

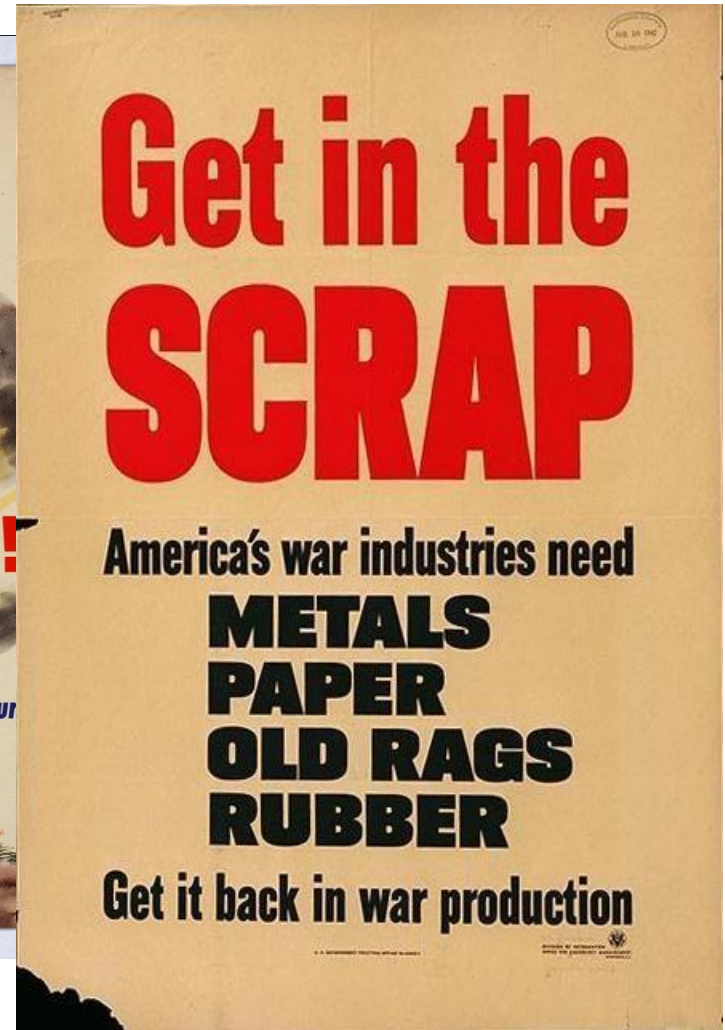
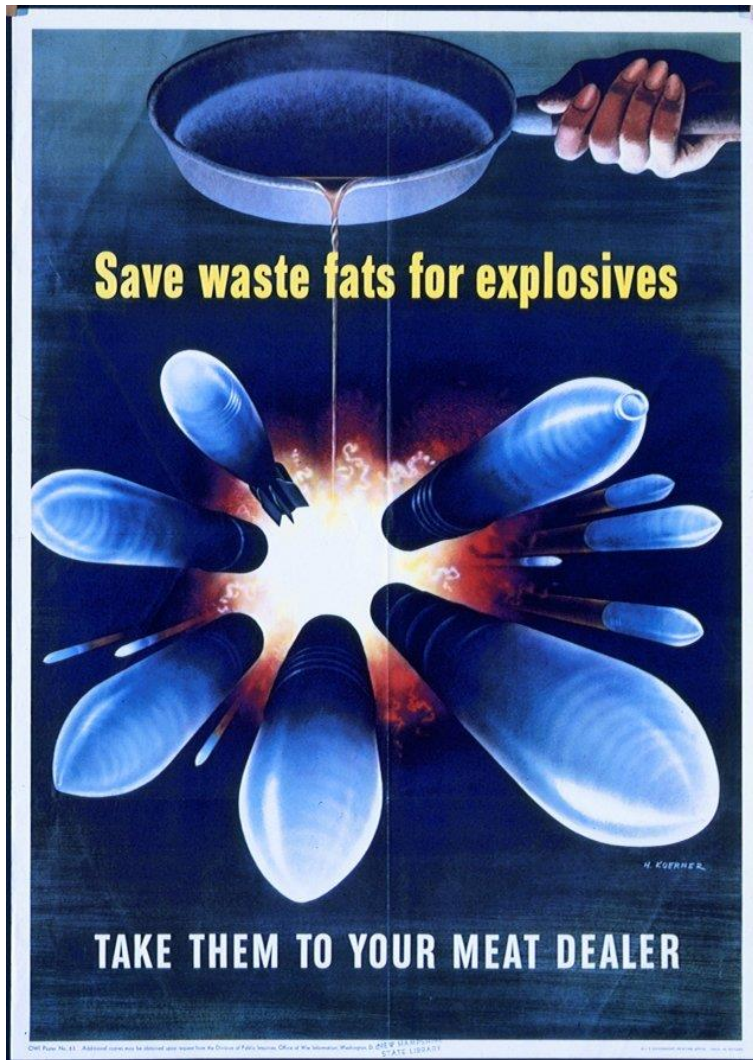
Challenges & Opportunities with recycled plastics

Fredrik Holst – Product Manager

rondo 

BRINGS OUT THE BEST IN PLASTIC RECYCLING

Recycling has a long tradition...





