

LISBOA 2010 16th World Meeting

MAY 25/28



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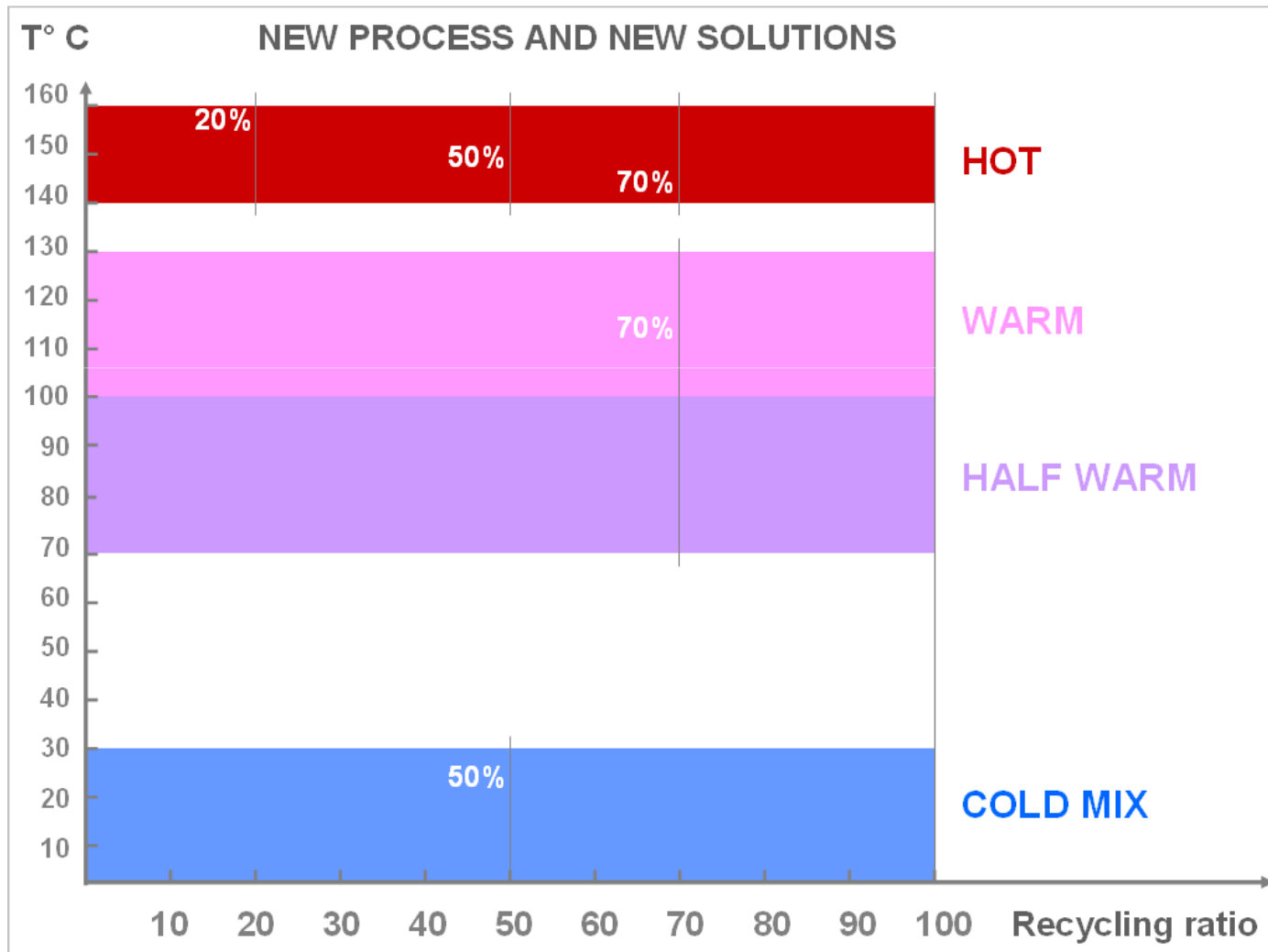


