Advancement in Additive Solutions for the PVC & CPVC Industry

Benchmark Polytechnik

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Meet Marketing

The parent company of Benchmark Polytechnik

Driving excellence in PVC manufacturing with industry-leading additives and dedicated technical support.

Facts & Figures

- Years in business: 30 Years
- Number of employees: 70+
- 25-26 Turnover: 550 Cr+
- Technical support
- Advanced laboratory

150+ Specialty Additives for PVC & CPVC Ind.

Business Partners

DOW CHEMICAL COMPANY
Impact Modifier (MBS / AIM) & Processing Aid

OMYA GROUP
Calcium Carbonate

FINE ORGANICS INDUSTRIES LTD.
Polymer & Food Additives Division

PAYAL POLYPLAST PVT. LTD.
Primary Plasticizers

SHANDONG RIKE CHEMICAL CO. LTD.
Acrylic Processing Aid / CPE

GRASIM INDUSTRIES LTD.
Chlorinated Paraffins (CPW)

HUBEI BENXING NEW MATERIAL CO. LTD.
Methyl Tin Stabilizer

IMPORT
PVC Resin / Titanium Dioxide

HONEYWELL
Polyethylene Waxes

SOLVAY SPECIALITY
UV Stabilizer / Antioxidant

SUN ACE KAKOH (PTE) LTD.
Ca-Zn / Lead Stabilizer

Benchmark Polytechnik

Next Gen PVC & CPVC Additives

- Resolve industry wide challenges
- Innovative additive blends
- Efficient production
- Superior quality

Technical case studies- Challenges in the industry & its solutions

Product Development

CPVC Pipes

Quality Improvement

Fittings: UPVC, SWR & AGRI

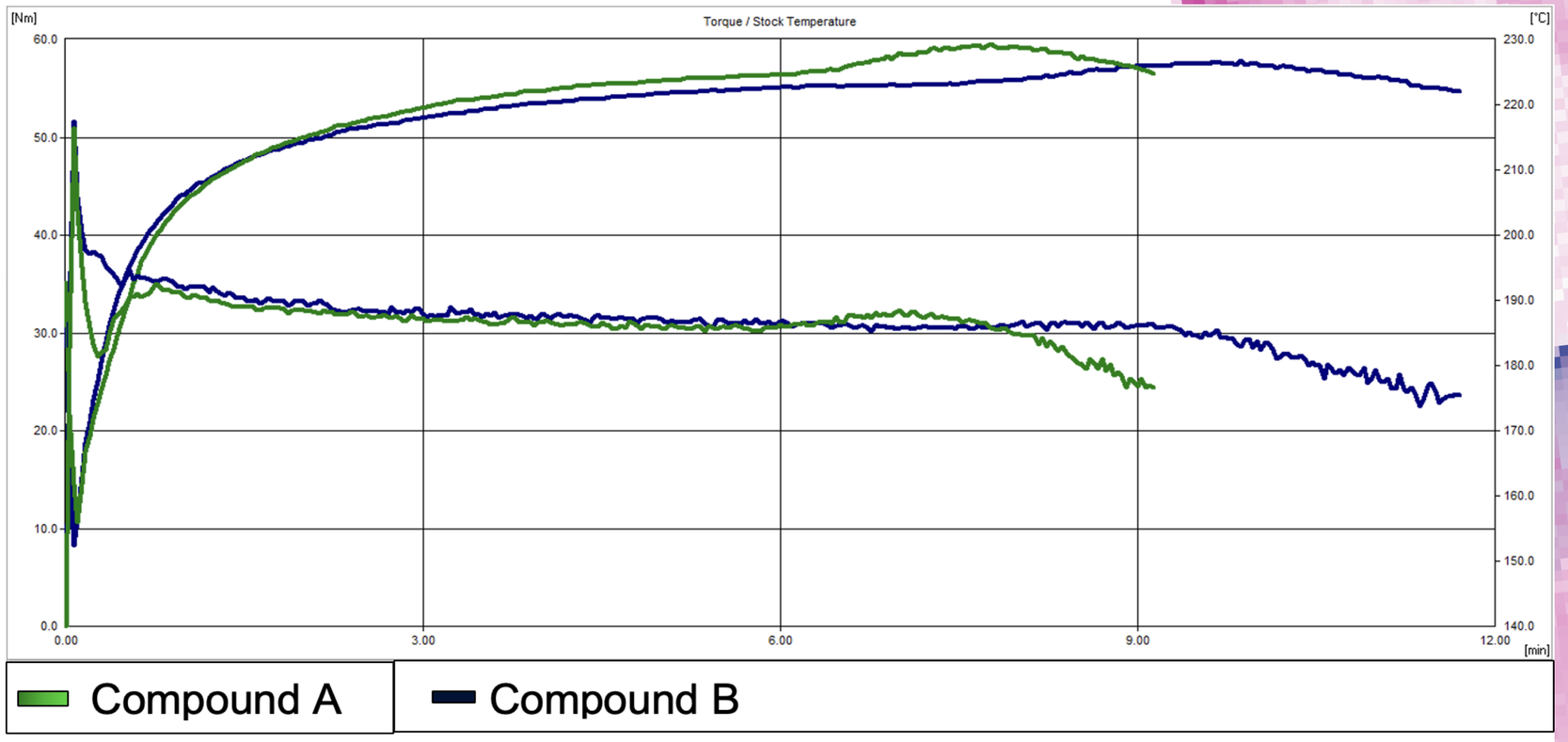
Product development challenges in CPVC Pipe and its solutions

