SIMULATION MECHANISMS ECCENTRIC PRESS AND GEAR USING SOFTWARE ADAMS FOR REDUCING MATHEMATICAL CALCULATIONS AND THE TIME ASSOCIATED WITH THESE

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Abstract: *The development of the approximate blank size should be done to determine the size of a blank to produce the shell to the required depth and to determine how many draws will be necessary to produce the shell. This is determined by the ratio of the blank size to the shell size. Various methods have been developed to determine the size of blanks for drawn shells. These methods are based on algebraic calculations; the use of graphical layouts; a combination of graphical layouts and mathematics.*

Key words: MSC ADAMS, presses, eccentric

1 Introduction

Presses can be evaluated with regard to their function as:

• Energy-producing machines, with the application of this energy being abrupt and instantaneous. All the machine's energy storage is depleted at the end of its work cycle. Such machines are hammers, which use a "free fall" principle as a basis of their function. However, sometimes their efficiency is increased by an addition of steam or pressurized air. The hammers' energy source is temporarily disconnected at the time the ram is released for an operating cycle, which consists of its falling down on the workpiece.

• Force-producing machines, which operate by generating a considerable amount of force, independent of the position of the ram. Hydraulic machinery is the main representative of this category.

• Stroke-controlled machines, or mechanical presses, the function of which depends on the movement and location of the ram. During the work cycle, the ram is always in contact with the source of its power. These presses can be further divided as:

• Presses driven by a crank or eccentric drive. Simple crank drives are the most commonly used types, with extended crank drives in knuckle-joint presses.

• Presses driven by a cam. Cam-driven systems are used in presses with less tonnage.

Each of these groups has certain advantages and disadvantages closely connected with the type of process they represent. For example, hydraulic presses have fewer operating parts, which brings the cost of their repairs down. However, should these machines be in need of any repair, such a procedure will be very demanding. With mechanical presses their breakdowns are visually detectable, but a complete knowledge of the circuit is required to find a problem within a hydraulic system. Also the tolerance range of hydraulics is not as impressive as that of mechanical presses, with the latter group also being faster. Fortunately, each type's usefulness is given by the type of its applications, and that's where their function, along with its advantages and drawbacks, fits (fig. 1.).