Recycling and Mixing

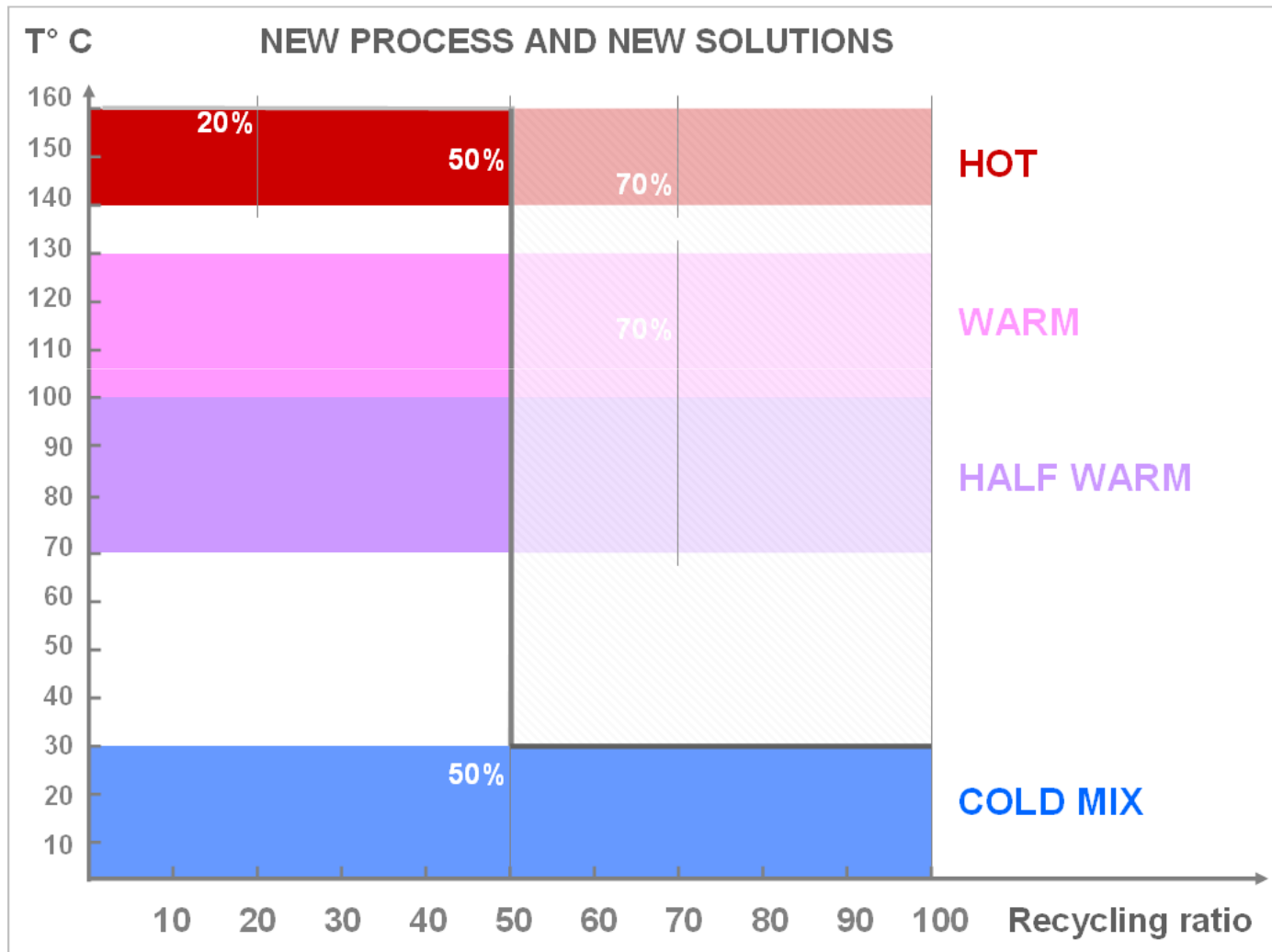
New process needs new equipment

Jacques BONVALLET, FAYAT Group, Sales & Marketing Director