We belong to the Polykemi Group



Rondo Plast AB



The raw material - Definitions

- ✓ **Secondary raw material**
 - ✓ Out-of-spec / Off-grade, Left over lots, etc.

- ✓ **Recyclate / Recycled materials**
 - ✓ Industrial waste (Ground inlets, scrap, etc.)
 - ✓ Consumer waste (Schampoo bottles, etc.)



Drivers for using recycled plastics

✓ Concern for the environment



✓ Green marketing



✓ Reducing cost and legislation



Green marketing

- PET-bottles; Coca Cola
- ✓ PET GF30 for chairs



- ✓ PET for new bottles, etc.

Green marketing

VW, BMW, Audi

- Pragmatic users of recycled plastics but use it poorly in their marketing

"[...], it should be assumed that no secondary materials are used in the visible area of the vehicle."



Capisco office chair - Nordic eco label



Herved bekreftes at
**Håg Scandinavian Business
Seating AS**

har lisens nr 231 057 til å benytte Svanemerket på

**HÅG Capisco 8106
HÅG Capisco 8107
HÅG Foot Ring**

i overensstemmelse med miljømergingskrav
for Møbler og innredninger versjon 4.2
gjeldende til 30.06.2015

Sertifikatet har kun gyldighet sammen med utstedt lisens.

Stiftelsen Miljømerking i Norge

A handwritten signature in blue ink, reading "Alvild Hedstein".

Alvild Hedstein, direktør



Green marketing

"HÅG has decided to be a guiding star, to show the way into a new era. To be a guiding star is a challenging task, among other things concrete measures have to be taken and we need to act as a raw model to others. Already 1995 HÅG started to use recycled plastics from bottle caps, bumper covers and other plastic waste [...]."



Demands....our Challenge

- Recycled materials – requirements as though virgin?
 - ✓ Technical
 - ✓ Aesthetical
 - ✓ Homogeneity
 - ✓ Purity
 - ✓ Reproducability
 - ✓ etc...
 - ✓ Much lower price than virgin

Does this make sense???

"You get what you pay for"

– is also the Truth here

The higher the demands are on recycled materials, the higher the price tag gets.

It is important to focus on your demands:

"Nice to have" or "Need to have".

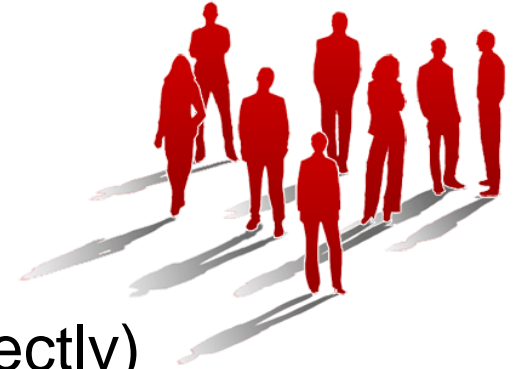


The raw material – Purchasing

*To know your supplier is as important as knowing your customer –
Even more so in the recycling business*

The players

- Recyclers & "recyclers"
- Traders & dealers
- Compounders & "compounders"
- The BIG players (directly and indirectly)



