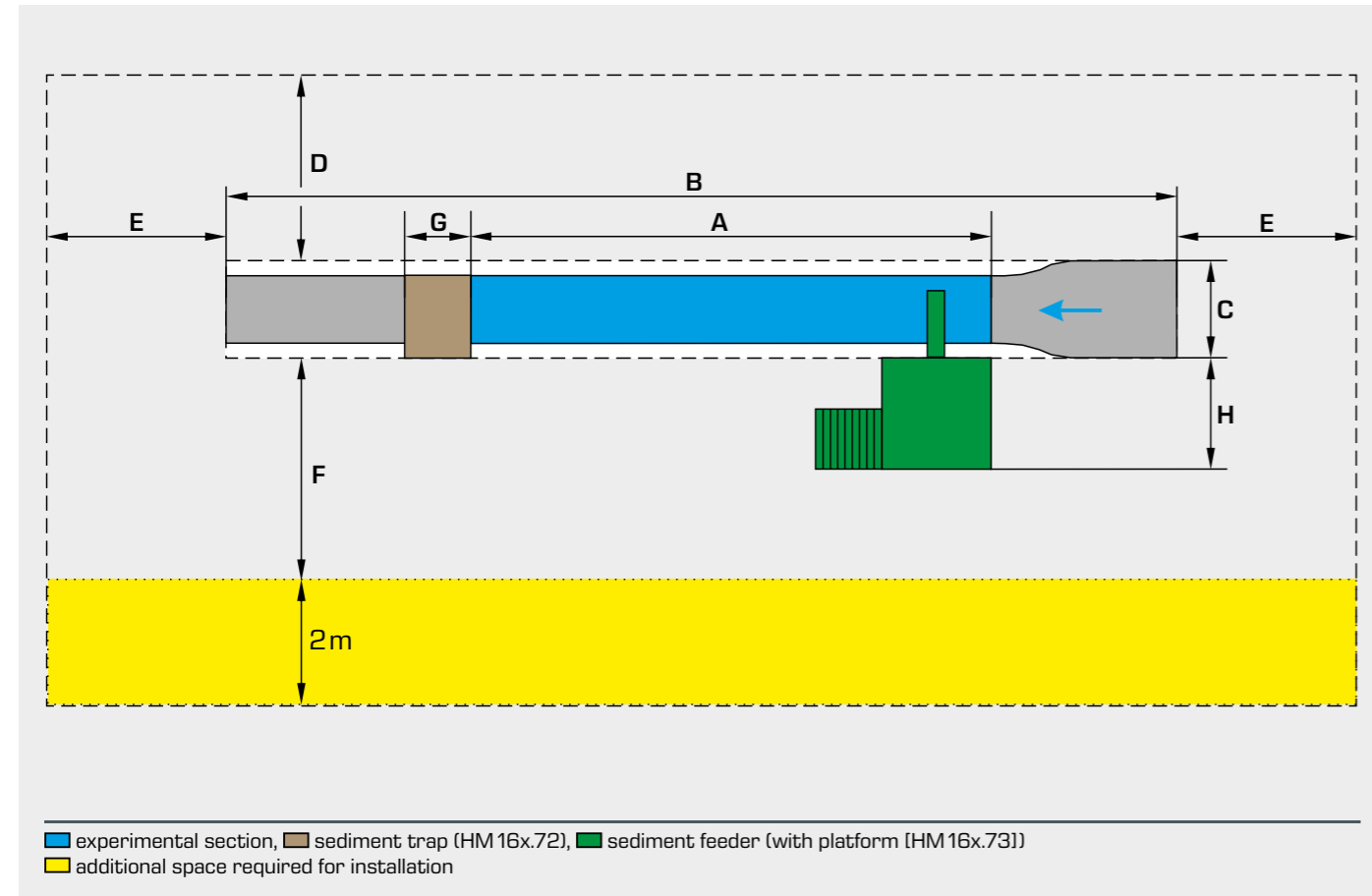
Discharge in the active siphon weir HM 161.36

GUNT experimental flumes Laboratory design

The following table lists the space requirements of all GUNT experimental flumes including the water tank.

GUNT will gladly undertake the precise laboratory planning for you to set up the experimental flumes.

A lifting device is recommended when placing larger models in the experimental sections of HM 161.