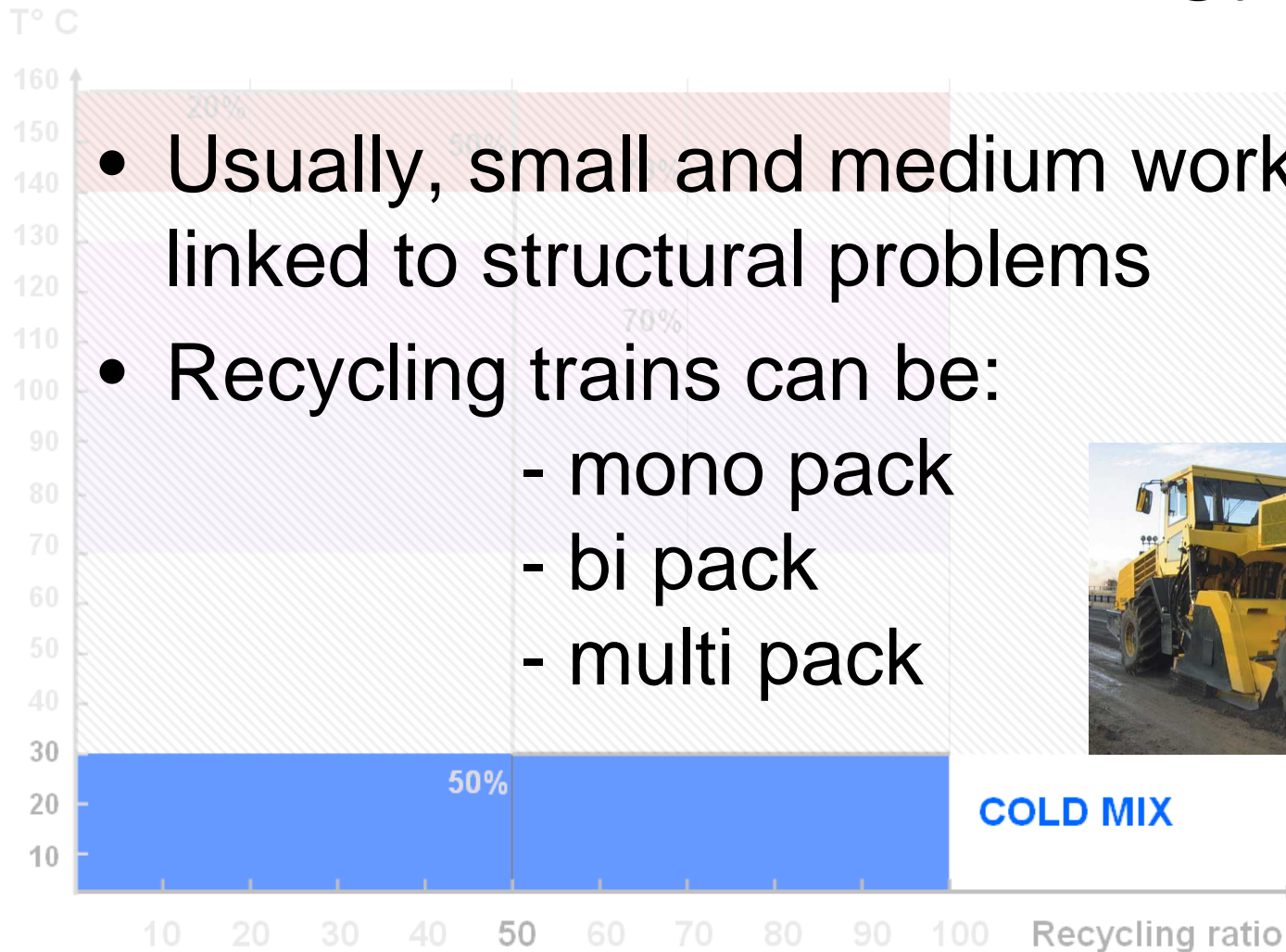
New process and new solutions



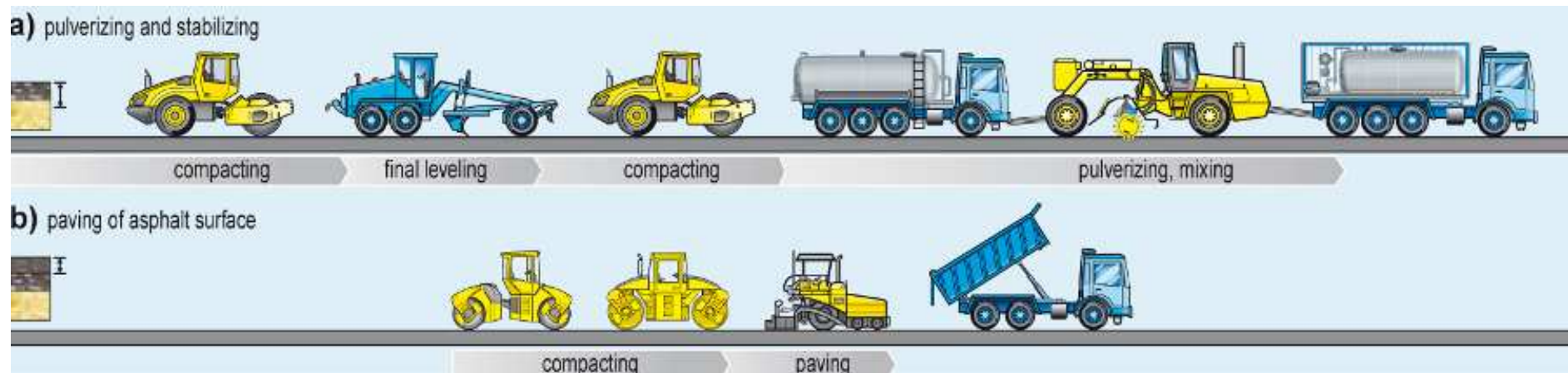
New process and new solutions



In place, cold technology