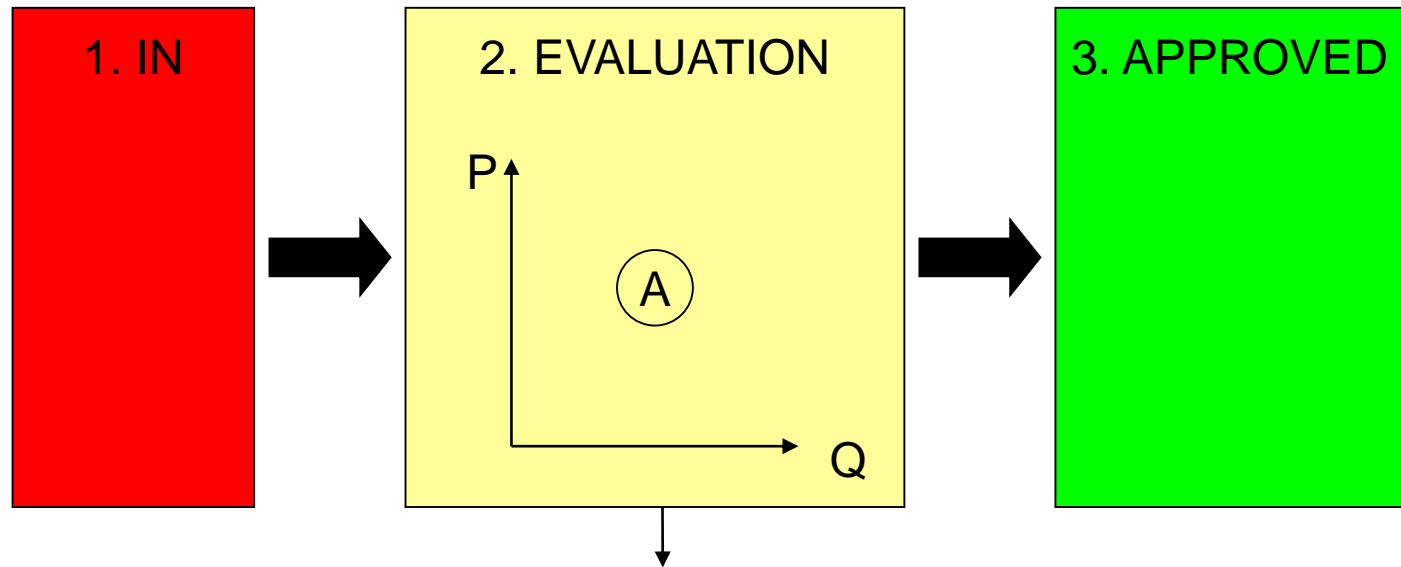
The game

- Competitive market but opportunity for large profits
- Many middlemen
- Mostly a low tech business
- Use sometimes kept "secret"
- Cost saving is the driving force



The raw material

Sourcing filter: Technically skilled purchasing dep.



Q = QUALITY
P = PRICE (Cost)
A = AMOUNT (Quantity)

Not approved!

Bigger volume = lower price?

- For recycled polymers the opposite is often true

Quality control

XRF test equipment – testing of RoHS (restriction of Hazardous Substances)

Lead (Pb)

Mercury (Hg)

Cadmium (Cd)

Hexavalent chromium (Cr⁶⁺)

Polybrominated biphenyls (PBB)

Polybrominated diphenyl ether (PBDE)

Portable instrument, easy to use,
results in 30 sec



RoHS Certificate

It is possible to get
ROHS Certificate on a
single production if
needed.



Thermo
SCIENTIFIC

Thermo Fisher Scientific
900 Middlesex Turnpike
Billerica, MA 01821

Certificate of Verification

XL3t-81776

Reading No 680
Mode Plastics Non PVC
Time 2014-05-26 12:10
Duration 10.56
Units ppm
Sigma Value 2
Sequence Final
Result Pass
Flags Th.Cor. 2.50mm
SAMPLE
LOCATION
INSPECTOR
MISC
NOTE



	ppm	±	Error
Cr	< LOD	:	79.692
Ba	< LOD	:	475.268
Ti	2036.447	±	319.381
Cl	< LOD	:	150000.000
Sb	< LOD	:	76.746
Sn	< LOD	:	63.915
Cd	< LOD	:	42.005
Bal	997809.375	±	42.001
Bi	< LOD	:	9.455
Pb	< LOD	:	5.851
Br	< LOD	:	4.528
Se	< LOD	:	6.945
As	< LOD	:	2.769
Hg	< LOD	:	10.609
Au	< LOD	:	15.495
Zn	< LOD	:	14.026
Cu	< LOD	:	18.912
Ni	< LOD	:	21.529
Fe	< LOD	:	30.917
V	< LOD	:	280.924

Supervised By: _____

Qualified testing equipment



Gas Chromatography



DSC



FT-IR



Weatherometer

Extensive testing capabilities ensure quality and performance of the REPRO & REZYCOM-products

