Computerized Realtime X-Ray Inspection
of Consumer Waste Product for Hazardous Materials

Gary Korkala
Security Defense Systems Corporation
160 Park Avenue, Nutley, NJ 07110 USA 800-325-6339
Co-Authors
Ken Robbins – Maine Energy Recovery Corporation
David Chon – David Chon Associates

ABSTRACT

This presentation describes the design and manufacture of a computer controlled x-ray
scanning system for the fully automated inspection of waste for hazardous materials. Of
particular importance was the necessity to accurately detect various sizes of propane tanks and
large heavy metal objects. In addition, rejects had to be accurately identified and each image
saved for archival requirements. The equipment utilized, material handling, software
development and implementation is detailed herein. The problems of establishing a stable image
in a harsh environment required ruggedizing all of the components as well as positive pressure
air delivery and air conditioning of the computer and related electronic enclosures. The use of
commercially available equipment and latest detector technology were utilized as much as
possible to reduce costs and to provide a reliable low maintenance system that also included the
ability to conduct diagnostics and software upgrades remotely via computer.

INTRODUCTION

The implementation of conventional x-ray imaging, ie., image intensifiers, standard linear
diode arrays (LDA’s) in the inspection of waste could not be employed due to the various size
conveyor tunnels, height of waste product and speed. This type inspection had to be conducted
under very adverse conditions and in some instances continuously 24 hours a day. It was not
possible to stop the stream of waste from the tipping floor nor to control its distribution within
the conveyor. Until recently realtime
x-ray has also been employed in numerous industrial applications but primarily as a manual
operation where a technician makes the final acceptance or rejection decision. Computer
processing of digitized radiographs has also emerged as has some automated systems where
pattern recognition has been the main criteria for accept/reject analysis.

The instant requirement was to develop a fully automatic inspection system capable of
inspecting waste automatically while providing a visual and audible signal to the crane operator
of suspect contaminants. The operator would stop the line briefly while picking the suspect
object from the conveyor. Conveyor size, speed, and depth of waste had to be taken into
consideration when coming up with a design that would satisfy most if not all similar inspection
applications. Until now this inspection operation was strictly manual, left to the tipping floor
staff or crane operator. Undetected propane tanks that reach the shredder could result in a