Recycling train using bitumen emulsion



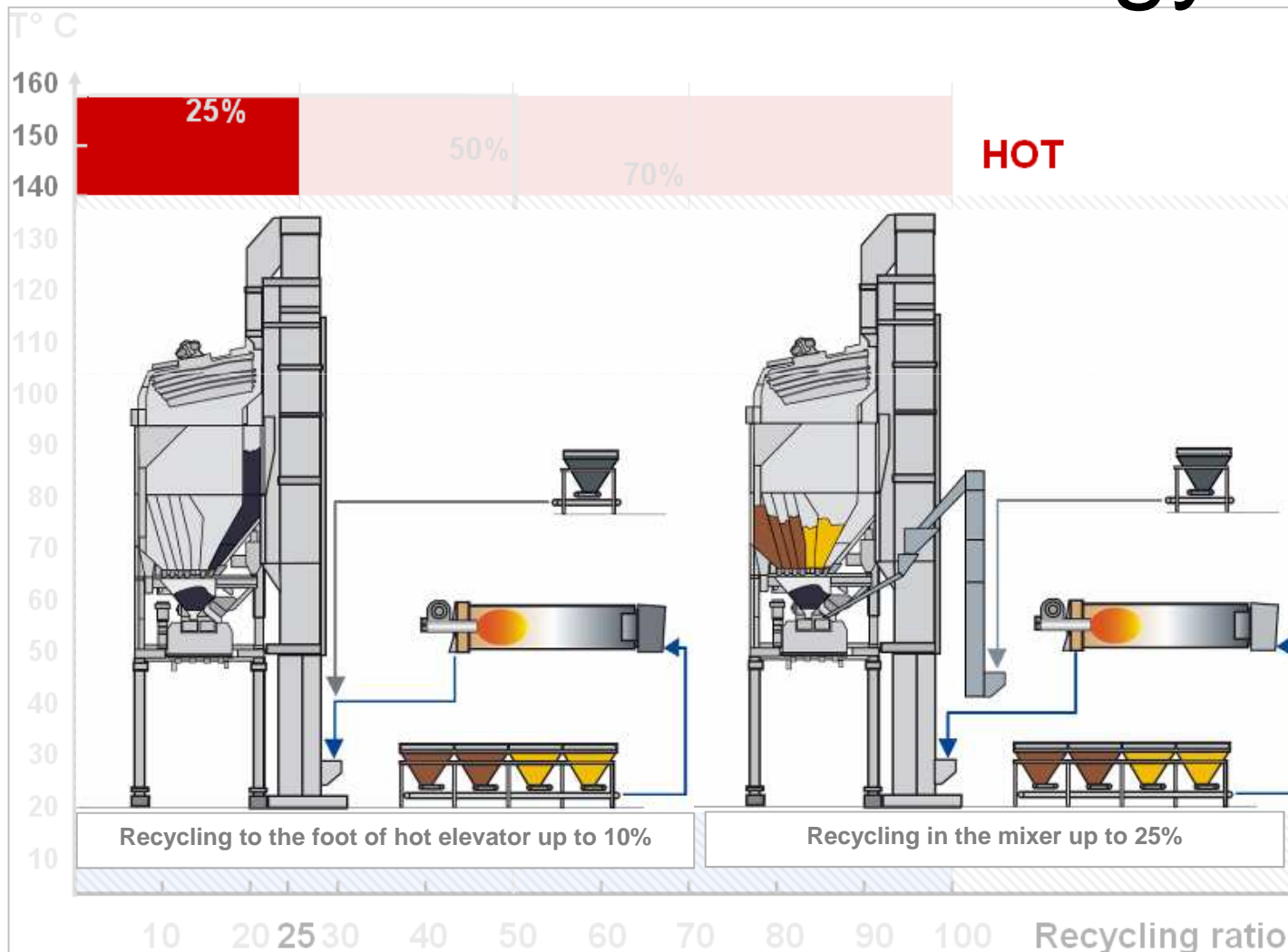
In place recycling with emulsion or foam bitumen with a compact machine

