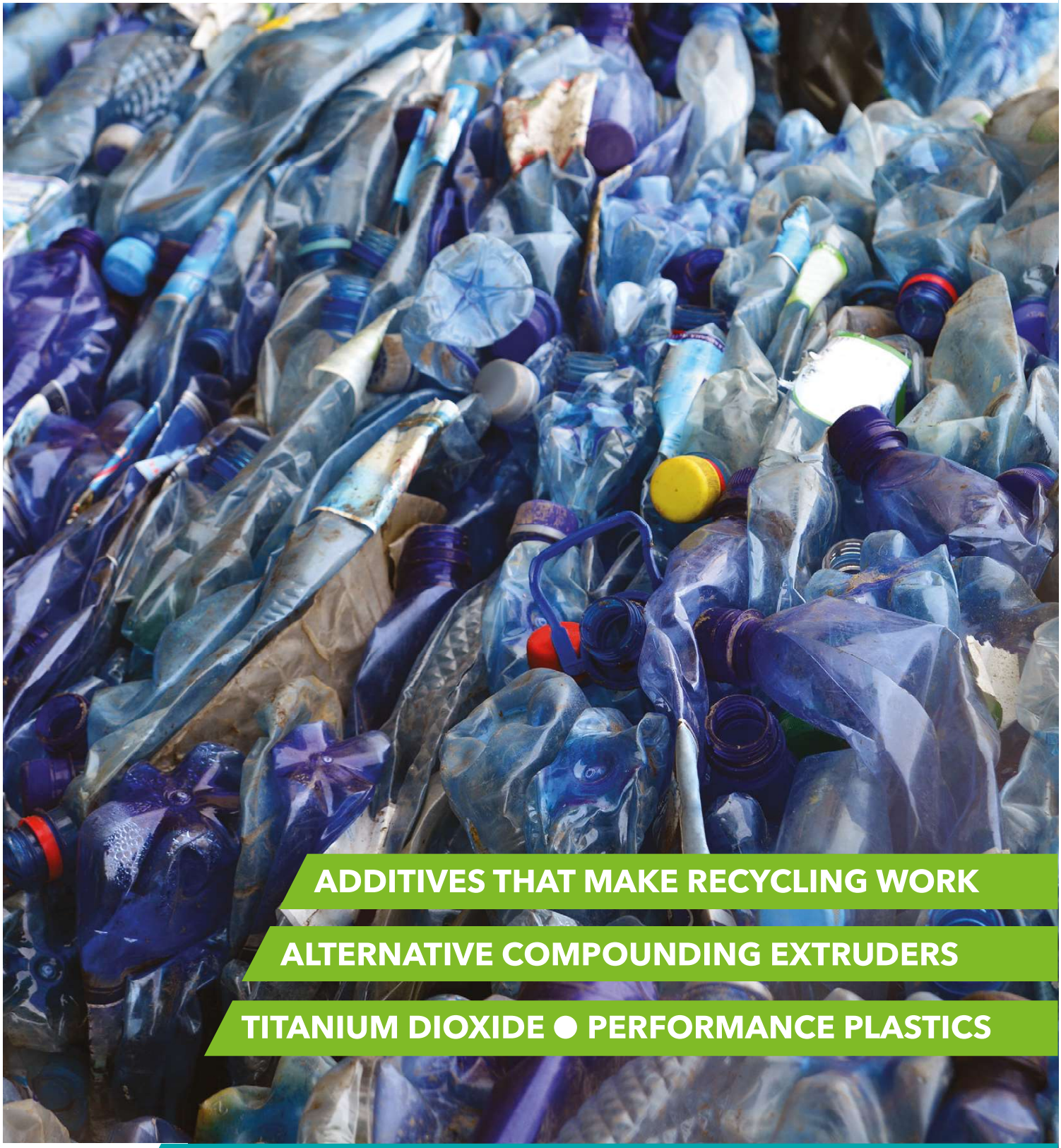
OCTOBER 2020

ISSN 2053-7174

Compounding WORLD



ADDITIVES THAT MAKE RECYCLING WORK

ALTERNATIVE COMPOUNDING EXTRUDERS

TITANIUM DIOXIDE ● PERFORMANCE PLASTICS

AMI

Bringing the plastics industry together

Compounding WORLD

PAGE 5

PAGE 17

PAGE 35

PAGE 51

PAGE 63

COMING NEXT ISSUE

› Carbon black › Inline measurement › Feeding solids › Mixers

CONTACT US

CLICK HERE TO MAKE SURE YOU GET YOUR COPY

AMI

Third Floor, One Brunswick Square,
Bristol, BS2 8PE, United Kingdom
Tel:+44 (0)117 924 9442
Fax:+44 (0)117 311 1534
www.ami.international
www.twitter.com/plasticsworld
Registered in England No: 2140318

EDITORIAL

Editor-in-Chief: Chris Smith
chris.smith@ami.international

Technology editor: Peter Mapleston
editorial@compoundingworld.com

Contributing editor (USA): Jennifer Markarian
editorial@compoundingworld.com

Contributing editor (UK): Mark Holmes
editorial@compoundingworld.com

ADVERTISING

Advertisement manager: Claire Bishop
claire.bishop@ami.international +44 (0)1732 682948

Sales & commercial manager: Levent Tounjer
levent.tounjer@ami.international +44 (0)117 924 9442

Sales manager (China): Jenny Zhou
jenny.zhou@ami.international +86 13651 985526

Events and magazines director: Andy Beevers
andy.beevers@ami.international

DOWNLOAD MEDIA DATA

VISCOSPEED in HFFR compounds: Big impact with minimal dosage

INTRODUCTION

Demand for halogen free flame retardant cable materials (HFFR) has grown consistently over the past few decades, due largely to the reduction in smoke and the absence of toxic and corrosive fumes in the event of fire when compared to traditional halogenated flame retardant materials. These HFFR materials are typically polyolefin compounds with a high loading of inorganic flame-retardants such as aluminium hydroxide (ATH) and magnesium hydroxide (MDH).

A new harmonised European Construction Products Regulation (CPR) came into effect in July 2017 with the aim of further reducing fire risk. It requires that cables should delay the outbreak of fire and cause minimal smoke emissions. This goal is generally achieved by increasing the inorganic flame retardant filler content. For the most demanding applications it may be necessary to add as much as 65-80% of appropriate filler. This, of course, has challenging consequences with regard to processability and mechanical properties for both producers of cable compounds and for cable manufacturers.

