CHAPTER 02
LITERATURE REVIEW

The majority of the research in the area of poly bag manufacturing has been concerned with the film blowing process. In the film blowing, a significant work has been carried out to show how polymer rheology interacts with the process, and relatively little work has been done to correlate the type of polymer and processing conditions to the properties of the materials produced. In the literature of poly bag manufacturing, stresses and strains developed in the process and thereby the film properties are defined at the freeze line.

A comprehensive two-dimensional simulation of the film blowing process has been tried out by Iyad A. Muslet and Musa R. Kamal [5] based on a mathematical model that incorporates the Phan-Thien and Tanner (PTT) and the neo-Hookean constitutive equations with crystallization effects.

The bubble formation and the biaxial stretching of the film were studied by Sidiropoulos et al [6] using a non-isothermal, purely viscous, and temperature dependent model. The model is incorporated into a software package called B-FILMCAD. A special attention has been given to the importance of the temperature in the modelling of the blown film process. It was found that temperature is by far the most important modelling parameter.

Steven Brown et al [7] implemented performance modelling capability (simulation, capacity analysis, and cost analysis) at factories of Siemens Semiconductor for both wafer fabrication and back-end operations.

The time-consuming and challenging tasks of large-scale simulation modeling, knowledge collection from disparate sources, model building, model validating, and multiple-scenario simulation runs to find the best solutions are generally distributed.
between several specialized tools. Because manufacturing and business systems are complex systems encompassing many different sub-systems, it is becoming imperative that descriptions from different domain experts are captured, stored, and integrated with data from legacy information systems and used to design multiple simulation models of the enterprise systems. Therefore, Graul et al. [8] presented the concept and a framework for capture and maintenance of multiple descriptions and its applicability in manufacturing systems modeling and simulation. They presented a knowledge-based approach to support the integration of multiple descriptions with data collected from legacy status for the use in the design and generation of valid simulation models.

Luo et. al. [9] works on film-blowing to cover visco-elastic non-isothermal flow for both the convected Maxwell and the Leonov models. The general effect of visco-elasticity is to stiffen the film and restrain the increase in bubble diameter. There is some difference between bubble shapes generated using the Maxwell and Leonov constitutive models but the temperature variation of properties is seen as the dominant effect. The Leonov model tends not to be stiff enough in its response to the present flow, which is purely extensional and good agreement with experiment was not obtained. For the Maxwell model, the relevant mean relaxation time must be used for a close correspondence between experiment and calculation.

Starting with a short analysis of the current situation in the field of factory simulation and an overview of current tendencies in the manufacturing area, Marco Schumann et. al. introduces a method to integrate High Level Architecture (HLA) and existing simulation tools [10]. They presented the simulation tool SLX [11] and the visualization tool Skopeo [12], which were both utilized to perform a prototype federation of a manufacturing plant. SLX is a discrete event simulation tool for Windows 95/NT operating systems developed by the Wolverine Software
Corporation [11]. SLX is a classical simulation language-oriented stand-alone tool that includes a programming language with a C-like syntax. The article [10] was concluded by looking at further chances for high level architecture to become a standard in the field of factory simulation.

In addition, many researchers have interested in film blowing and process plant simulations [13], [14].

Literature shows that many simulation packages [15]-[19] are available for the factory simulation. Some of them are general purpose and others can be used for the special purposes. Arena is an easy-to-use, powerful tool that allows creating and running experiments on models of the systems [15]. It can be specially used for the factory simulation and it has versions of Arena 5.0, Arena 7.0 and Arena 9.0. It provides the preeminent solution for better business decisions with simulation. Any business environment, from customer service to manufacturing to health care, can benefit from simulation. Whether the analyzing an existing supply chain or a new emergency-room layout, have to follow five easy steps with Arena: create a basic model, refine the model, simulate the model, analyze simulation results, and select the best alternative.

Affordable and complete process simulators originally developed by Polymer training UK and now updated by A. Routsis Associates as a training and assessment tool for operators and technicians. Polymer Training UK calls it PICAT [16], an acronym, meaning Polymer Industry Competency Assessment Tool. PICAT uses a series of complex mathematical algorithms to simulate machine and process conditions. All of the production personnel such as machine operators, supervisors, setup technicians, mould setters, process technicians, and managers will enjoy spending time on the simulator.

With Flexsim Simulation Software [17], end-users can create a computerized 3-dimensional model that behaves like the actual system it represents. A simulation
model of any manufacturing or material handling system or process can be created using Flexsim’s drag and drop model building objects. Flexsim can determine the capacity of an entire plant, a single manufacturing line, or warehouse. It can balance labour and equipment requirements. Flexsim can be used to manage bottlenecks, solve excessive work-in-process problems, justify capital expenditures, establish proper inventory levels, improve order picking systems, and optimize production rates. FabSim offers a unique approach to simulate a semiconductor manufacturing plant with discrete-event simulation.

As a compact tool in a single executable, FabSim [18] allows simulating a complete fab very efficiently. Data representing the Fab and the planned operation are required as input. No extra effort is needed to set up a model. Machines are listed with their different recipes, batching capability, dispatching rules, setup and setup avoidance policies, meantime between failures (MTBF), and meantime to recovery (MTTR). Processes are described by their flow charts which contain a sequence of machines and recipes to be visited by each lot. The lots are started in a planned sequence (start time, process, and priority). Alternatively a maximum WIP may be defined. Variability may be introduced by MTBF with slightly variable process step duration and variable waiting time for lot transport. The output is a list of lots leaving the Fab after being processed. Other data like machine usage or buffer occupancy is available as well.

MATLAB [19] is generally can be used for the simulation. It can be used for neural network simulation, neuro-fuzzy simulation control system simulation, and even any system simulation. It has specially designed tool for the simulation called Simulink. It is an environment for multi-domain simulation and model-based design for dynamic and embedded systems. It provides an interactive graphical environment and a customizable set of block libraries that let you design, simulate, implement, and test a
variety of time-varying systems, including communications, controls, signal processing, video processing, and image processing. Simulink is integrated with MATLAB, providing immediate access to an extensive range of tools that let you develop algorithms, analyze and visualize simulations, create batch processing scripts, customize the modeling environment, and define signal, parameter, and test data.