- Milling without screening and no size control (constant speed of milling)

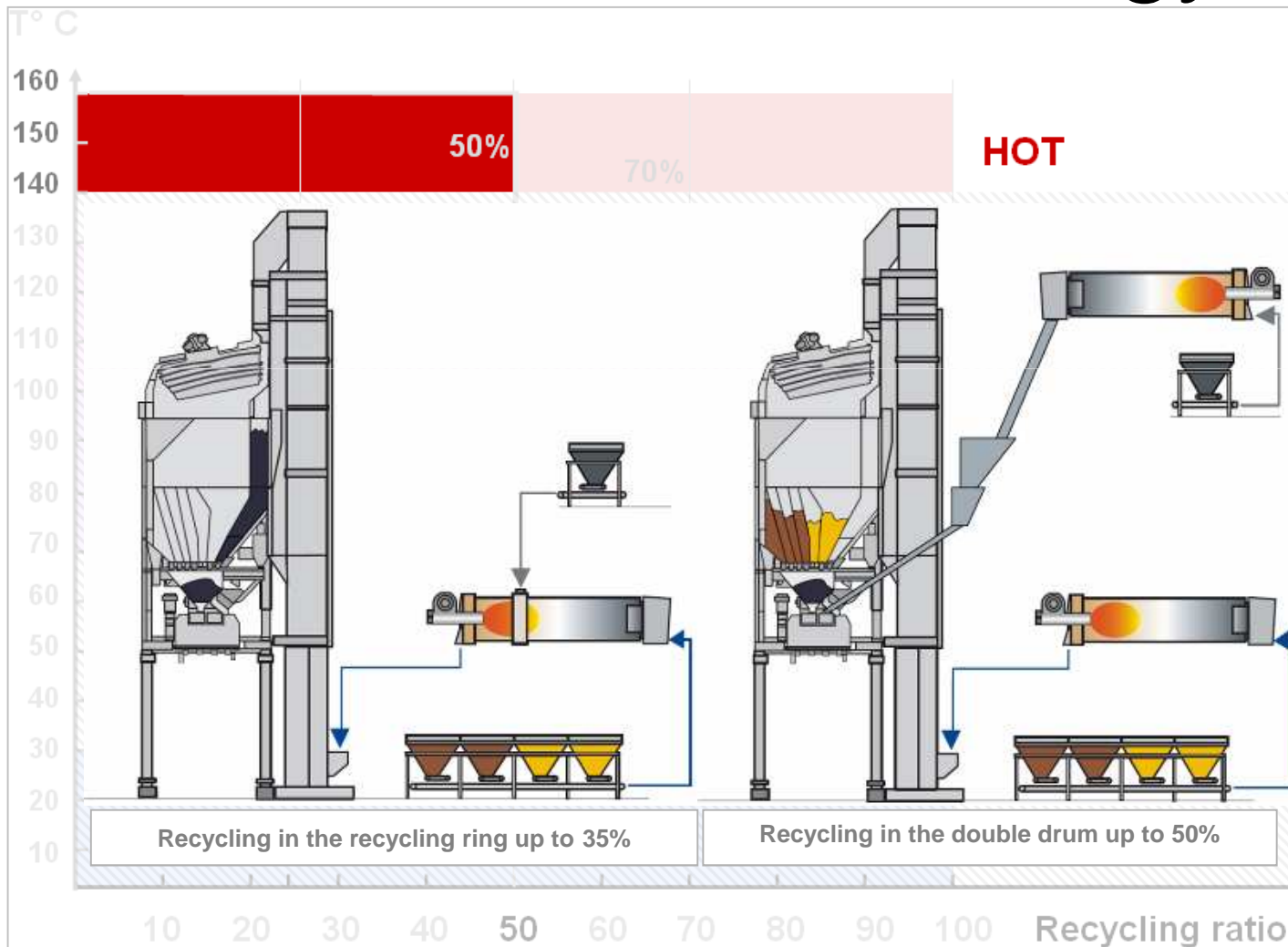
Recycling train typology

| Fonctionnalité | | Machines compactes (1 unité) | | | Machines complexes (2 unités) | | Machines Multi-unités | |
|-----------------------------|---------------------------------|------------------------------|----------|----------|-------------------------------|----------|-----------------------|----------|
| | | Niveau 1 | Niveau 2 | Niveau 3 | Niveau 1 | Niveau 2 | Niveau 1 | Niveau 2 |
| Système auto-moteur | | • | • | • | | | • | • |
| Fraisage et reprofilage | Tambour embarqué | • | • | • | • | • | • | |
| Fraisage et reprofilage | Largeur de fraisage variable | | • | • | • | • | • | • |
| Fraisage et reprofilage | Régulation auto. prof. fraisage | | • | • | • | • | • | • |
| Collecte des matériaux | | • | • | • | • | • | • | • |
| Criblage | Embarqué | | | • | • | • | • | • |
| Broyage | Embarqué | | | • | • | • | • | • |
| Dosage | RAP | • | • | • | • | • | • | • |
| Dosage pondéral | RAP | | | • | • | • | • | • |
| Dosage par débitmètre | Eau | | | | • | • | • | • |
| Dosage par débitmètre | Emulsion/Mousse | | | | • | • | • | • |
| Dosage par débitmètre | Additifs | | | | | • | • | • |
| Dosage pondéral | Ciment | | | | | | | • |
| Dosage par débitmètre | Emulsion d'accrochage | | | | | | | • |
| Malaxage | Embarqué | • | • | • | • | • | • | • |
| Malaxage | Par mélangeur double-arbre | | | • | • | • | • | • |
| Application | Table d'application intégrée | | • | • | • | • | • | (•) |
| Réservoir embarqué | Emulsion/Bitume | | | • | | • | • | • |
| Réservoir embarqué | Eau | | | | • | • | • | • |
| Réservoir embarqué | Additifs | | | | | • | • | • |
| Réservoir embarqué | Emulsion pour accrochage | | | | | | | • |
| Réservoir embarqué | Ciment | | | | | | | • |
| Brossage du fond de fouille | | | | | | | | • |
| Couche d'accrochage | | | | | | | | • |