	A	B (excl. G)	C	C (incl. G)	D	E	F	G	H	Height B (excl. H)	Height B (incl. H)	Required room height
HM 160	2,5m 5,0m	4,3m 6,9m	0,7m		1,0m	1,5m (>1 m)	2,0m			1,35m	1,80m	2,3m
HM 162/ HM 163	5,0m 7,5m 10,0m 12,5m	9,2m 11,7m 13,6m 16,0m	1,0m 1,0m 2,2m 2,2m	2,2m 2,2m 2,2m 2,2m	1,0m	1,5m (>1 m)	2,5m	1,0m	1,7m	2,20m	2,90m	with sediment feeder: min. 4,5m
HM 161	16,0m	22,0m	4,0m	4,0m	2,0m	1,5m (>1 m)	1,0m	1,0m	in C incl.	2,70m	3,70m	with sediment feeder: min. 5m

Installation requirements

This section provides some tips for planning a laboratory in which an experimental flume is going to be set up:

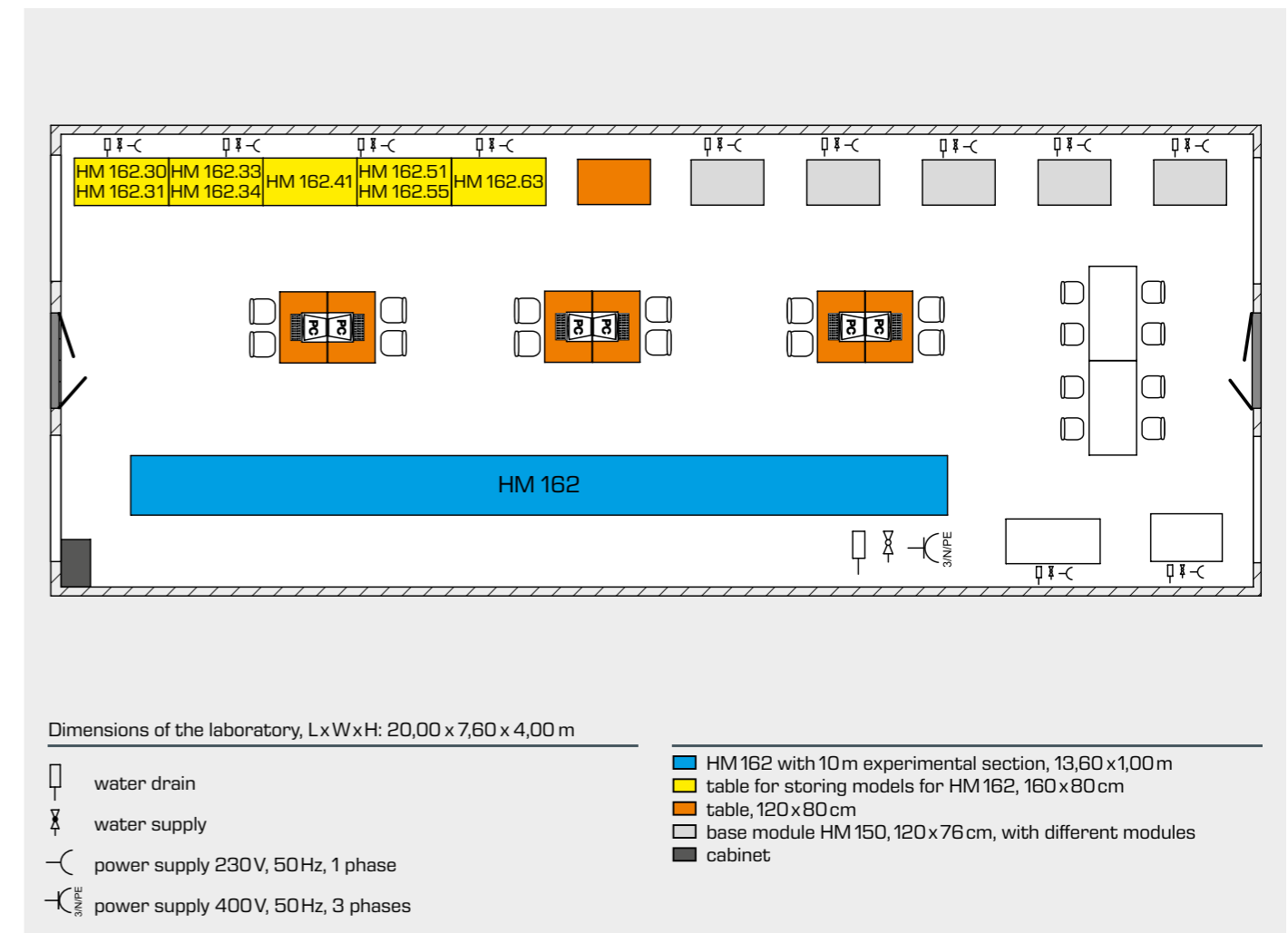
- the laboratory should be on the ground floor
- the floor must have sufficient load capacity
- the floor and the skirting area of the walls should be water-resistant
- the transportation routes to and within the laboratory must be spacious
- the water supply and drains must be big enough for larger amounts of water
- the two larger experimental flumes HM 162, HM 163, and HM 161 require three-phase alternating current