In VISCOSPEED, Innospec Leuna GmbH has developed a halogen-free, low-dosage, organic processing aid that minimises the negative impact of increased filler loading on processing without negatively affecting flame retardant properties. VISCOSPEED has been shown to improve the dispersion of ATH and MDH, as well as carbonates and silica-based nano-materials, across many different cable compounds, demonstrating improved flow during processing and manufacturing.

VISCOSPEED, which is polar by nature, enables fast wetting and dispersion of inorganic filler particles in the polymeric matrix. Moreover, it prevents fine filler particles re-agglomerating during processing, which ensures the filler makes the maximum contribution to flame retardancy. This is especially useful where milled natural fillers are deployed, such as milled MDH, and where inorganic synergistic additives such as nano-silica, sepiolite and nanoclays are used. Ultimately, the interaction between the polar filler and the VISCOSPEED additive results in optimised dispersion and char formation and reduces dripping tendency.

VISCOSPEED IN SHEATHING COMPOUNDS

The sheathing of the cable is a critical component in terms of protection from mechanical shocks and flame retardancy. Addition of VISCOSPEED to highly flame retardant sheathing compounds has been shown to significantly improve processability without negative effect on elongation at break, aging behaviour or flame retardancy. Data for an EVA-based cable sheathing compound (Table 1) shows that, despite a reduction in the level of maleated coupling agent in the formulations using VISCOSPEED (compounds 1B and 1C) the tensile strength is maintained above the critical value of 10 N/mm^2.

Due to its polarity, VISCOSPEED acts as a co-compatibiliser and can partially replace the maleated coupling agent. As the data in Tables 1 and 3 show, replacing 2% LLDPE-g-MAH with the same level of VISCOSPEED allowed a substantial increase in flowability (MFI) to be achieved without affecting elongation at break. The improvement in processability means that costly synthetic fillers can be replaced by much less expensive natural milled materials (Table 2).

