



Amy Philbrook



Paul Fowler



Jalaluddin Harun

A celebration and a new beginning

A celebration of 10 successful years and the announcement of a new beginning for the European Panel Products Symposium (EPPS) gave added interest to this year's tenth event, held in Llandudno, north Wales in October



In introducing the 10th edition of EPPS in the newly extended North Wales Conference Centre in the coastal resort of Llandudno, Dr Paul Fowler, director of organisers the BioComposites Centre, said: "This year we can celebrate 10 years of excellence in the dissemination of information from all over the world".

Dr Fowler went on to say that the delegates could also help to celebrate the official opening of the BioComposite Centre's redeveloped pilot facility at its new home on the island of Anglesey, not far from the university in Bangor, followed by a 10th anniversary gala dinner in the unique atmosphere of Beaumaris Castle (pictured above). He also announced a big change for 2007.

"We have decided it is time for a change and for growth for this symposium," he said. "Next year we will launch IPPS – the International Panel Products Symposium – as a fitting evolution of this truly international event. This will be held in the Welsh capital Cardiff and will run back-to-back with a conference on wood modification."

Fittingly, the keynote speaker for EPPS 10 was a man who has presented a paper at every edition of EPPS since the first in 1997, Dr Mark Irle of Ecole Supérieure du Bois, Nantes, France. He is also of course a regular contributor to *WBPI*.

Titled 'Our global business', Dr Irle's paper began by looking back over the last 10 years.

"The latest statistics published by the United Nations Food & Agriculture Organisation show total world production of all wood based panel types to have been 225 million m³ in 2004," said Dr Irle. "This annual growth in production, equivalent to nearly eight million m³ per year, is a little short of the nine million predicted by Dr James Bolton (founder of EPPS) in 1997 but the growth is real. It is surprisingly linear and, for the moment, continuous."

Dr Irle then went on to express that growth in terms of per capita consumption. This showed an increase of 57% between 1991 and 2004. "This is the real success story behind the wood based panels sector," he said.

The speaker then outlined the production history of each of the various panel types and the positive contributions made by research to the industry.

He concluded: "The consumption of wood based panels is increasing on a global level and the indications are that this will continue, especially now that the positive benefits of using [them] are recognised by governments and the general public."

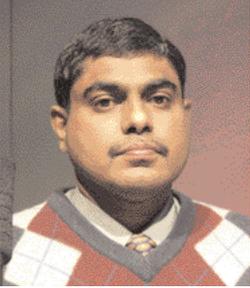
"Continued growth can be assisted by the development of new products, improving the reliability and consistency of existing products and by demonstrating the benefits of panels over other materials. All these require research and the research community must interact more with the commercial side of the industry, become more aware of its needs, provide solutions and gain its confidence".

Session 1, 'Fundamental studies', was opened by Dr John Sharp, whose paper was entitled 'wood, wood based panels and swelling. Is wood really low-tech?'

Dr Sharp pointed out that thickness swelling can be a significant problem in panels, with major variations and a totally erratic distribution of values leading to a reinforcement of the 'low-tech' image.

"However, if we consult a wood technologist or structural engineer, a different view will be proffered and in such professions, wood may be seen as being far from 'low-tech'," said Dr Sharp.

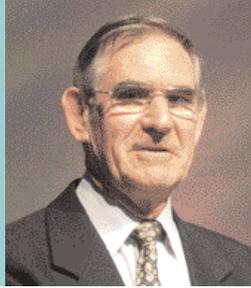
Jegatheswaran
Rathasingam



Joe Martoccia



Kelvin
Chapman



Manfred
Dunky



Martin
Ohlmeier



He concluded that swelling in a panel is least when the wood elements are in parallel as in wood, plywood and OSB. He also suggested that higher density panels are less dimensionally stable due to fibre compression, particularly at fibre cross-over points.



Next, Thomas Walther presented 'new opportunities for the microstructural analysis of wood fibre networks' – a matter closely connected to the previous speaker's points.

"The analysis of the microstructure will help us to better understand the fundamental mechanisms affecting the mechanical and physical properties of wood fibre based composites," said Mr Walther. His work aimed to produce 3-D images of wood fibre networks by the use of microtomography combined with powerful image analysis tools, with simulation of mat permeability and thermal conductivity.

After coffee, Professor Edmone Roffael of the University of Göttingen discussed his team's work on chemo-thermo-mechanical pulping (CMTP) versus thermo-mechanical pulping (TMP) for moisture resistant MDF.