An example of laboratory planning

The drawing below shows the planning for a laboratory that contains the experimental flume HM 162 (10m long experimental section), a few other GUNT units on fluid mechanics and workstations for the students.

In this case the models for HM 162 are stored on tables.

A small cabinet in the corner contains tools and can be used to store instruction manuals.



GUNT experimental flumes are being used all around the world

Below is a selection of customers who are using a GUNT experimental flume. There is at least one GUNT experimental flume in each of these countries, often there are several flumes in use at other colleges and universities within the country.

Satisfied customers...



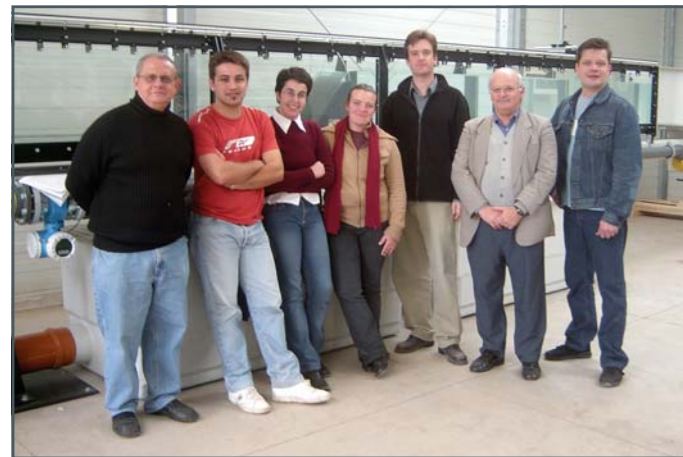
...in Malaysia with HM 162



...in Spain with HM 160



...in Indonesia with HM 162



...in Spain with HM 162



...in Bangladesh with HM 161



Africa

École Nationale Supérieure d'Hydraulique (ENSH; HM 162), Algeria
 Instituto Superior Politécnico de Tecnologias e Ciências (ISPTEC; HM 163), Angola
 TU Berlin Campus El Gouna (HM 162), Egypt
 University of Asmara (HM 160), Eritrea
 Haramaya University (HM 162), Ethiopia
 École Nationale d'Ingénieurs (HM 160), Mali
 Rivers State University of Science and Technology (HM 160), Nigeria

America

Centro Universitário Luterano de Palmas (CEULP/ULBRA; HM 160), Brasil
 Concordia University (HM 162), Canada
 Universidad Central de Chile (HM 162), Chile
 UCR Universidad de Costa Rica (HM 162), Costa Rica
 Escuela Superior Politecnica del Litoral (ESPOL; HM 162), Ecuador
 Instituto Tecnológico Agropecuario No. 10 de Torreón (008.161BL), Mexico
 Universidad Peruana de Ciencias Aplicadas (HM 162), Peru
 Burlington County College (HM 160), USA
 Universidad Católica Andres Bello (UCAB) (HM 160), Venezuela