VISCOSPEED can also be used to advantage in sheathing compounds based on POE (polyolefin elastomer) resins. POE is of interest to cable producers for its excellent combination of mechanical properties, flexibility, and very wide application temperature range (extending from -60°C to 125°C). However, standard POE cable sheathing formulations tend to drip when burning (see results for compound 3A in Table 3).

A number of studies have been carried out by Innospec Leuna to explore the effect of the addition of VISCOSPEED to POE-based formulations containing both coated and uncoated natural MDH. All have shown similar results in that processing was improved without deterioration of the most important performance parameters. Data in Table 3, for example, shows that the introduction of VISCOSPEED both eliminates burning drops during vertical fire tests and improves elongation. These effects are attributed to the ability of VISCOSPEED to allow a finer dispersion of the natural filler in the compound.

Table 1. EVA-based sheathing compound

Ingredient	(1A) Standard	(1B) 1% VISCOSPEED	(1C) 2% VISCOSPEED
EVA VAc=28% MFI=3	19,5	19,5	19,5
C_8-POE d=0.868 MFI=0.5	5	5	5
mLLDPE MFI=3-5	5	5	5
LLDPE-g-MAH	5	4	3
VISCOSPEED	-	1	2
Fine pp ATH BET=4 m^2/g	52	52	52
Coated milled MDH 3.5µm	12	12	12
Silicone Masterbatch	1	1	1
Stabiliser	0,5	0,5	0,5
TOTAL	100	100	100
PROPERTIES			
MFI – 21,6kg@190°C	4	7	12
Tensile strength [N/mm^2]	14,5	13	11
Elongation at break [%]	190	190	190

VISCOSPEED IN BEDDING COMPOUNDS

Finally, the use of VISCOSPEED has also been investigated in several different bedding compounds. Similar to the earlier examples, VISCOSPEED has been demonstrated to maintain easy processing

VISCOSPEED

By Innospec

Table 2. Natural MDH, EVA-based sheathing compound

Ingredient	(2) ATH-free
EVA VAc=28% MFI=3	15
C_8-POE d=0.868 MFI=0.5	15
LLDPE-g-MAH	4,5
VISCOSPEED	**2**
Uncoated milled MDH 3.5µm	62
Silicone masterbatch	1,5
Hydrophobicity MB	0,5
Stabiliser	0,5
TOTAL	100
PROPERTIES	
MFI – 21,6kg @ 190°C	2
Tensile strength [N/mm²]	>13
Elongation at break [%]	>150

Table 3. POE-based ATH-free sheathing compound

Typical Compostion	(3A) Standard coated MDH	(3B) VISCOSPEED coated MDH
C_8-POE d=0.868 MFI= 0.5	19,5	19,5
PP Plastomer MFI=8	9	9
POE-g-MAH	5	3
VISCOSPEED	**-**	**2**
Stearic coated milled MDH 3.5µm	60	60
Aluprem TB 1/t	5	5
Silicone masterbatch	1	1
Stabiliser	0,5	0,5
TOTAL	100	100
PROPERTIES		
MFI – 21,6kg@190°C	2	4
Tensile strength [N/mm²]	12	10
Elongation at break [%]	215	>250
Presence of burning drops	yes	no

of bedding compounds even with filler loadings up to, and in some cases extending beyond, 80%.

The resulting optimal filler dispersion achieved using VISCOSPEED is also the reason for the enhanced mechanical properties evident in drummable bedding compounds (Table 4). This data shows that exchanging EVA28 MFI=3 in compound 4A with 2% or 4% of VISCOSPEED (compounds 4B and 4C) results in a big increase in MFI as well as almost doubling elongation at break values. The findings indicate that filler content can be further increased without sacrificing mechanical properties, so allowing further optimisation of flame retardance performance.