Upgrading

Mechanical upgrading

- Sorting
- Washing
- Metal separation
- Homogenisation



Upgrading in the melt

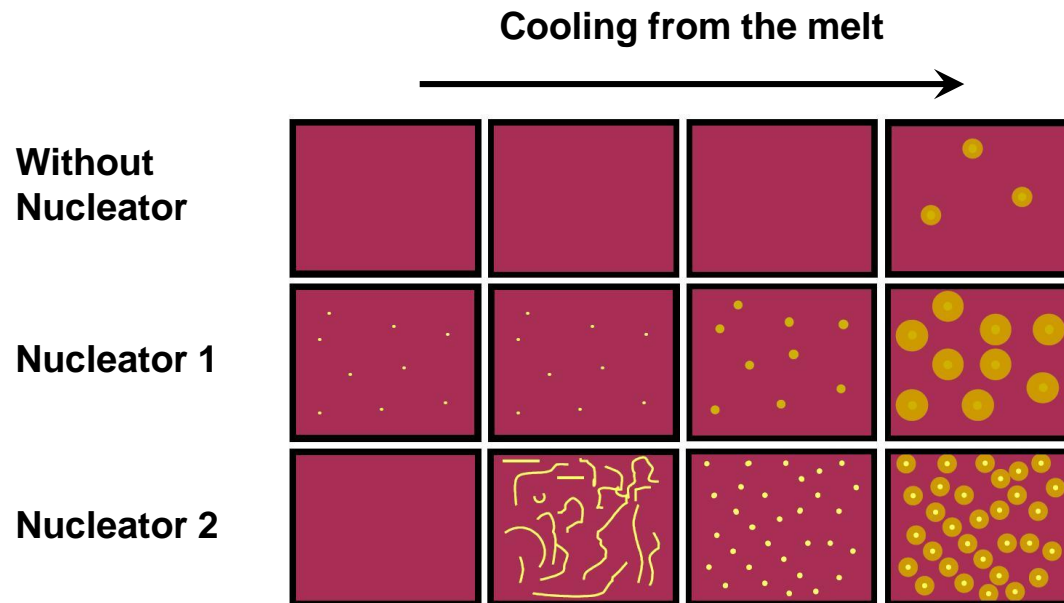
- Homogenisation & Filtration
- Molecular weight modification
- Blending and reinforcing
- Modification through additives



Uppgrading via additives

Nucleators

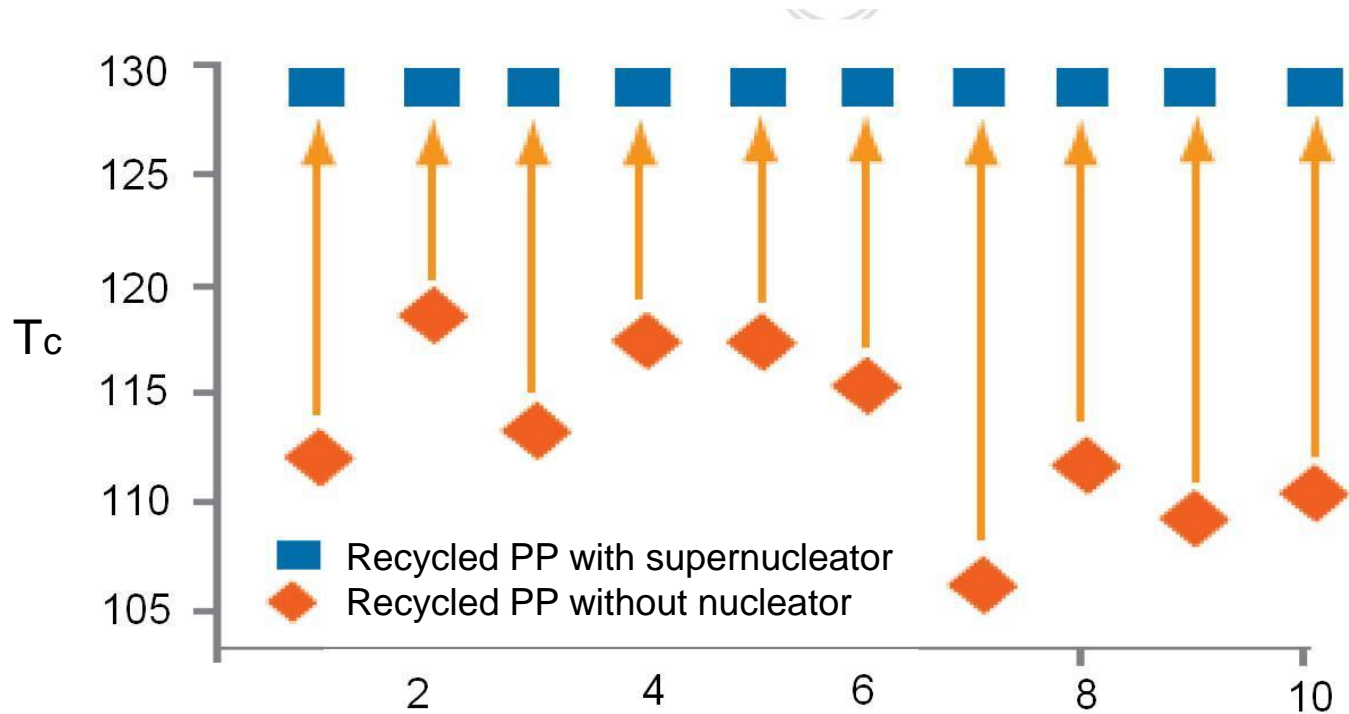
- Stabilises and improves the process properties of part crystalline polymers like PA and PP
- Can improve mechanical properties
- Reduces cycletime (cooling part)
- Minimizes sink marks and reduces warpage