He concluded that CTMP has a positive effect on the mechanical properties of the boards, but a tolerable negative influence on thickness swelling. It also has a positive impact on moisture and hydrolysis resistance of the boards "which could mark a profound change in future dealings of the market with this product. It may also save resin without impairing board properties".

Dr Amy Philbrook has carried out co-

polymerisation studies of wood resin using 15N NMR correlation spectroscopy and found that this is a powerful tool in elucidating amino resin structures in diisocyanate-urea-formaldehyde and phenol-urea-formaldehyde resins.

"As a result it is now possible to correlate the molecular structure to the physical properties of the resin such that the benefits of co-polymerisation can be assessed," said Dr Philbrook.

High strength resin-impregnated compressed wood is seen by Dr Mohamed Iftekhar Shams, from Khulna University in Bangladesh, as an answer to wood's inherent problems of dimensional instability due to moisture, low durability due to bio-deterioration and lower mechanical properties compared to other engineering materials.

However, Dr Iftekhar Sham's team found that high pressure hot pressing meant high cost. They thus developed a system of lower pressure pressing with phenol formaldehyde resin impregnation and steam treatment of the wood.

The end-use suggested was as a highly-densified surface layer for plywood or waferboard to produce flooring, table tops and similar high-wear surfaces.

Session 2, 'Resins and emissions', was opened by Dr Manfred Dunky of resin maker Dynea. His 'mini-keynote' presentation was entitled 'Resins in Europe (for particleboard, MDF and OSB)'.

Dr Dunky pointed out that European annual production of these composite panels comprises almost 60 million m³, consuming in excess of five million tons (liquid basis) of all types of condensation resins, such as UF, MU(P)F and PF, as well as PMDI.

"With the anticipated annual growth in panel production between 2006 to 2010, there will be 25 plants established in the next five years, leading to an additional resin demand of 800,000 to one million tons, including Russia, in 2010 when compared with 2005," said the speaker.

Requirements for the development of the resin industry going forward were identified by Dr Dunky as cost-effective bonding solutions such as: minimising resin consumption; shorter press times; special resins for low density boards; mat pre-heating without resin pre-hardening; and dry gluing.

Requirements of the resins themselves would include: broadening the operating window in production; further decreasing formaldehyde emissions; improving moisture resistance and swelling characteristics

of panels; and bio-based and binderless bonding.

Dr Dunky suggested that the close link between the wood based panels and the adhesives industries is the best way forward.

"Trends in indoor air quality legislation and monitoring – could you be affected?" was the title of the paper by Peter Williamson of PPM Technology.

He said that several factors, including wood panel products, can contribute to poor indoor air quality (IAQ) and that the IAQ legislation already introduced in the Far East is likely to increase the demand for low formaldehyde/VOC-emission products.

Dr Alpha Barry of Forintek Canada Corp reported on a study of volatile organic chemical (VOC) emissions from an MDF pilot plant dryer exhaust in which he found that it was possible to reduce emissions by better control of the entire process. Emissions varied with resin loading and type, with MUF resins in MDF producing lower emissions than UF resins.

Mathias Makowski of the Federal Research Centre for Forestry and Forest products, Hamburg, Germany, reported on 'Measurement and health-related evaluation of VOC emissions from OSB made of Scots pine'. These VOCs are mainly terpenes and aldehydes from the pine itself and are thus of natural origin and their release is a factor of temperature and hot stacking conditions.

'Online measuring method for the fast determination of formaldehyde emissions from panels and finish foils' was presented by Steffen Tobisch of the IHD institute in Dresden, Germany. He reported that the field and laboratory emission cell (FLEC) and online formaldehyde analyser used in his experiments gave fast and continuous measurement for quality control and allowed the optimisation of panel plant parameters and lacquer recipes.

Christopher Phanopoulos of Huntsman reported on his study of penetration and diffusion behaviour of isocyanate based adhesives, saying that they were found to wet wood well and spread and penetrate rapidly and that their mode of adhesion allows for dissipation of stresses and thus higher strengths.

Dr Kelvin Chapman of MDF Tech New Zealand opened the second day's session on 'Raw materials and preparation' with another mini-keynote address entitled 'Zen and the art of making MDF'. He concluded that "The key to making good MDF lies in understanding the whole process, not just one part".



Mohd Iftakhar Shams



Peter Meinschmidt



Tom Woolley



Dr Sujit Banerjee of Georgia-Tech, Atlanta, US, reported that the amount of fines produced while flaking wood for OSB manufacture depends on both temperature and knife sharpness angle, with more frequent knife changes recommended in cold winter conditions.