Table 4. Drummable bedding compounds

Typical Composition	(4A) Standard	(4B) 2% VISCOSPEED	(4C) 4% VISCOSPEED
C_4-POE d=0.868 MFI<0.3	15	15	15
EVA VAc=28% MFI=3	15	13	11
Stearic coated milled MDH 5,5 µm	70	70	70
VISCOSPEED	**-**	**2**	**4**
TOTAL	100	100	100
PROPERTIES			
MFI 160°C@21.6kg	1	3	7
LOI	36	36	36
Tensile Strength at break, MPa	5	6	7
Elongation at break [%]	<50	>60	>100

SUMMARY

The new VISCOSPEED processing aid for halogen free flame-retardant compounds from Innospec has shown in all the compounds tested that it can optimise filler dispersion and so ease processing. It has also been demonstrated that VISCOSPEED achieves these positive results with no adverse effect on aging, flame retardancy or mechanical properties. In fact, in the case of POE-based formulations, elongation at break and flame retardancy can be improved.

Low dosages of VISCOSPEED will help to maintain stable production in high productivity compounding equipment by accelerating the incorporation of fillers into the polymeric matrices. The incorporation of VISCOSPEED improves and accelerates the dispersion of flame retardant mineral fillers (milled ATH, milled MDH, kaolin, silicates, etc.) and additives (nanoclays, nanosilica, sepiolite, etc) into polymeric matrices with associated benefits in terms of rheology and flame retardancy.

To learn more about VISCOSPEED and review test results obtained in cable compounds, Aluminium Composite Panels (ACP) and TPO-roofing membranes, contact Dr. Christoph Bornschein at Innospec Leuna.

Innospec Leuna GmbH
Am Haupttor, Bau 6310
06237 Leuna, Germany
www.innospecinc.com

Tel: +49 (0) 3461 43 44 38
christoph.bornschein@innospecinc.com

Fire Resistance in Plastics

30 November - 2 December 2020
Radisson Blu Scandinavia Hotel
Düsseldorf, Germany

Discover the latest developments in fire retardant technologies

SECURE YOUR PLACE

Receive your yearly update at the Fire Resistance in Plastics conference.

This event has been established as one of the leading global conferences on the latest developments in flame retardancy and flame retardant plastics.

Why attend?

- Discover new developments in fire retardant technologies
- Learn about the latest research, testing and regulatory requirements
- Review market trends, opportunities and challenges
- Benchmark your company against other leading players
- A unique opportunity to network with key professionals from the global FR industry, all in one place

Industry-leading speakers include:

Dr. Kevin Bradley
Secretary General BSEF
THE INTERNATIONAL BROMINE COUNCIL

Mr. Adrian Beard
Chairman (Europe)
PINFA

Mr. Marc Leifer
Global Technical Support Manager
ICL-IP FR-SBU

Mr. Peter Kornas
Director - Product development and technical application
BöFA COMPOSITE SYSTEMS GmbH & Co. KG

Mr. Tobias Moss
Manager Innovation & Application Development
CHEMISCHE FABRIK BUDENHEIM KG

Sponsored by:

ICL Industrial Products

pinfa
Phosphorus, Inorganic & Nitrogen Flame Retardants Association

Media supporters:

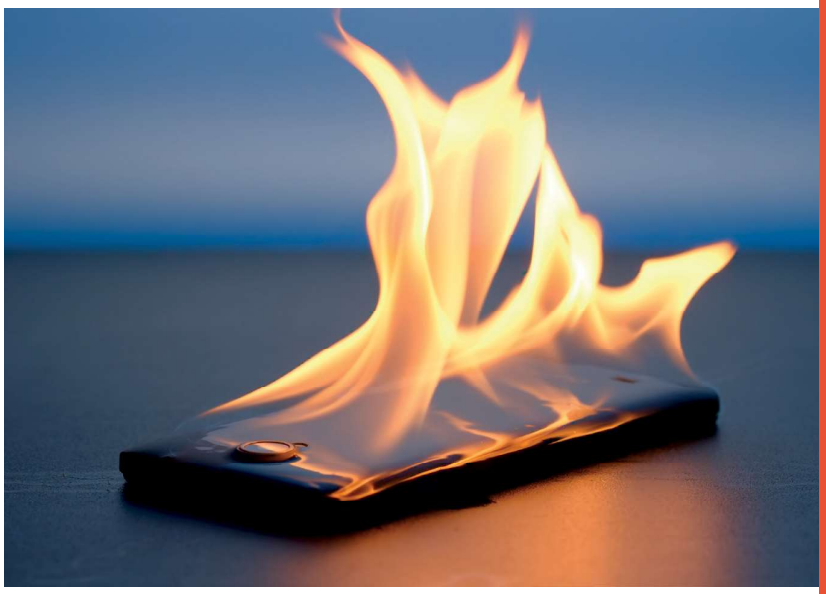
Compounding WORLD

Injection WORLD

Fire Retardants in Plastics

May 4-5, 2021
Hyatt Regency Houston
Houston, TX, USA

Exploring trends and technical developments in the international flame retardant industry



CONTACT US

Harriet White
Conference Organizer
T +1 610 478 0800
E harriet.white@ami.international

Sponsored by:

Nabaltec ALBEMARLE Budenheim

Organised by: AMI

Media supporter: Compounding WORLD

NEW DATES

SAVE THE DATE

Meet us in Houston for the 10th edition of Fire Retardants in Plastics.

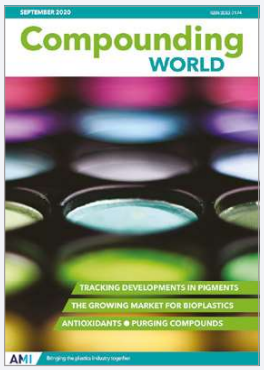
This conference will provide a lively and productive forum to debate the latest developments for a wide range of applications including electrical goods, construction and transportation.

Sessions will provide a comprehensive view of the latest flame-retardant technologies including advances in additives, compound formulations and applications. Expert speakers are also invited to present valuable insights into regulatory developments, performance standards and testing technologies.

Book your place

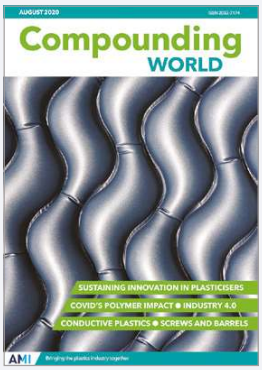
Keep informed: read our latest editions

AMI publishes five process-specific FREE plastics industry magazines. Simply click on the cover below to read each magazine. Or download the issue in the relevant Apple or Android app



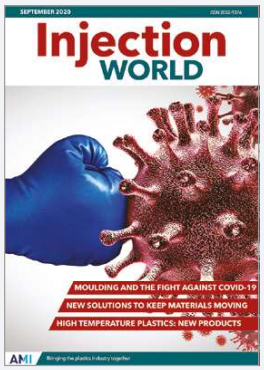
Compounding World
September 2020
The September issue of Compounding World looks at the tougher demands being placed on pigments, examines how bioplastics applications are broadening, and covers stabilisers, PVC biocides and purging compounds.

› CLICK HERE TO VIEW



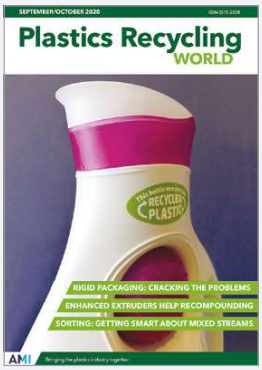
Compounding World
August 2020
The August issue of Compounding World delves deep into thermally conductive additives and production data usage, plus the latest on development of sustainable plasticisers and what's new in screws and barrels.

› CLICK HERE TO VIEW



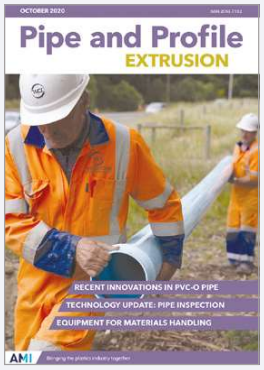
Injection World
September 2020
The September issue of Injection World has an in-depth feature on medical technology, and how injection moulders and machinery groups are contributing to the fight against Covid-19. Plus new products in temperature-resistant polymers and the latest in materials handling.