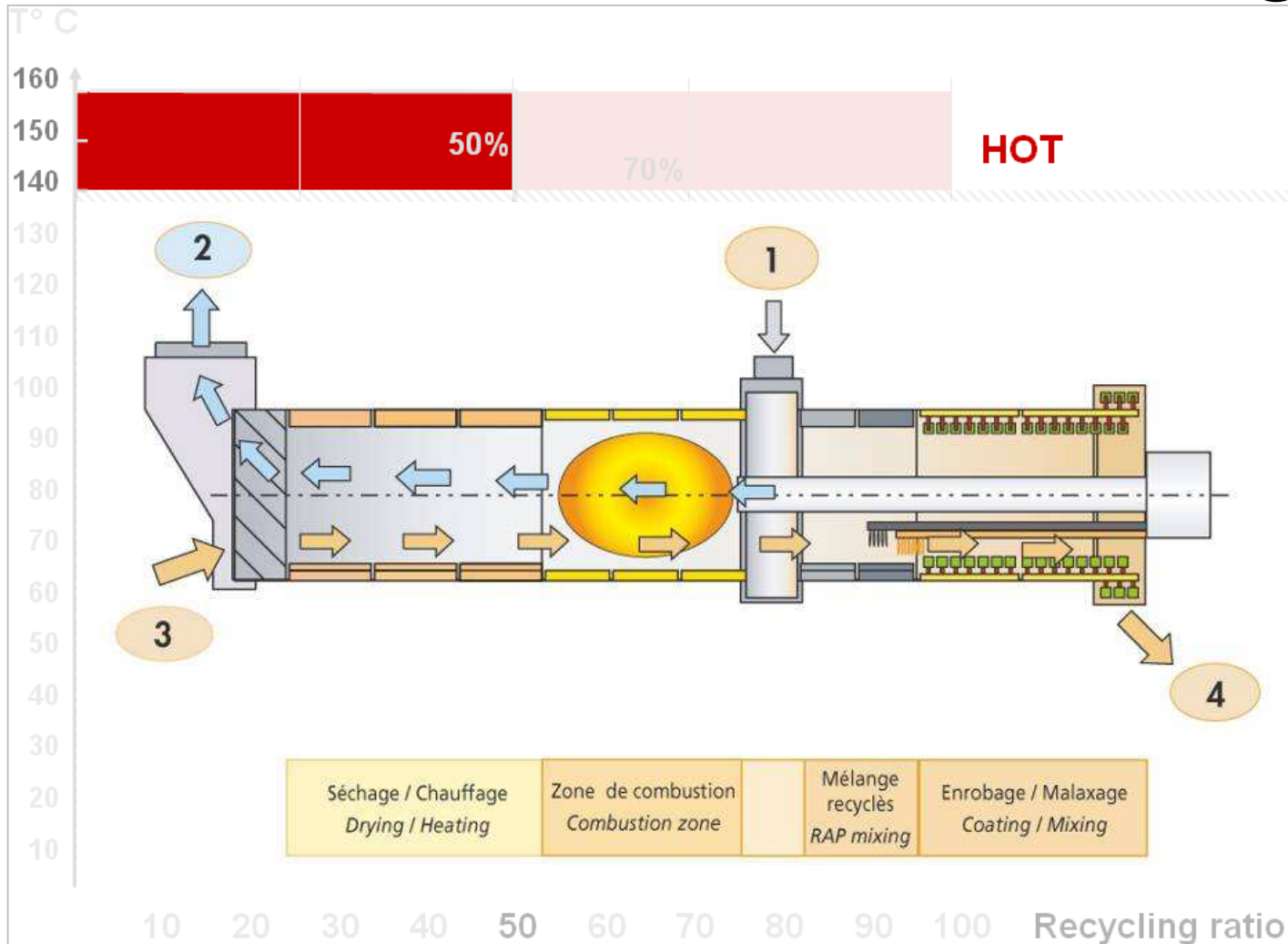
Batch mix technology



Batch mix technology



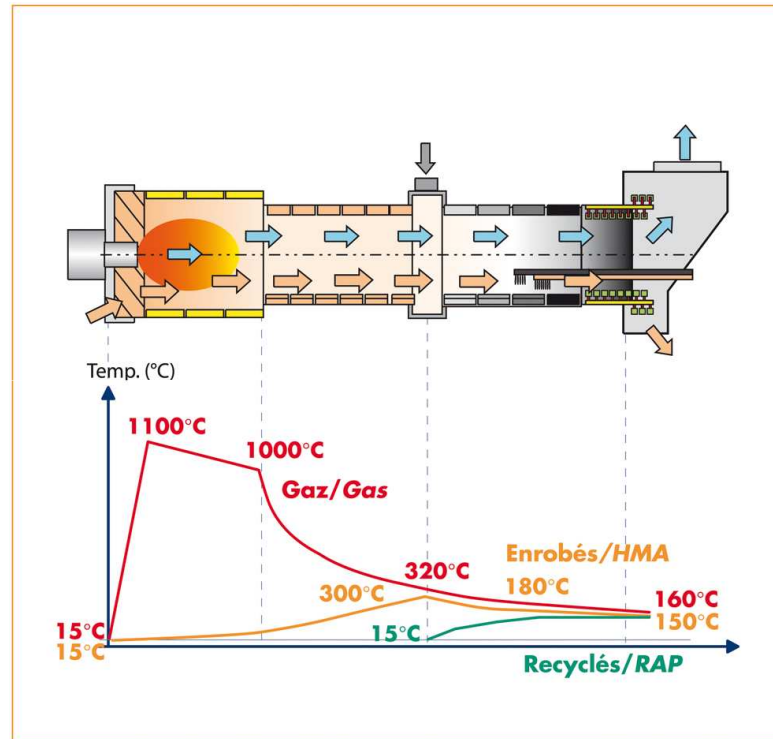
Continuous mix technology



RMS 300 R: double drum coater

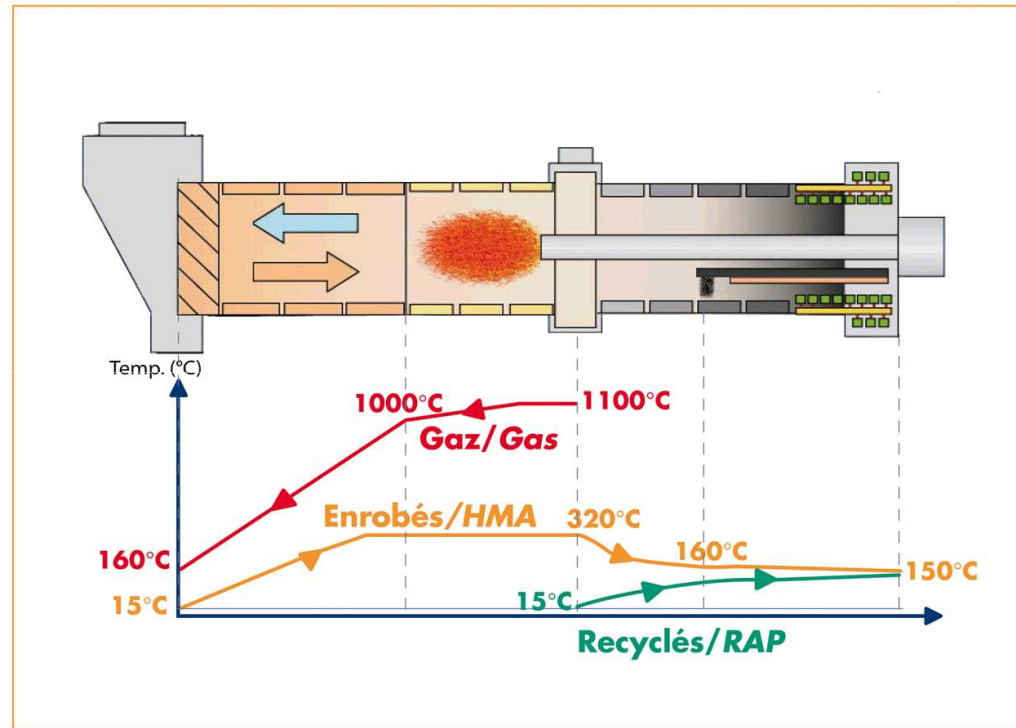


Step 1 Continuous and parallel flow



- Recycling: up to 25%
- Low energy mixes: +

Step 2 Counterflow



- Recycling: 0-50%
- Low energy mixes: +

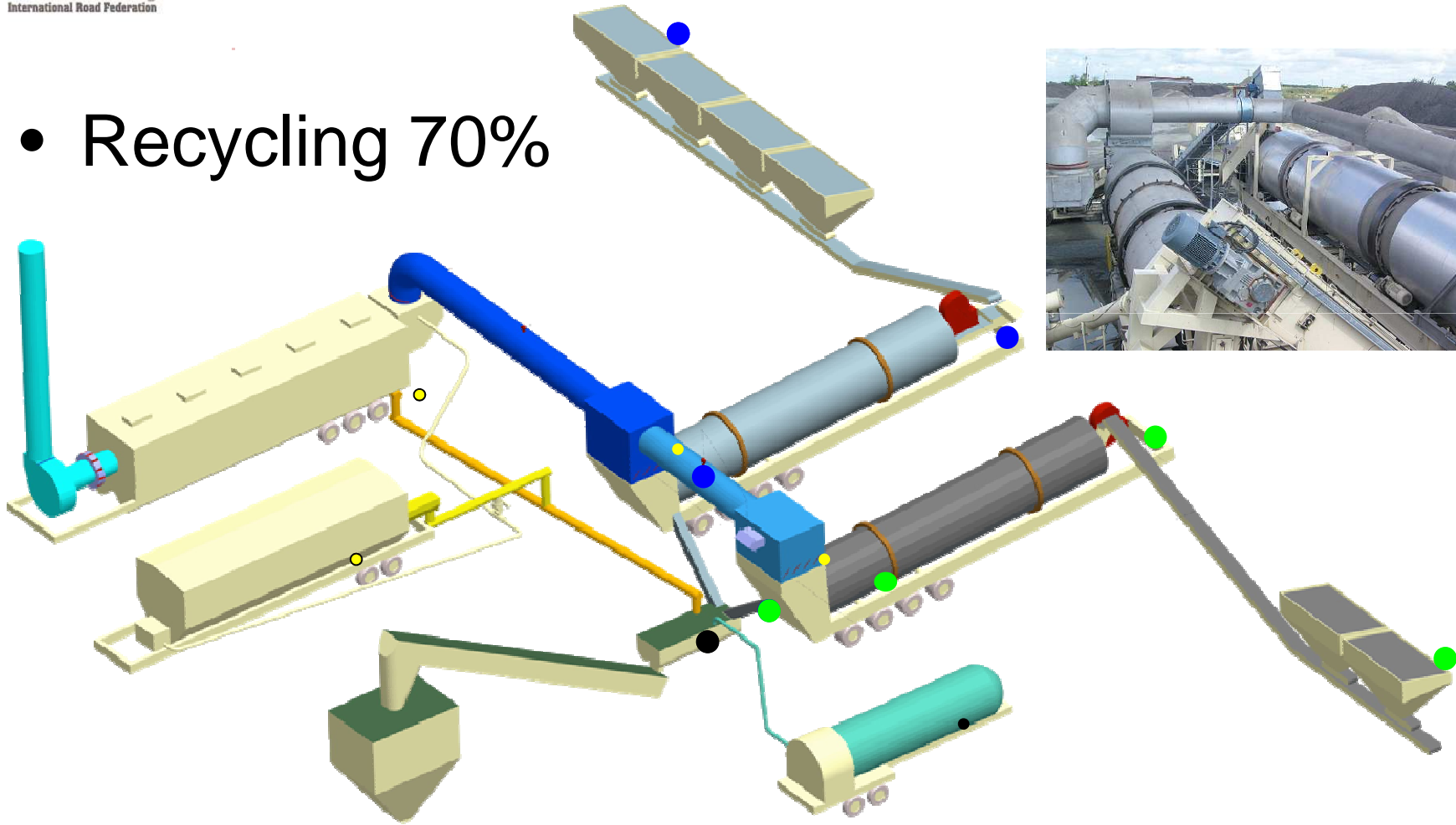
Consumption

- Calculated for a drum dryer as a function of humidity and recycling rate at 150°C and relative variation according to humidity (kg/t of domestic fuel)

| | Recycling: 0% | Recycling: 50% |
|-------------|---------------------|--------------------|
| Moisture 2% | 4.52 kg/t | 4.81 kg/t |
| Moisture 3% | 5.21 kg/t (+15.70%) | 5.68 kg/t (+18.1%) |
| Moisture 4% | 5.91 kg/t (+13.40%) | 6.19 kg/t (+9%) |
| Moisture 5% | 6.62 kg/t (+12.0%) | 6.71 kg/t (+8.4%) |