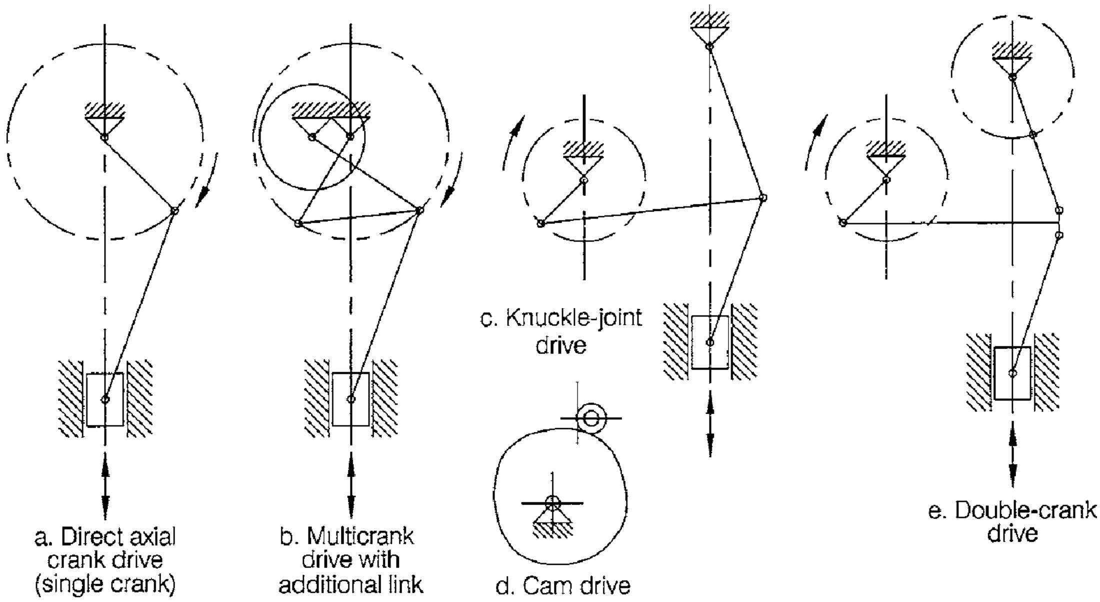


Fig.1. *Various types of press drives*

2. Simulation with ADAMS trial

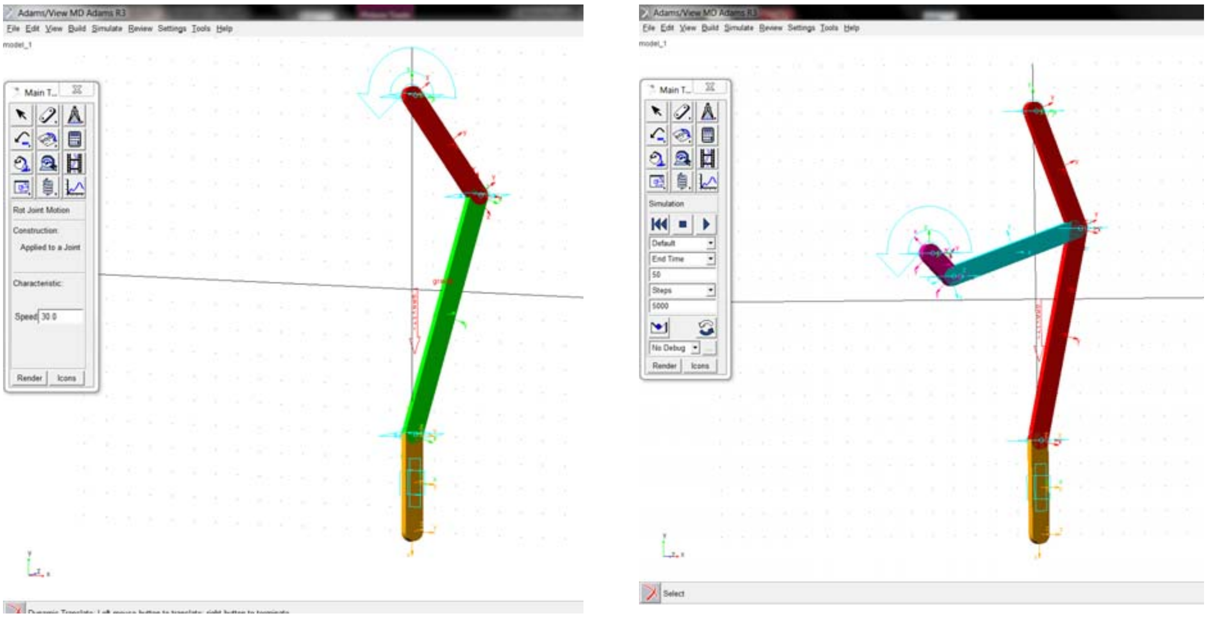
Adams is the most widely used multibody dynamics and motion analysis software in the world. Adams helps engineers to study the dynamics of moving parts, how loads and forces are distributed throughout mechanical systems, and to improve and optimize the performance of their products.

Traditional "build and test" design methods are now too expensive, too time consuming, and sometimes even impossible to do. CAD-based tools help to evaluate things like interference between parts, and basic kinematic motion, but neglect the true physics-based dynamics of complex mechanical systems. FEA is perfect for studying linear vibration and transient dynamics, but way too inefficient to analyze the large rotations and other highly nonlinear motion of full mechanical systems.

Adams multibody dynamics software enables engineers to easily create and test virtual prototypes of mechanical systems in a fraction of the time and cost required for physical build and test. Unlike most CAD embedded tools, Adams incorporates real physics by simultaneously solving equations for kinematics, statics, quasi-statics, and dynamics. Utilizing multibody dynamics solution technology, Adams also runs nonlinear dynamics in a tiny fraction of the time required by FEA solutions. Loads and forces computed by Adams simulations improve the accuracy of FEA by providing better assessment of how they vary throughout a full range of motion and operating environments.

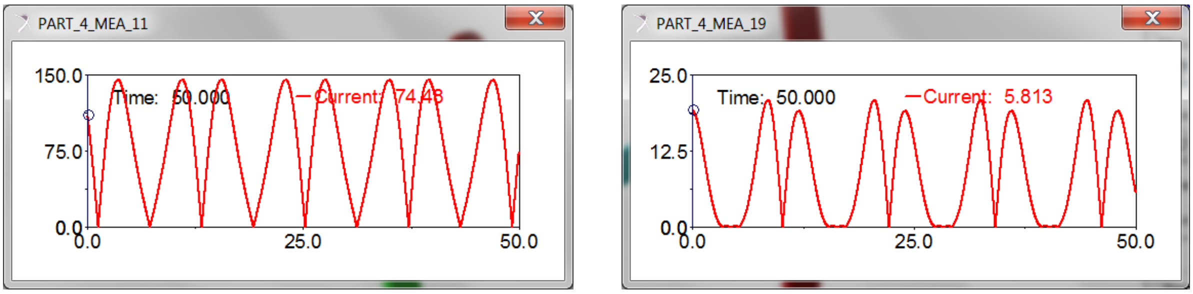
In the study were simulated using ADAMS software trial presses mechanical components of two mechanisms, namely: eccentric mechanism and gear.

3D images ofthe two mechanisms are illustrated in Figure 2 and graphs speed,accelerat ion, potential and kinetic energies are shown in Figures 3 ... 6.