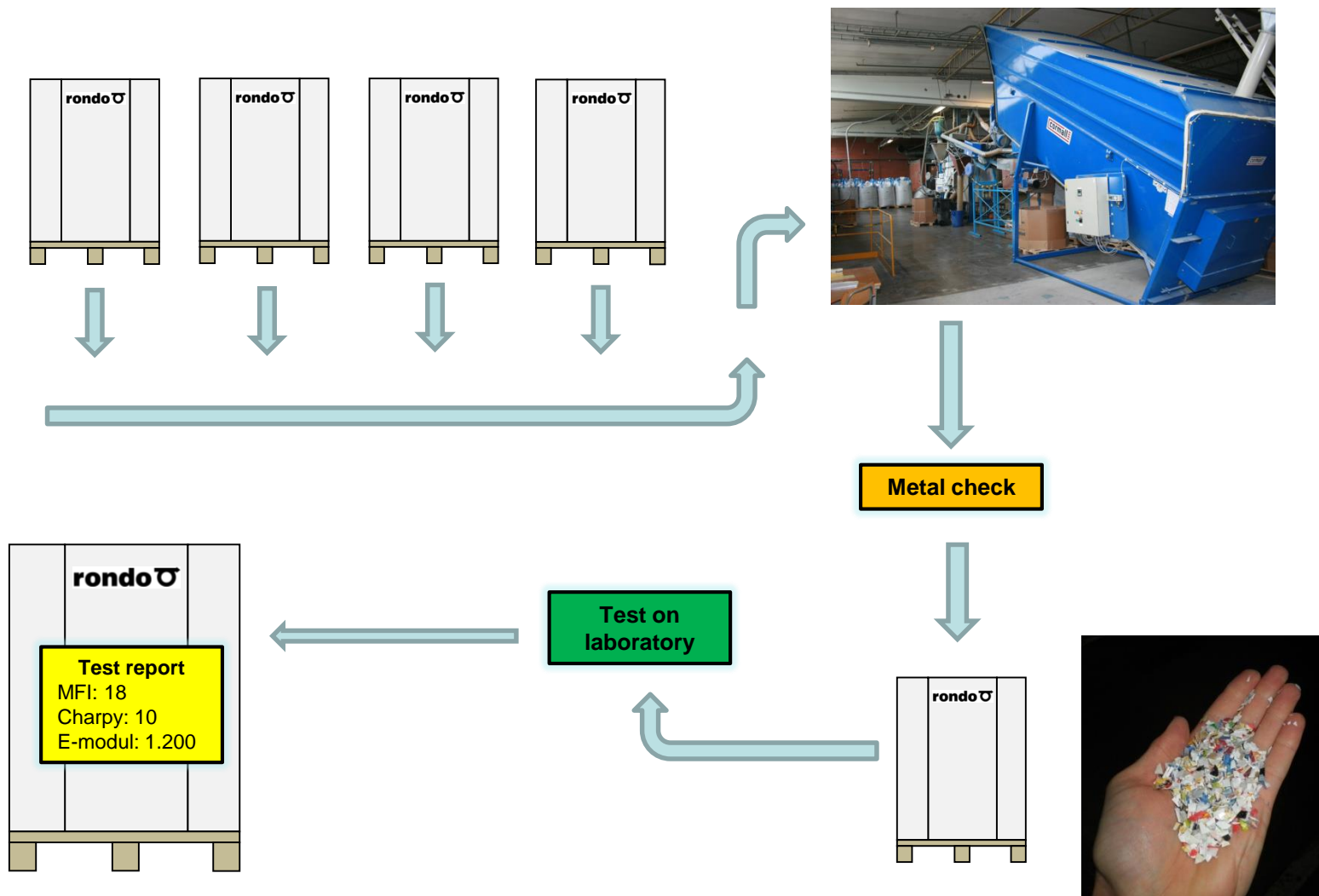
Uppgrading via additives

Nucleators

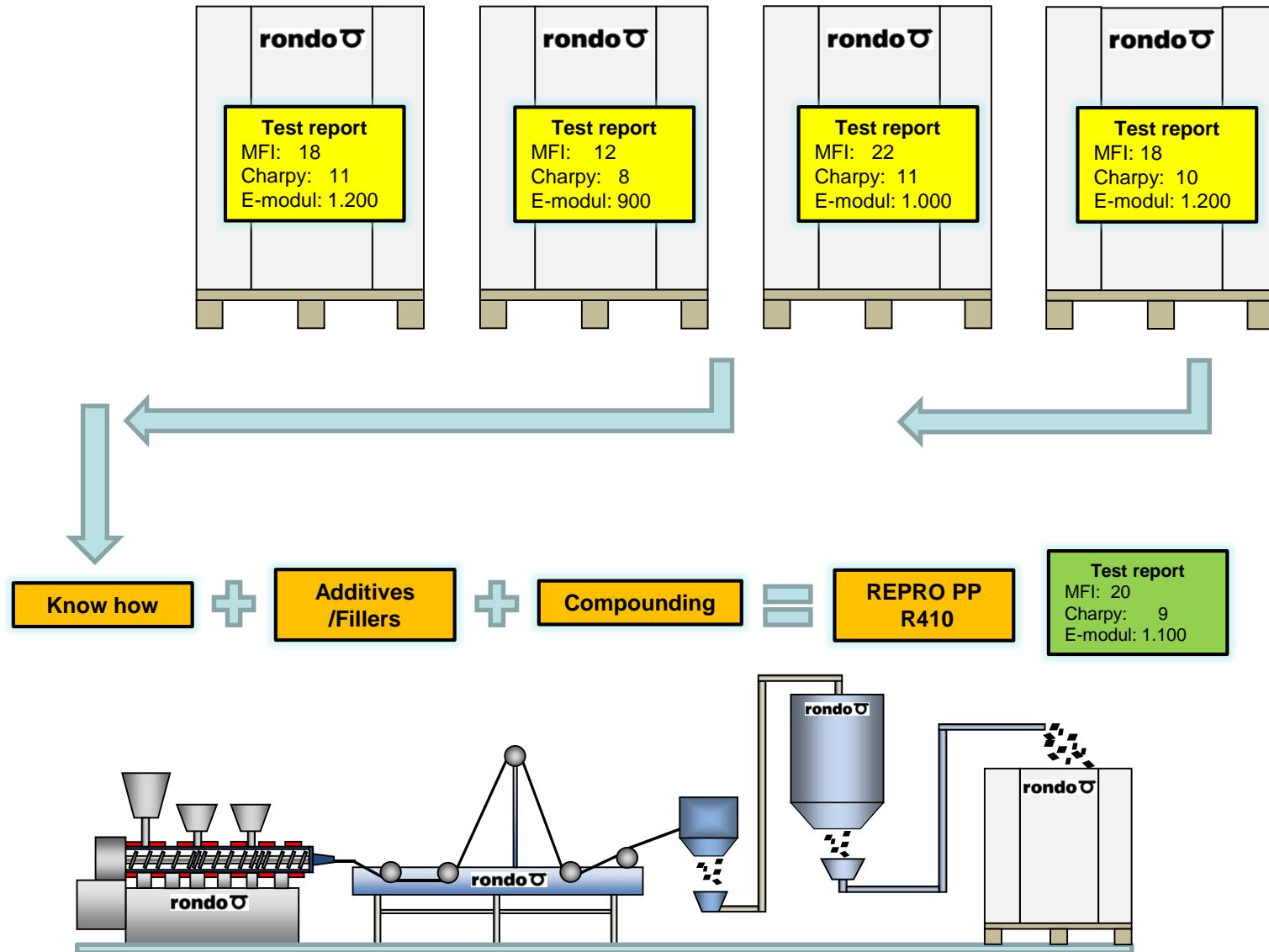
- Enables even process properties, even though a varying raw material is employed



Upgrading





Compounding



Certificates

If necessary – there is opportunity to get certificate on every single production






PRÜFZEUGNIS – TESTRESULTS – PROVCERTIFIKAT

www.rondoplast.se


Kunde/Customer/Kund:	
Qual. Nr./Qual.no/Kval.nr:	Repro PPC R200500 Svart
Prod.nr/Prod.no/Prod.nr:	162482
Customer Artikel.no:	
Customer Orderno:	