Step 3 Double drum + coater

- Recycling 70%

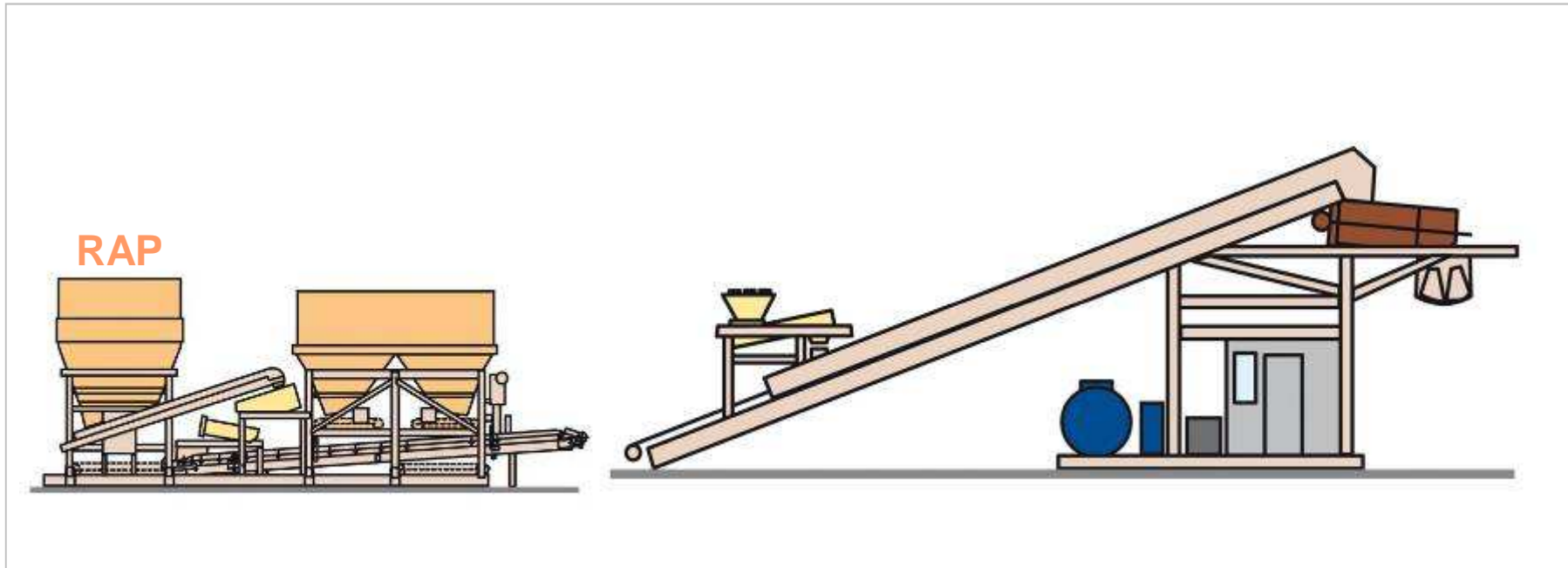


Double drum / Results

| | | | |
|-----------------------------|-------|-------|-------|
| Recycling rate | 50% | 50% | 70% |
| T° finished product | 160°C | 160°C | 160°C |
| Recycling rate of main drum | 0 | 30% | 30% |
| RAP t° in TSR | 130°C | 130°C | 130°C |
| T° of virgin aggregates | 190°C | 175°C | 210°C |

Temperature chart of two drums

Cold mix plant



- Crusher on board
- Particle size control
- Correcting sand



Different processes have been developed to reach the strength goal

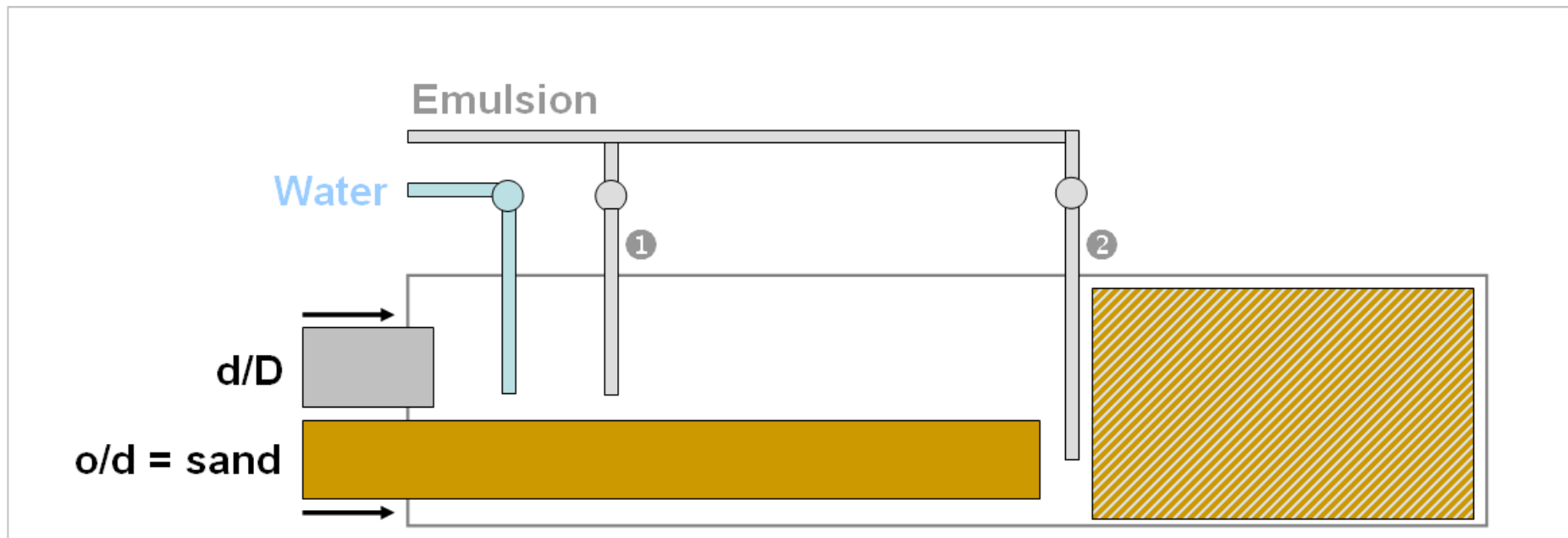
- New mix designs, new emulsion
- Sand (0/d) precoating
- Gravel (d/D) precoating
- Double coating
- Using additives
- Using RAP
- Warming a little bit

Hypermobile modern cold mix asphalt plant

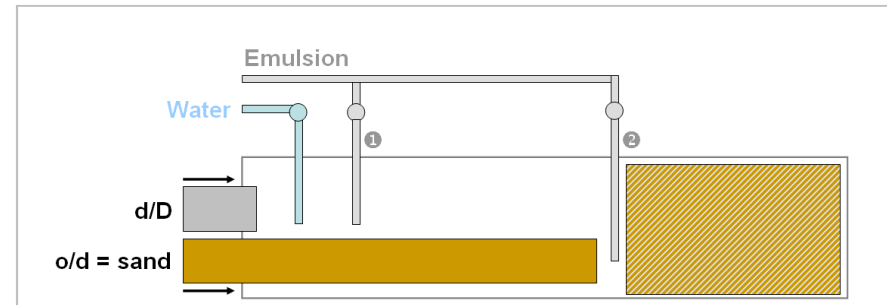


Full coating

- Different processes are used by contractors based on the double coating



Full coating



- d/D = coarse aggregate fraction is prewetted with water: target = $\pm 7\%$ then coated with emulsion avoiding segregation (asphalt)
- $o/d =$ is introduced in a second step, coated with additional emulsion, then mixed
- $d/D + o/d =$ mixed together

Double coating mixing plant 200 T/h



Single mixer for prewetting



Conclusion

- Many different processes following cooperation between contractors and manufacturers
- 3 main hot technologies using the continuous process
- 4 to 5 main hot technologies using batch process
- Cold mix solution in plant: different options
- In place: mainly cold solution (hot in place recycling is not popular)



Thank you for your attention!

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