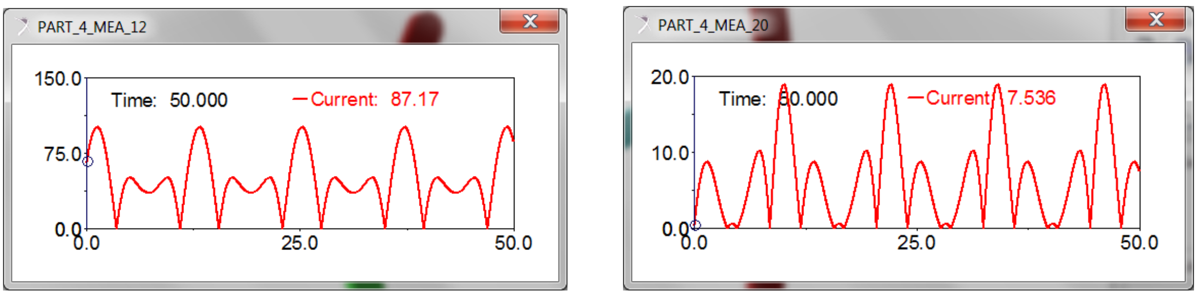
a). Eccentric mechanism *b). Gear mechanism*

***Fig.2**.The spatial modeling*



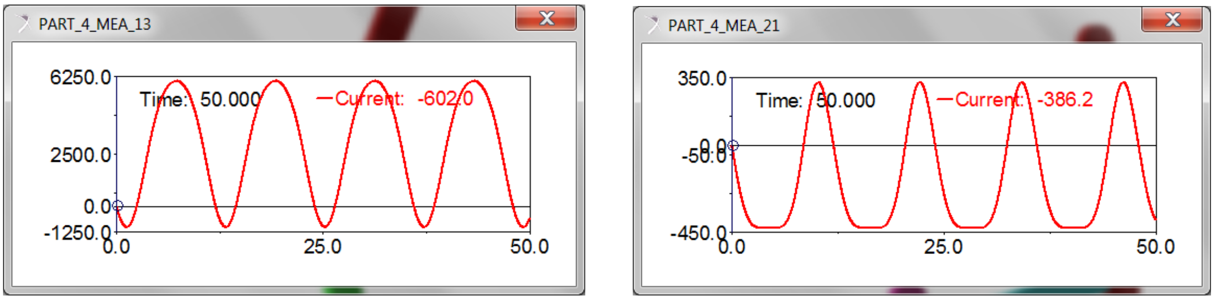
a). Eccentric mechanism *b). Gear mechanism*

***Fig. 3**. Velocity graphics*



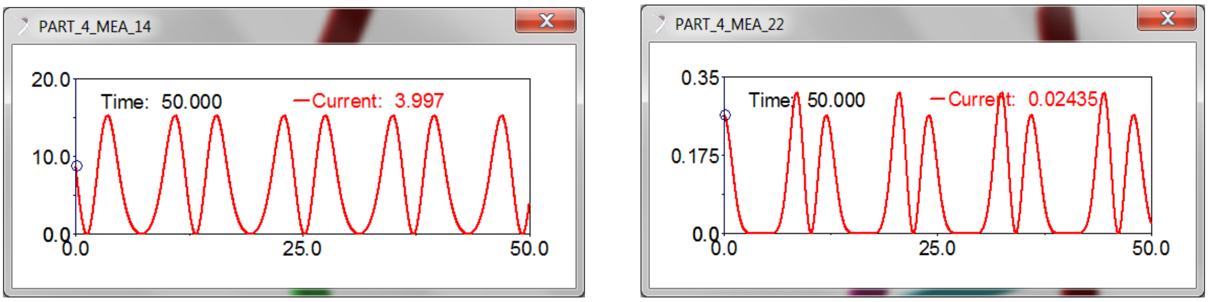
a). Eccentric mechanism *b). Gear mechanism*

***Fig.4**. Acceleration graphics*



a). Eccentric mechanism *b). Gear mechanism*

Fig.5. *Potential energy graphics*



a). Eccentric mechanism *b). Gear mechanism*

Fig.6. *Kinetic energy graphics*

3. Concluzions:

Analyzing the graphs of the two mechanisms can be seen that :

- the ram speed press with eccentric mechanism is much larger than the press ram with gear ;
- cycles of chart velocity are more differentiated gear;
- at the bottom of the ram stroke is noticed a decrease in speed which is desirable in achieving deep drawing operations;
- the potential-energy acceleration and the press ram gear are lower than those with mechanical eccentric press ram..

By the method of simulation mechanisms mechanical presses cold compressing them using ADAMS software greatly simplifies the mathematical calculations and also reduces time associated with them.

This method is part of new methods for investigating the behavior of different bodies are in motion.

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