Case studies:

1. Processibility challenge
2. Consistency issues of additives used
3. Performance variations across different CPVC resin
4. Difficulties in achieving VSP as per Indian standard
5. Ensuring the use of safe and compliant additives

Case study 1: Processibility Challenge

- **Running Duration: 4+ Days of continues production in more optimized compound**
- **Output: ~10-15 Kg/Hr increased output**



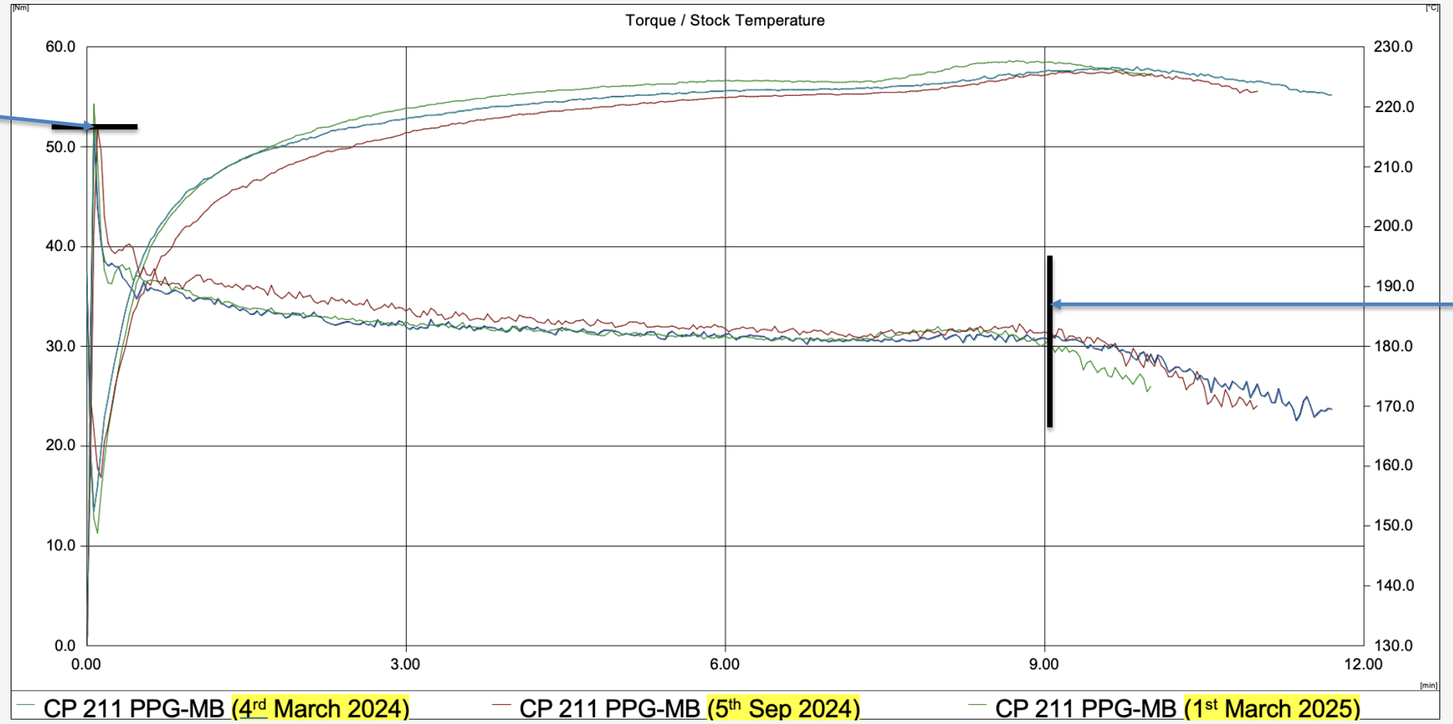
Compound A		
Fusion Time t	00:01:06	[HH:MM:SS]
Decomposition Time tD	00:06:46	[HH:MM:SS]
Stability Time	00:05:40	[HH:MM:SS]