Batch nr	Charpy SK - 20 °C	Max Böj	Töj flyt	Fukthalt	Densitet	Charpy SK + 23 °C	MF1 2,16/230	E-modul
	ISO179				ISO1183	ISO179	ISO1133	ISO178/527
Unit	kJ/mm ²	N/mm ²	10mm/min	%	g/cm ³	kJ/mm ²	g/10min	N/mm ²
Tolerance	-	-	-	< 0,17	0,91-0,94	6 - 10	16 - 24	900-1 250
1	3,0	47	8,2	0,08	0,93	7,2	21,2	1257
3	3,1	47	8,5	0,10	0,93	8,0	21,6	1135
4	3,0	44	8,7	0,10	0,93	7,3	20,2	1143
5	3,0	46	8,4	0,10	0,93	7,3	20,7	1159
6	3,1	46	7,8	0,06	0,93	7,5	19,2	1218
7	3,1	45	8,0	0,06	0,93	7,0	20,1	1184
8	4,0	45	7,8	0,07	0,92	7,9	23,5	1144
9	3,0	45	8,0	0,06	0,93	7,5	20,0	1115
10	3,2	45	8,4	0,05	0,93	7,1	19,6	1159
11	3,6	45	8,2	0,09	0,93	7,5	20,3	1139
12	3,4	46	8,7	0,10	0,93	7,3	19,5	1150

Kommentaren/Comments/Kommentarer:



BRINGS OUT THE BEST IN PLASTIC RECYCLING



Marie Hugosson
Namnförtydligande

2014-03-26
Datum/Date/Datum

Sign

Legislative requirements - REACH



In order to legally sell a preparation where one or several substances (including monomers in polymers) accumulate into an amount >1 ton:

- A Substance has to be pre-registered by someone before 081201
- or the recycler has to be a downstream user to a pre-registrant/registrant...
- But... Waste has no pre-registrant!
- **Hence, the recycler needs to preregister all relevant substances!**



Products from Rondo are legal!

REPRO

REPRO standard materials

Product	Description	Mfi	Charpy (notched)	Filler (%)	Flexural modulus (MPa)
PP RC3X	PP injection moulding	12	8	5	1100
PP R320	PP improved surface, injection moulding	14	11	3	1100
PP R410	PP improved surface, injection moulding	20	9	2	1100
PP R610	PP improved surface, injection moulding	30	9	2	1100
PP R820	PP improved surface, injection moulding	35	9	2	1100
PP RM242E	PP 10% mineral reinforced, high impact, injection moulding	10	20	10	900
PP RT314	PP 20% talcum reinforced, injection moulding	15	5	20	1700
TPE R251	PP mineral, impact modified, injection moulding	10	25	7	900
PP RG4	PP 20% glassfibre reinforced, injection moulding	7	7	20	2900
PP RG6	PP 30% glassfibre reinforced, injection moulding	6	5	30	5000
ABS RE5	ABS injection moulding	12	10	0	2100
ABS RE6	ABS high impact, injection moulding	8	14	0	2100
PC/ABS RTX64	PC/ABS, Standardkvalitet, Formsprutning	25	35	0	2200
PC/ABS RTX65	PC/ABS high impact, injection moulding	20	45	0	2300

The REPRO standard materials are regranulated qualities in black colour.

Click on button below to obtain an overview about the **REPRO** range.

- Datasheets
- MSDS
- Processing parameters

REPRO Short facts

↓ Data sheet PP RC3X

↓ MSDS PP RC3X

↓ Process REPRO PP

↓ Data sheet PP R320

↓ MSDS PP R320

↓ Process REPRO PP

↓ Data sheet PP R410

↓ MSDS PP R410

↓ Process REPRO PP

↓ Data sheet PP R610

↓ MSDS PP R610

↓ Process REPRO PP

↓ Data sheet PP R820

↓ MSDS PP R820

↓ Process REPRO PP

↓ Data sheet PP RM242E

↓ MSDS PP RM242E

↓ Process REPRO PP RM

↓ Data sheet PP RT314

↓ MSDS PP RT314

↓ Process REPRO PP RT

↓ Data sheet TPE R251

↓ MSDS TPE R251

↓ Process REPRO PP

A MEMBER OF THE POLYKEMI GROUP

rondo
BRINGS OUT THE BEST IN PLASTIC RECYCLING

REPRO PP R410

Injection moulding

PROPERTY	VALUE	UNIT	STANDARD
Density	0,93	g/cm ³	ISO 1183
MFI 230°C/2,16 kg	20	g/10 min	ISO 1133
Flexural modulus at +23°C	1100	N/mm ²	ISO 178
Flexural Strength	40	N/mm ²	ISO 178
Tensile Strength	-	N/mm ²	ISO/R 527
Elongation at break	-	%	ISO/R 527
Elongation at yield	8	%	ISO/R 527
Impact Strength			
notched Charpy at +23°C	9	kJ/m ²	ISO 179
notched Charpy at -20°C	4	kJ/m ²	ISO 179
unnotched Charpy at +23°C	-	kJ/m ²	ISO 179
unnotched Charpy at -20°C	-	kJ/m ²	ISO 179
Filling content	2	±2%	Rondo
Heat distortion temp.			
HDT 120°C/h at 455 kPa	B	°C	ISO 75-1
HDT 120°C/h at 1820 kPa	A	°C	ISO 75-1
Softening temp.			
Vicat 50°C/h at 9,81 N	A	°C	ISO 306
Vicat 50°C/h at 49,05 N	B	°C	ISO 306
Burn rate	-	mm/min	FMVSS 302
GWT at 2 mm	650	°C	IEC 695-2-1
UL94 at 1,6 mm	HB	°C	UL 94
Shore A	-	°	ISO 868
Shore D	-	°	ISO 868
Shrinkage (with flow)	1,2-1,6	%	ISO 2577
Shrinkage (across flow)	1,2-1,6	%	ISO 2577