The use of waste, or recycled, wood for panel manufacture is likely to increase, at least in Europe, so the presentation of Peter Meinschmidt of the Wilhelm Klauwitz Institute (WKI) in Germany on innovative separation techniques for particleboards made from this material was perhaps timely.

He addressed the problems of removing contaminants which cannot be separated by mechanical or magnetic means by using infrared thermography and online spectroscopy to identify contaminants such as rubber and plastic. Work continues on ways to remove the identified pollutants.

Wayne Wasylciw from the Alberta Research Council in Canada looked at the manufacture of oriented structural split straw board (OSSB) in a similar process to OSB, developed by ARC and now being commercialised.

This utilises the tensile strength of straw strands in tension parallel to the stalk, which he said is comparable to aspen strands.

Work continues in developing a commercial straw splitter, rather than using existing wood OSB technology, and on scaling up production speeds, but it looks promising.

Session 4 covered 'The built environment' and was kicked off by professor Jalaluddin Harun of the Institute of Tropical Biocomposites in Malaysia looking at prospects and challenges in the Asia-Pacific, with a focus on Malaysia.

"Raw material for solid wood production is declining and there is a need for new

sources of raw materials to sustain current manufacturing and development," he said.

The speaker said that new biocomposite products like fibre reinforced plastic composites, LVL and kenaf oriented board offered possibilities for some markets.

Professor Tom Woolley, an architect from Queens University Belfast, Northern Ireland, discussed 'natural building'. He talked of the use of natural insulation materials such as hemp or wool and 'hemcrete' wall systems.

Staying with buildings, Joe Martoccia, now a director of UK timber frame house manufacturer/builder Potton and of the UK Timber Frame Association, but formerly employed in the panel manufacturing/marketing industry, spoke about the increasing acceptance of timber frame in the UK.

With market growth by 2010 expected to be 50%, Mr Martoccia called on the panel industry to work with the timber frame industry to develop more and better panel products to share in this growth.

Following this presentation, the delegates were taken to the Isle of Anglesey to witness the official opening of the new pilot line by the vice-chancellor of the University of Wales Bangor, Professor R Merfyn Jones (see photo page 42) and on to a gala dinner at the 13th Century Beaumaris Castle.

Session 5 was entitled 'Process control technologies' and the first speaker was Dr Martin Ohlmeyer of the Federal Research Centre, Hamburg, who offered 'New methods to determine fibre quality for MDF production' in which he presented preliminary results for an optical fibre size and distribution measurement system.

Matthias Fuchs, technical director of Electronic Wood Systems, Hameln, Germany presented the EWS Conti-Scale

for non-contact measurement of area weight and thus board weight on the production line at high speeds – and the EWS Gauge Controller for thickness measurement.

Dr Bernd Bergmann of GreCon, Alfeld, Germany, then presented the on-line x-ray inspection system 'Dieffensor' to detect glue lumps and foreign bodies before the continuous press to prevent expensive damage to the stainless steel belt.

Surface smoothness of panels is vital to certain surfacing processes and can be a problem with rubberwood based MDF, as manufactured in Malaysia.

Dr Jegatheswaran Ratnasingam, faculty of forestry, Universiti Putra Malaysia, reported on contract research for a Malaysian MDF producer into surface finishing, in which he found that 150-grit sanding was best for liquid surface applications, while 120-grit was best for overlaying.

Robert Massen of Massen Machine Vision Systems, Germany, reported on his company's automatic visual monitoring of bare and surfaced panels using multi-sensorial camera-based inspection systems with different camera/illumination modules.

These sensors can be used on raw boards, profiled edges or decorative surfaces to assess both physical and aesthetic quality, giving quality inspection and process monitoring at the same time, with automatic generation of quality reports per shift, said the speaker.

The final paper in this varied symposium was from Arun Gupta of the University of Canterbury, New Zealand. He and his team had modelled the hot pressing of MDF and found that their model could predict the main variables which control the manufacturing of MDF panels.

This year's EPPS, as always, set a demanding pace, with 25 papers presented in the five sessions, but still allowed time for questions of the speaker at the end of each presentation and for the all-important networking among delegates.

The international flavour of this event, with speakers from Europe, Asia, North America and New Zealand and delegates from all corners of the world – as at every EPPS – would certainly seem to justify the change in name to the International Panel Products Symposium (IPPS) from 2007. □

This article can only give a brief glimpse into the subjects covered at EPPS10, but copies of this and previous years' full proceedings are available for purchase from the BioComposites Centre at: www.bc.bangor.ac.uk