Compound B		
Fusion Time t ↓	00:00:40	[HH:MM:SS]
Decomposition Time tD	00:09:56	[HH:MM:SS]
Stability Time ↑	00:09:16	[HH:MM:SS]

Rheology analysis aids in identifying opportunities for process optimization and formulation adjustments

Case study 2: Consistency issues of additives used

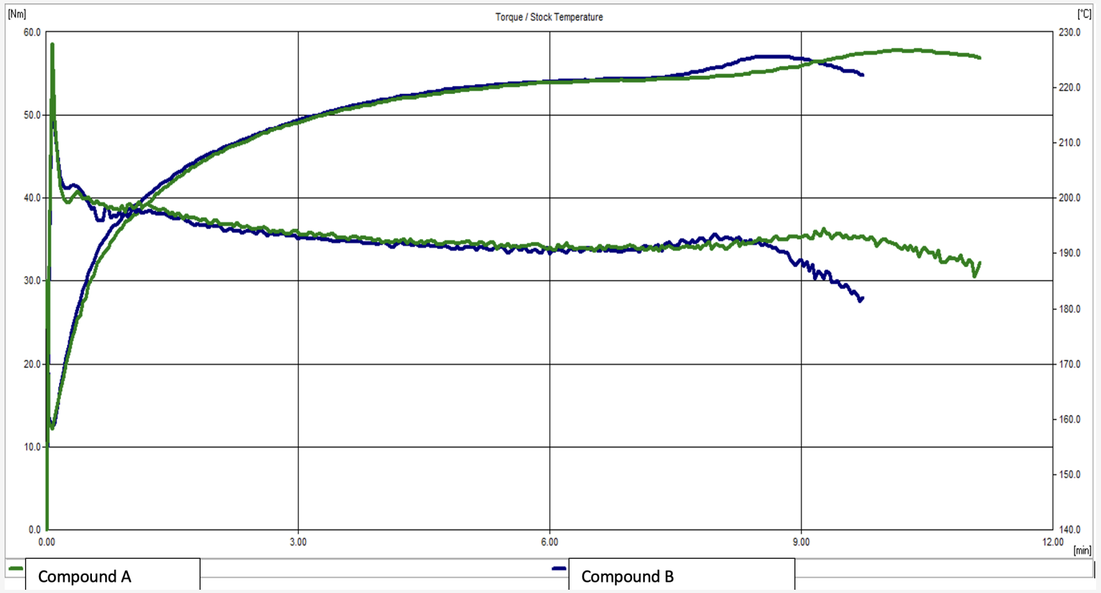
Consistent Load

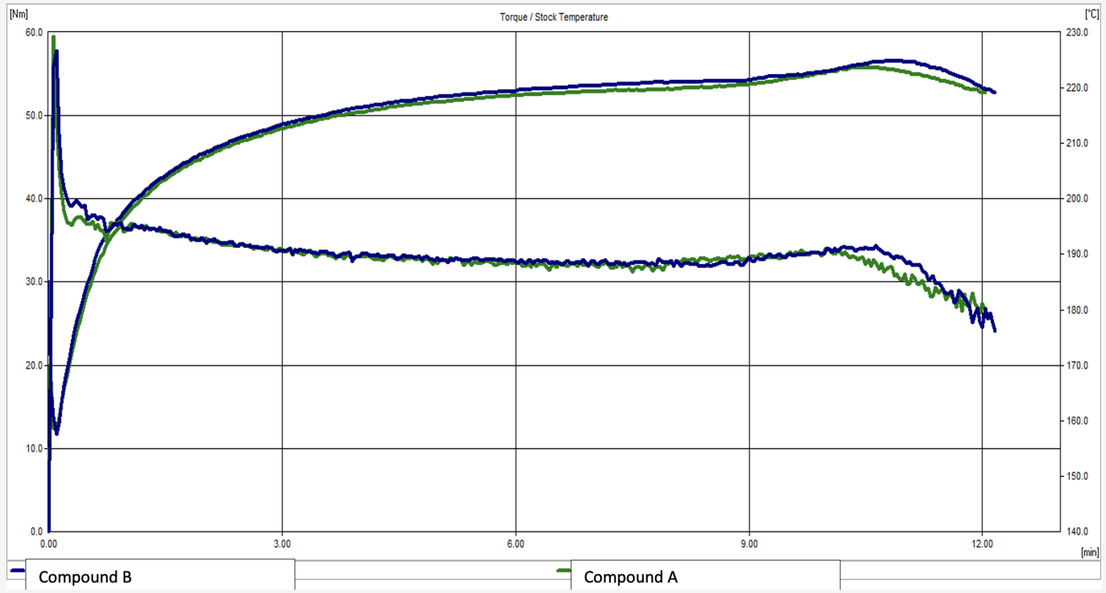


Consistent Stability

Regular QC of additives is essential to maintain compound consistency

Case study 3: Performance variations across different CPVC resin

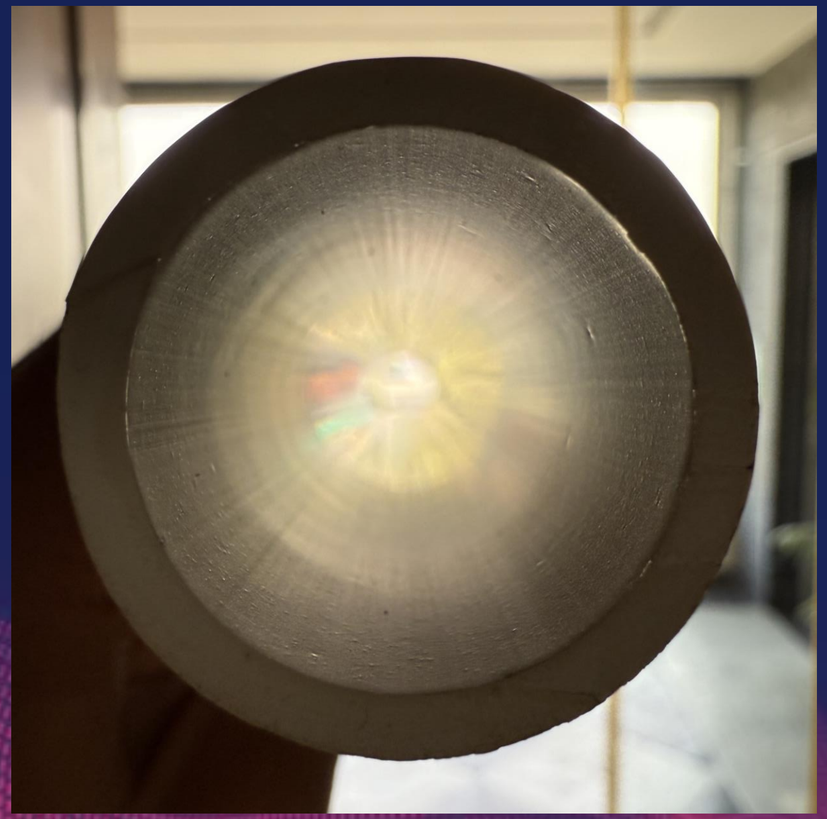




Performance across different CPVC resin may vary & can be tackled with adjustment in additives

Case study 4: Difficulties in achieving VSP as per Indian standard (IS-15225:2002)

Sr.No.	Test	Specification	**CPVC Pipe powerpack (SDR-13.5) Class 2**
1.	Density	1.45-1.65 gm/cc	**1.51 gm/cc**
2.	VST	≥ 110 °C	**111.8°C**
3.	Tensile Strength	≥ 50 Mpa	**66.94 Mpa**
4.	Flattening	No Crack & Splitting up to 40%	**PASS**
5.	Drop Test Resistance to external at 0°C	TIR-10%	**PASS**
6.	Reversion Test	≤ 5.0%	**4.92 %**
7.	Hydrostatic Pressure	Apply Pressure as per Standard for 1 hr	**Applied Pressure 60.81 Kg/Cm2 PASS**



With right balance of additives, you can achieve VSP in CPVC Pipes

Case study 5: Ensuring the use of safe and compliant additives

Along with CPVC resin, additives should also be tested at reputed organization to ensure the safety of end users.