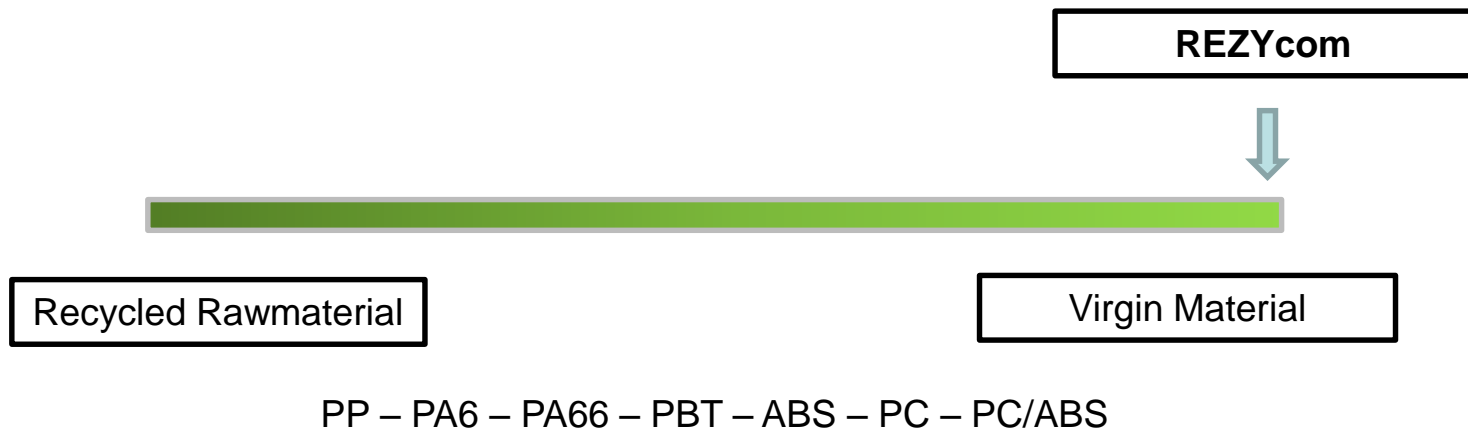
Stated values in this datasheet are approximate. All information, recommendations and advice given by Rondo Plast AB or any of its subsidiaries and affiliates, written or verbal, are according to Rondo Plast AB's knowledge to the date of this edition, correct and given in good faith. It is the responsibility of the customer to test and evaluate if the material suits the application and the environment in which it is intended to be used. Rondo Plast AB, its subsidiaries and affiliates can not be held responsible or liable for any loss incurred through incorrect or faulty use of the products. Rondo Plast AB takes no responsibility for any printing errors.

Version: 1/130115

RondoPlast AB, Blygatan 6, Box 97, 271 21 Ystad, Sweden
Tel: +46 411-723 90, Fax: +46 411-723 71 Email: rondo@rondoplast.se
www.rondoplast.se

REZYcom

- Is a customer adapted compound. It takes advantage from the best of two worlds, Rondo Plast and Polykemi.
- It is a quality that is partly or wholly based on recycled raw material.
- It is for customers that also are looking for a "Green Profil" – but do not want to compromise on Quality.
- Based on the demand from the customer – we develop and put together a compound that get as close as possible to the set target.



rondo

BRINGS OUT THE BEST IN PLASTIC RECYCLING



IF ONLY WE HAD A MAGIC BIN THAT WE COULD THROW STUFF IN AND MAKE IT DISAPPEAR FOREVER. WHAT WE CAN DO IS FIND CREATIVE WAYS TO RECYCLE. WE USE OUR WASTE CO₂ TO GROW FLOWERS. AND OUR WASTE SULPHUR TO MAKE SUPER-STRONG CONCRETE.
REAL ENERGY SOLUTIONS FOR THE REAL WORLD. WWW.SHELL.COM/REALENERGY



rondo

BRINGS OUT THE BEST IN PLASTIC RECYCLING

Thank you for listening!

www.rondoplast.com