Pneumatic Waste Collection System for MSW and Recyclables
Mr. Paul Marttila, President, MariMatic Inc.
Traditional Way of Collecting Waste
Pneumatic Waste Collection of MSW & Recyclables

Conventional Automatic Waste Collection System (AWCS)
Automatic Collection of MSW & Recyclables

Conventional Automatic Waste Collection System (AWCS)

- Waste inlets
- Collection piping
- Separation
- Air blower
- Air filtration and Odour removal
- Compactor
- Container
Automatic Waste Collection System (AWCS)

Conventional AWCS (Using Vacuum)

Systems have been in use since 1960's. Product development since that time has been minimal.

Approximately 700 systems in 40 countries, mainly Asia, Europe and Mid-East. Only about 10 large-scale systems in N. America.

Main factor preventing wider adoption is the large pipe size, which results in:

→ costly and difficult installation
→ significant space requirement
→ huge energy consumption
→ too high OPEX ($ / waste ton)
Automatic Waste Collection System (AWCS)

Some AWCS Manufacturers:
Envac, MariMatic, Ros Roca, Stream, Transvac...

Sample Installations in the USA:
• Disney World
• Roosevelt Island
• Carmel Indiana

Recent Major U.S. Orders:
• Hudson Yards (Manhattan)
• Hunters Point (San Francisco)
The Origin of Advanced AWCS
Automatic Waste Collection System (AWCS)

Conventional vs Modern AWCS
Automatic Waste Collection System (AWCS)

Waste collection

The AWCS consists of waste inlets connected via pipe network to a transfer station.

Inlets are automatically emptied with a certain frequency or when filled up.
Collecting MSW & Recyclables - How it works
Pneumatic Waste Collection of MSW & Recyclables

Collecting MSW & Recyclables - How it works

[VIDEO]
Collecting MSW & Recyclables - How it works
Automatic Waste Collection System (AWCS)

Using the Waste Inlets
Automatic Waste Collection System (AWCS)

Mild Steel Piping

The typical pipe size used for conventional AWCS waste collection is 400 mm to 800 mm (about 16 to 32 in.)
Automatic Waste Collection System (AWCS)

New Composite Piping

Due to recent advances in technology, it is now possible to halve the pipe size to 300 mm (about 12 in.)
Automatic Waste Collection System (AWCS)

Why the pipe size matters

V1 = 20 m/s => dia 500 mm pipe requires 14137 m$^3$/h (about 500,000 f$^3$/h)

V2 = 20 m/s => dia 300 mm pipe requires 5089 m$^3$/h (about 180,000 f$^3$/h)
Automatic Waste Collection System (AWCS)

Data Comparing MetroTaifun vs Traditional AWCS and Truck & Bin

<table>
<thead>
<tr>
<th></th>
<th>Typical Power Requirement (kW)</th>
<th>Energy Consumption (kWh / waste ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional AWCS</td>
<td>600</td>
<td>&lt;150</td>
</tr>
<tr>
<td>MetroTaifun</td>
<td>150</td>
<td>&gt;150</td>
</tr>
<tr>
<td>Truck &amp; Bin</td>
<td>100</td>
<td>&lt;50</td>
</tr>
<tr>
<td>Traditional AWCS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MetroTaifun</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Automatic Waste Collection System (AWCS)

Representative Installation
Automatic Waste Collection System (AWCS)

Where the waste ends up - Transfer Station
Automatic Waste Collection System (AWCS)

Where the waste ends up - Transfer Station

1. Separation

Waste separating and compacting container - all in one.

[VIDEO]
2. Compactor

Waste separating and compacting container - all in one.
Automatic Waste Collection System (AWCS)

Where the waste ends up - Transfer Station

3. Container

Containers for each fraction can contain up to several weeks amount of waste.
4. Vacuum pumps

Thanks to MetroTaifun technology, significantly smaller vacuum pumps can be used.
5. Air filtration and odour removal

Effective air filtration, less air needed, and intelligent odour dispersion system reduce significantly the odour.
Automatic Collection of MSW & Recyclables

Where the waste ends up - Transfer Station

Waste station

Smart waste station

Equal capacity

Container with compactor (VIDEO)

Container without compactor (VIDEO)

Typical waste station size 200-400 m² / 2150-4300 sqf
Automatic Waste Collection System (AWCS)

Inside Transfer Station
Automatic Waste Collection System (AWCS)

Inside Transfer Station
Automatic Waste Collection System (AWCS)

Inside Transfer Station
Automatic Waste Collection System (AWCS)

Single-Line and Ring-Line

Patented / Patent Pending

[VIDEO]
Automatic Waste Collection System (AWCS)

Single-Line and Ring-Line

[VIDEO]
Automatic Waste Collection System (AWCS)

Single-Line and Ring-Line

Patented / Patent Pending
Automatic Waste Collection System (AWCS)

Single-Line and Ring-Line

Patented / Patent Pending
Automatic Waste Collection System (AWCS)

Applications

Patented / Patent Pending
Automatic Waste Collection System (AWCS)

