PLUMBING CONNECTION

WWW.PLUMBINGCONNECTION.COM.AU SUMMER 2016

WHO WANTS TO BE A PLUMBER?

PROMOTING PLUMBING AS A PROFESSION OF CHOICE

INSIDE:

TEST RIG UPDATE

FEBRUARY 2015 MARKED AN IMPORTANT TIME FOR THE ASSOCIATION OF HYDRAULIC SERVICES CONSULTANTS AUSTRALIA (AHSCA) AS AN AGREEMENT WAS MADE TO COLLABORATE WITH THE UNIVERSITY OF THE SUNSHINE COAST (USC) TO UNDERTAKE CUTTING-EDGE RESEARCH TO INVESTIGATE, QUANTIFY AND ACCURATELY PREDICT THE HYDRAULIC BEHAVIOUR OF ROOF WATER IN BOX GUTTERS AND DOWNPIPES OF LARGE BUILDINGS. THE PAST 12 MONTHS HAS SEEN CONSIDERABLE DEVELOPMENTS AT THE NATIONAL ROOF DRAINAGE RESEARCH FACILITY. **JUSTIN FELIX** REPORTS.

More experimental research is required to accurately evaluate the capacity of conventional roof drainage systems and to investigate how it might change in the future due to expected increases in rainfall intensities resulting from climate change. This is where the vision of Mark Alexander of the AHSCA became integral to the research project taking flight.

"The Research Project now has its own website www.testrig.com.au which Victorian chapter president Ben Rimmington has donated an incredible amount of time and energy to design, develop and implement," Mark Alexander said.

"Chief Investigator, Dr Terry Lucke has done a wonderful job at interpreting our requirements for the construction of the test rig facility. While the scaffold construction of the rig appears quite simplistic to the casual observer, the flexibility and functionality that Terry has been able to design into the structure is remarkable, with simplicity and reliability being the key ingredients."

The design of the rig incorporates:

- Three working levels.
- Adjustable gutter width.
- Adjustable gutter depth.
- Adjustable gutter gradient.
- Adjustable outlet location, each end or central.
- The ability to adjust the flow at each roof sheet.
- The ability to observe both positive and negative (syphonic) pressure effects on each outlet and overflow configuration.

The design challenges of the facility were not just limited to the physical rig construction; the pumps used to generate the specific pressure and flow requirements of simulated storm patterns also required unique consideration. BKB Grundfos developed a dedicated pump set solution with modulating flow and pressure characteristics that can replicate storm hydrographs from historical storm ➤

Professionals will find them worthy. Others won't find them at all.

Now introducing a full line of inlet valves exclusively for Professionals. Fluidmaster's® PRO Series is for the hard working plumbing professional who requires high quality, professional grade products that have been engineered for reliability and durability.

Designed & Engineered in the USA

WaterMark
WMKA 25416
ATS 5200.016
SAI Global
PRO45B-AU

AUSTRALIA:
Haron International Pty. Ltd.
P.O. BOX 999, 5/100 New Street
Ringwood Victoria 3134
Ph: (03) 9870 9966 Fax: (03) 9870 9366
www.haron.com.au

Fluidmaster PRO SERIES FOR PROFESSIONAL INSTALLATION ONLY

events from around the world. The pumps are capable of delivering 100 litres per second, which far exceeds the maximum flow of 16 litres per second as set out in the Australian Standard for box gutter design.

"When dealing with such high circulation flows (100 l/s) uncontrolled wave generation within the tank can cause cavitation and subsequent failure of the pumps," Mark explains.

"To counter this possibility, Terry and the team at USC developed a simple but effective anti-wave baffle constructed from a modified concrete stormwater pipe. This is another demonstration of Dr Terry Lucke's experience in being able to implement a simple and reliable solution to a complex problem. Terry's ability in this regard has enabled the overall costs of the Research Project to be much lower than they would have been if we were working with a less experienced team."

The initial flow modelling results have already revealed some remarkable results that will change the way the industry think about roof drainage solutions. The development of combination hybrid systems (gravity/syphonic) is one of the advanced design solutions under review.

Having the ability to test and witness all the components of the roof drainage system in concert (gutters, sumps, overflow, outlets, downpipes) has provided the team with a unique opportunity to observe and record the important hydraulic relationship that one component of the system has with another. This unique aspect of the AHSCA Research Facility will assist in a better understanding of the hydraulic characteristics that has not been possible in previous studies.

The Research Facility is also able to review and verify currently available data that is included in various references such as AS/NZS 3500.3. This provides the opportunity for the research team to reverse engineer current sizing guidelines to identify excessive safety allowances (in addition to freeboard). Identification of duplicated safety allowances will result in more realistic and efficient outcomes for AHSCA members.

While the vast majority of the rig is completed and commissioned, the research team is still developing one of the extremely important and sensitive areas. A multitude of measuring and recording devices has been trialled using various technologies and the team is currently reviewing the trial results of the various systems with the full implementation and commissioning due in the upcoming months.

Dr Terry Lucke also designed an oversized return flow gutter at the base of the test rig that allows observations of localised turbulent discharges from downpipes. This type of configuration may be used where upper catchments discharge to lower gutters. This addition to the rig allows the opportunity for future research and the development of further design solutions.

The test rig is impressive across the board and uses pumps that are capable of delivering 100 litres per second.

"The return gutter also allows the observation of the discharge flows from positive and negative pressure environments at various flow rates. This will allow us to development the most suitable connections of the roof drainage systems to the in ground stormwater networks.

"The additional mid and lower working levels originally incorporated into the design in the test rig by Dr Terry Lucke has allowed additional research to be undertaken

concurrently. Recently the National Technical Council (NTC) commissioned a preliminary research study on the eaves gutter overflow provisions detailed in the National Construction Code. This research was able to be undertaken by a supplementary research team and therefore did not interfering with the research being conducted on the upper level."

The preliminary observations related to the National Construction Code (NCC) eaves gutters overflow provisions provided a significant level of concern to the NTC and resulted in a formal submission to the Australian Building Codes Board that recommended further testing and research are undertaken.

The mid level working platform of the rig has also allowed the AHSCA and USC to collaborate with research partners such as Specialty Plumbing Supplies (SPS) to test its roof and floor drainage grates. The roof and floor grate test rig has been constructed in a manner that will allow various grated outlets to be changed with minimum modification.

"The 'partnering" with selected research partners such as SPS will allow us to develop national AHSCA testing standards for a number of components that currently have no recognised "benchmark" for testing. This will allow our members to specify products with confidence that the performance characteristics quoted by the manufacturer is reliably established and can be replicated in the typical installed environment. It is planned to offer this service to other manufacturers for a number of products in the upcoming years," Mark says.

In an agreement with all AHSCA State Chapters, the next 12 months will see the formation of the AHSCA Research Foundation. The Foundation will assume ownership and responsibility of all aspects of the current and all future research projects.

It is envisaged the Foundation will ultimately be self-funded and use any accumulated funds for further research, training and education of AHSCA members. It is hoped that the establishment of the AHSCA Research Foundation will ensure the AHSCA maintains its focus on developing hydraulic design engineering solutions for the use of AHSCA members. ■

Contact: AHSCA test rig
www.testrig.com.au