Asia

Herat University (HM 162), Afghanistan
 Military Institute of Science & Technology (MIST; HM 161), Bangladesh
 Institute Technology Brunei (ITB; HM 162), Brunei
 City University of Hong Kong (HM 162), China
 Indian Institute of Technology of Roorkee (ITT) (HM 162), India
 Universitas Bandar Lampung (HM 162), Indonesia
 Qom University (HM 162), Iran
 University of Technology (HM 160), Iraq
 University Teknologi PETRONAS (HM 162), Malaysia
 Far Eastern University (HM 160), Philippines
 Taif University (HM 162), Saudi Arabia
 Institute of Technology University of Moratuwa (ITUM; HM 160), Sri Lanka
 Burapha University (HM 161), Thailand
 American University of Sharjah (HM 160), UAE

Flinders University (HM 160), Australia

Europe

University of Cyprus (HM 162), Cyprus
 Aalto University (HM 161), Finland
 Centre de Formation Hydraulique d'EDF (HM 163), France
 Bundesanstalt für Wasserbau (HM 163), Germany
 Rezekne Higher Education Institution (HM 160), Latvia
 Warsaw Agricultural University (HM 162), Poland
 Politécnico de Viseu (HM 162), Portugal
 Moscow State Construction University (MGSU; HM 162), Russia
 Slovak University of Technology (STU; HM 163), Slovakia
 Universidad de la Laguna (ULL; HM 162), Spain
 Okan University (HM 160), Turkey
 University of Southampton (HM 161), UK

...and many more

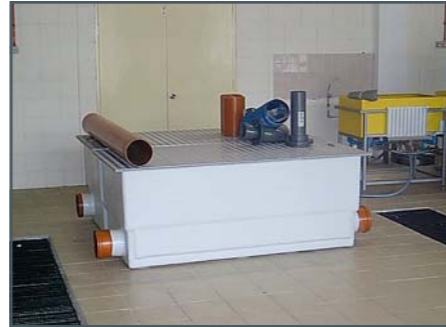
Assembly of GUNT experimental flumes using the example of HM 162



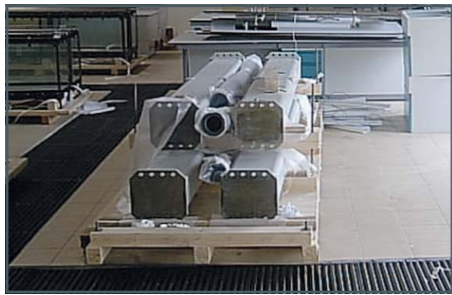
Inlet element, outlet element and flume supports



Elements of the experimental section



Water tank and piping



The carrier (bottom left) is assembled from separate elements (left) and placed on the flume supports using a forklift (right). The flume supports are bolted into the floor (centre).



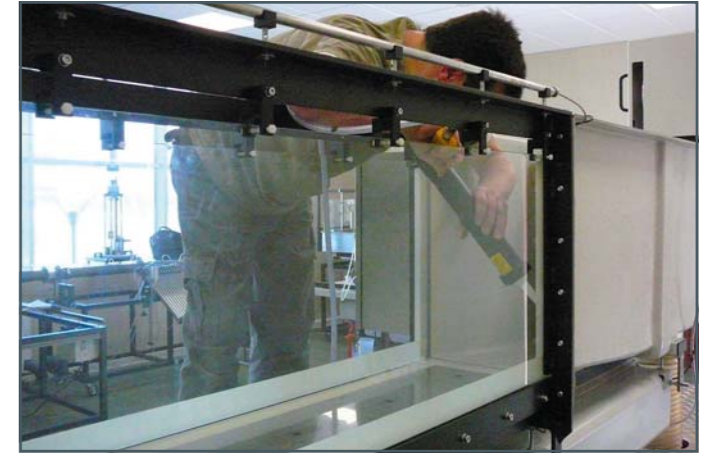
Jacking support for inclination adjustment



The experimental section element is placed on the carrier with a forklift, aligned and installed.



The inlet element is raised onto the carrier, aligned and connected to the experimental section.



Then the experimental flume is sealed.



Last but not least is work on the wiring (left). Then the water tank is aligned and connected to the pipeline system (right).



Once installation is complete the system is commissioned; this photo shows the process with the broad-crested weir.

GUNT experimental flumes are set up and commissioned by experienced staff on site. This ensures that you can focus on your experiments right from the word go.



This fully assembled experimental flume is located at the Universiti Teknologi PETRONAS (UTP) in Ipoh, Malaysia.