Pioneering Innovation in Toxic-Free, Sustainable Future. Globally 1st.

NSF 533 CPVC Pipe Powerpack®

Quality challenges in SWR/Agri/UPVC fittings and its solutions

Case studies:

1. Quality variations across different machines and molds
2. Challenges in achieving VSP & SRT as per Indian Standard in SWR Fittings
3. Challenges in increasing production output

Case study 1: Quality variations across different machines and molds

All fittings are made from the same additive blend on different:

- Resins
- Machines
- Molds
- Product Size

Note: Enables centralized material feeding to multiple injection machines via a single conveyor system

A well-balanced additive blend enables the development of a compound with a broad processing window

Case study 2: Challenges in achieving VSP & SRT as per Indian Standard in SWR Fittings

Sr. No.	Parameter	Specification As per IS 14735	powerpack
1	Weight	_	196 gm
2	Density	_	1.42 gm/cc
3	VSP	≥ 78 °C	80.2 °C
4	SRT	Test Specimen shall not Blister, Excessive Delamination or Cracking or Signs of bend	PASS
5	Drop Test Resistance toexternal at	TIR-10%	PASS

VSP can be increased with new age stabilizer

Case study 3: Low output challenge

GRADE	Refilling Time (Sec)	Cycle Time (Sec)	Output (Kg/Hr)
A without specialized Lub.	33.2	88	11.5
B with specialized Lub.	26.1	80.9	12.5

7 Seconds Reduction in Refilling Time

Use highly specialized lubricants to minimize refilling time, thereby increasing output

Complexities of these solutions

A. Requires advanced laboratory
B. Technical people with practical experience and deep understanding of additives
C. Complex process: Involves a relentless cycle of testing, refining, and repeating—each step uncovering new challenges until the right solution is achieved

From Multiple Additives to Single Powerful Tailor-Made Solution

Conventional Method

PVC Resin
Calcium Carbonate
Colour

Heat Stabilizer
External Lubricant
Internal Lubricant
Titanium Dioxide
Impact Modifier
Processing Aid
Stearates

New Method

PVC Resin
Calcium Carbonate
Colour

Powerpack®

Effective

- Ease of production
  - Lower inventory & purchase req
  - Compounding built in
  - Easy Mixing
  - Wide processing window
- Traceability & accountability
- Systematic production

Efficient

- Lower manpower requirement at every level: purchase, labour, technical.
- Reduced R&D Cost
- Lower automation requirement
- Energy saving with lower temp processing window
- Optimized compound cost in comparison with self-compounding

Scale

Other notable developments

Conduit Pipes: Increased bending property & Plasticizer free

Hollow Doors: Improves processing & durability of the product

Cable Tray: RoHS Compliant & excellent strip strength & flexibility

Edge bends: Excellent strength & flexibility

CPVC Fitting Granules

Available in both Lead & Lead Free

Infrastructure & Outlook

Lab instruments:

1. **Torque rheometer (Brabender)**
2. **Dynamic testing oven**
3. **Two roll mill**
4. **Auto. VICAT testing machine**
5. **Drop Impact**
6. **Pressure Testing**
7. **Hot Oven**
8. **IZOD**
9. **Universal testing machine & more**

Capacity: 12,000 Ton/Annum


Production Facility

Headquarters

Vicat Softening Point Tester

Torque Rheology


Drop Impact tester

Dynamic testing oven

End Note

“Our mission is not to replace existing systems but introduce innovative solutions that improves product quality, enhances efficiency, and effectiveness of the operation thus unlocking new opportunities for scale and success. Share your needs with us, and we’ll craft the perfect solution for you.”

Thank you

Benchmark Polytechnik

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