› CLICK HERE TO VIEW



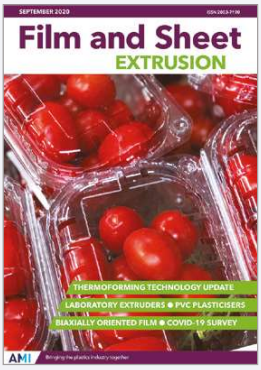
Plastics Recycling World
September/October 2020
The September/October 2020 issue of Plastics Recycling World magazine explores how better processing and smarter design is improving rigid plastics recycling, plus a review of the latest innovations in sorting technology and extruders for re-compounding.

› CLICK HERE TO VIEW



Pipe and Profile
October 2020
The October 2020 edition of Pipe and Profile Extrusion magazine explores the latest developments in oriented PVC pipes (PVC-O). It also takes a look at some new applications of pipe inspection technology and materials handling equipment.

› CLICK HERE TO VIEW



Film and Sheet
September 2020
The September edition of Film and Sheet Extrusion magazine takes a look at the latest innovations in the world of thermoforming. It also reviews developments in biaxial films, plasticisers and lab-scale extrusion machinery.

› CLICK HERE TO VIEW

Take out your own FREE subscriptions to any of the magazines. Click on the logos below to simply register on-line.

Compounding WORLD
Film and Sheet EXTRUSION
Pipe and Profile EXTRUSION
Injection WORLD
Plastics Recycling WORLD

GLOBAL EXHIBITION GUIDE

2020	**7-8 October**	Compounding World Expo Europe, Essen, Germany **POSTPONED**	www.compoundingworldexpo.com/eu/
	13-17 October	Fakuma, Friedrichshafen, Germany **CANCELLED**	www.fakuma-messe.de
	4-5 November	Compounding World Expo USA, Cleveland, USA **POSTPONED**	www.compoundingworldexpo.com/na/
	10-13 November	Plastimagen, Mexico City **POSTPONED**	www.plastimagen.com.mx
	1-5 December	Equiplast, Barcelona, Spain **POSTPONED**	www.equiplast.com
	5-8 December	Plast Eurasia, Istanbul, Turkey	www.plasteurasia.com/en
2021	**9-12 January**	Arabplast 2021, Dubai, UAE	www.arabplast.info
	11-14 January	Plastimagen, Mexico City **NEW DATE**	www.plastimagen.com.mx
	4-8 February	PlastIndia, New Delhi, India **POSTPONED**	www.plastindia.org
	13-16 April	Chinaplas 2021, Shenzhen, China	www.chinaplasonline.com
	4-6 May	Kuteno, Rheda-Wiedenbrück, Germany **NEW DATE**	www.kuteno.de
	4-7 May	Plast 2021, Milan, Italy	www.plastonline.org/en
	17-21 May	NPE 2021, Orlando, FL, USA	www.npe.org
	1-2 June	Compounding World Expo Europe, Essen, Germany **NEW DATE**	www.compoundingworldexpo.com/eu/
	15-18 June	FIP, Lyon, France **NEW DATE**	www.f-i-p.com
	29 June -1 July	Interplas, Birmingham, UK **NEW DATE**	www.interplasuk.com
	14-18 September	Equiplast, Barcelona, Spain **NEW DATE**	www.equiplast.com
	12-16 October	Fakuma, Friedrichshafen, Germany	www.fakuma-messe.de
	3-4 November	Compounding World Expo USA, Cleveland, USA **NEW DATE**	www.compoundingworldexpo.com/na/

AMI CONFERENCES

19-22 October 2020	Composites **VIRTUAL GLOBAL SUMMIT**
26-29 October 2020	Agricultural Film **VIRTUAL GLOBAL SUMMIT**
2-4 November 2020	Plastics Regulation Europe **VIRTUAL SUMMIT**
3-4 November 2020	Chemical Recycling Europe, Hamburg, Germany
30 Nov-2 Dec 2020	Fire Resistance in Plastics Europe, Dusseldorf, Germany
26-28 January 2021	Thermoplastics Concentrates 2021, Coral Springs, FL, USA
2-3 February 2021	Polymers in Cables America, Charlotte, NC, USA
25-26 March 2021	Compounding and Masterbatch Asia, Bangkok, Thailand

For information on all these events and other conferences on film, sheet, pipe and packaging applications, see

www.ami.international