Applications

Patented / Patent Pending
Automatic Waste Collection System (AWCS)

Applications

Patented / Patent Pending
Automatic Waste Collection System (AWCS)

Applications

Patented / Patent Pending
Automatic Waste Collection System (AWCS)

Selected MetroTaifun References

1. Mecca, Saudi-Arabia
2. Stockholm, Sweden
3. Linköping, Sweden
4. Västerås, Sweden
5. Zhuhai, China
6. Helsinki, Finland
7. Helsinki (Malmi), Finland
8. Tampere, Finland
9. Espoo, Finland
10. Vantaa, Finland
11. Frøya, Norway
12. Hail, Saudi-Arabia
Automatic Waste Collection System (AWCS)

1. Mecca, the largest AWCS in the World

- Daily system capacity: 900,000 kg
- Construction in: 2012-2014
- Visitors: 13 million
- Waste collection points: ~ 400
- Pipeline (length): > 30,000 m
2. Vällingby Parkstad, Stockholm, Sweden

3 fractions

~ 20 collection points

Piping ~ 1 km

3000 residents (1400 apartments)

Also retail and offices

Project started 2013
Build up 2013 -2017
Automatic Waste Collection System (AWCS)

3.

Vallastaden, Linköping Sweden

Residential and retail

3 fractions, which are collected in separate colored waste bags for to be optically sorted at the sorting plant

Project start 2013

Build up 2013 -2017, phase 1 into use in 2016
Automatic Waste Collection System (AWCS)

4.

MariMatic’s AWCS systems to kv. Zethelius, Västerås

Compact system with gravity chutes

~150 apartments

Project started 2013

Build up 2013 - 2017
5.

Zhuhai, China

The new, modern eco-environment in Zhuhai, China will be built during 2015 and the MetroTaifun System will be installed to serve the waste handling needs of 6,000 residents in high-rise buildings and additional office complexes.
Automatic Waste Collection System (AWCS)

6.

Kruunuvuorenranta, Helsinki, Finland

Residents ~ 14 000
Jobs ~ 1000

Project start 6/2014
Phase 1 into use 2015
Waste inlets ~ 400
Piping ~ 10 km
Estimated build up 2014 - 2028

System O&M contract for 20 years included
Automatic Waste Collection System (AWCS)

7.

Malmi Hospital, Helsinki, Finland
Waste and linen collection and conveying

3 waste fractions

Gravity chutes

Compactor-Container set up suitable for lower floor heights – possibility to feed in waste directly into compactor

Build up 2012 -2013, into use 2014

Ready connections for future expansions to other buildings

Linen collection with gravity chutes
Vuores, the largest AWCS in Finland

<table>
<thead>
<tr>
<th>Construction in</th>
<th>2010-2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total area</td>
<td>1256 hectares</td>
</tr>
<tr>
<td>Residents</td>
<td>13,000</td>
</tr>
<tr>
<td>Jobs</td>
<td>5,000</td>
</tr>
<tr>
<td>Residential waste</td>
<td>1.9 million kg /year</td>
</tr>
<tr>
<td>Office waste</td>
<td>650,000 kg /year</td>
</tr>
<tr>
<td>Waste collection points</td>
<td>~ 400</td>
</tr>
<tr>
<td>Waste fractions</td>
<td>4</td>
</tr>
<tr>
<td>Pipeline (length)</td>
<td>13,000 m</td>
</tr>
<tr>
<td>Daily system capacity</td>
<td>25,000 kg</td>
</tr>
</tbody>
</table>
Espoo Tapiola, The biggest AWCS in business premises in Finland

Joins both old and new retail buildings into one AWCS

3 fractions: mixed waste, cardboard and separate Biowaste system

Waste and cardboard is collected through gravity chutes

Waste collection terminal is 25 m under the ground in car parking facilities

System build up 2014 - 2018

Piping 400 m and gravity chutes 350 m
10.

Vantaa Kivistö, Finland

Residents ~ 13 000
Jobs ~ 1500

Project start 1/2014
Phase 1 into use 2015
Waste collection locations ~110
Waste inlets ~ 440
Piping ~ 9 km
Estimated build up 2014-2025

System O&M contract for 20 years included
Nutrimar – Salmar, Frøya Norway

High hygienic conveying system, for by products in salmon processing plant

The plant capacity is 450 tons / day

Taifun system conveys by products ~ 6 tons/h

Project installations has started and the system will be taken into use in 2014
Hail Saudi-Arabia

Poultry processing plant with a capacity of 36,000 birds / hour

Taifun system is collecting and conveying by products and waste from ~ 40 collection points

Phase one has been taken into use in 2013
Automatic Waste Collection System (AWCS)

The Most Modern Way of Collecting Waste

[VIDEO]
Automatic Waste Collection System (AWCS)

The Most Modern Way of Collecting Waste

We are small and pretty!

We consume a lot of trash instead of energy!

We are today's technology!
Automatic Waste Collection System (AWCS)

Thank You

Patented