Studies and to improve the characteristics of a Solid Fuel Secondary (C.S.S.) produced by Waste Special non Hazardous.

“ HiQCSS “

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Abstract:

Paper shows research activities which were initiated and conducted at the production plant RDF Company Dalena Ecologia S.r.l. in Italy. In the production of HiQCSS were used the following types of special waste

- ✓ Mixed plastics,
- ✓ Used tires,
- ✓ Textile waste,
- ✓ Waste footwear.

The study conducted for the improvement of the quality of CSS to search for the standard composition of waste fuel has been the basis of design choice for the new facility being built by Dalena Ecologia Srl In fact, he helped define the design choices suitable for engineering and logistics technology to be adopted for the production of a CSS quality and homogeneous. The technological approach is seen during the transposition of Directive EC 98/2008 on *End Of Waste*

Key words: Solid Fuel Secondary, Refuse Derived Fuel, Directive EC 98/2008 on waste and repealing certain Directives

Introduction

Purpose of research

The purpose of this research is to investigate the optimal composition of the mixture of wastes for the production of a quality CSS. Delete all the elements that produce interference to co-firing, and then produce a CSS (HiqCSS) adaptable to different end user's needs, with homogenous characteristics comparable to a primary fuel.

Phase control of incoming waste

Since May 2008, continues the production of CSS proceeding with controls carpet (100% of contributions) of the quality of the goods entering and conforming to specifications in the industry: UNI 9903-1:2004 (chemical composition) also coincide with the specifications governing the contracts between Dalena Ecologia Srl and the various companies that provide waste. In fact, given the inherent variability of the matrix, the need was to create a DATABASE for internal use that would allow "CLASSIFIED" refusal of the suppliers, of course based on the specifics but with respect to statistical analysis (conducted on a no. > 10 injections) to give reproducible method of control. They were then selected three parameters considered most critical: PCI, Moisture and Total Chlorine. P.c.i. and humidity are as important to the proper management of the thermal and chlorine because of its high variability in the waste matrix, given the great heterogeneity of the waste to the combustion

Internal procedure

E 'was defined as an internal procedure (IO-07) for the control of incoming waste, which is expressed essentially in three phases:

1. creation of representative sample for analysis. Have been used as a source, unified standards officially recognized (UNI 10802:2004, UNI 9903-3:2004). The method involves the removal of different rates of ground sample from tape and reducing the final sample by quartering.
2. laboratory analysis. Analysis with "quick way" of the three parameters identified and transmitting results to the Plant Manager in 2 hours

3. data processing and final formulation of the mixture. The final objective is to formulate, based on the average chemical composition of the feed material, the composition **STANDARD END CSS.**

Before proceeding with the application of the procedure was conducted in the laboratory, an important validation work of the so-called rapid methods. The need was to provide reliable analytical results in good time to classify a consignment before the end of its processing. Were conducted repeated tests on the three selected parameters, comparing the data obtained with conventional methods of analysis (methods UNI 9903). The major work has been done to reduce the time of the determination of moisture. Satisfactory results were obtained with a shift in content 10-15%. The analysis times were reduced from 25 ha 2 h.

Final checks

The analytical control of the CSS is done for two reasons:

1. Systematically verify compliance with contract specifications;
2. Validate the method for calculating the estimated mixture required to produce **CSS STANDARD OF QUALITY**.

Results

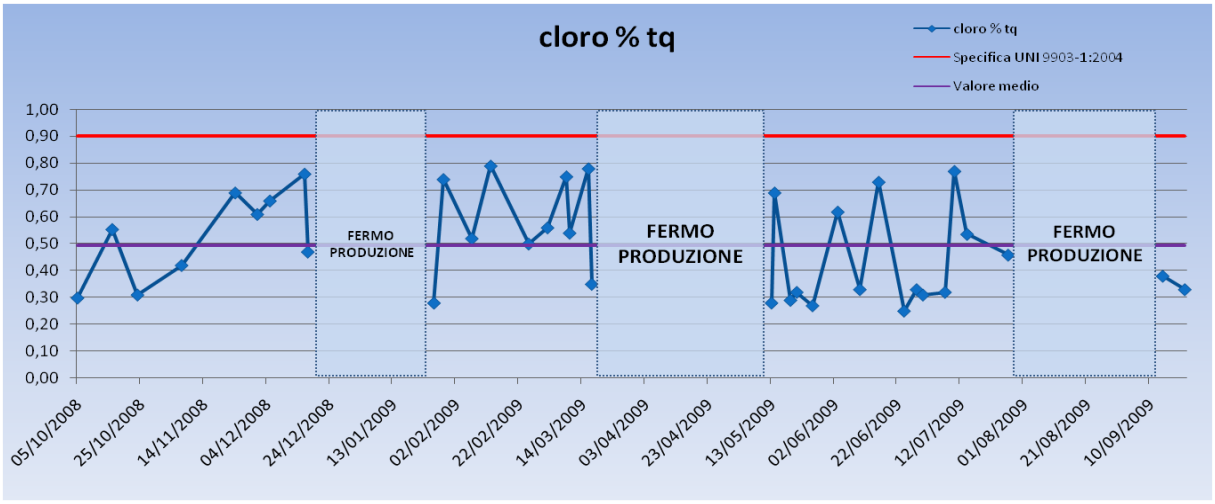
After a year and a half of daily analysis of the suppliers of waste has created a database that allowed fairly reliable to provide a good approximation of the mean values of P.C.I., Humidity and chlorine for each supplier

It was experimentally verified that the data provided in the composition of the final blend of CSS obtained by calculation by using the DATABASE SUPPLIERS deviate little from the observed data, it is therefore possible to predict the composition of the mixture of CSS final plan and intervene on the optimal mix of suppliers and quantities;

Despite the complexity of the waste matrix, taking the right preventive measures and proper control intensity, It 's possible to produce a chemical composition with CSS standards aimed at any particular.

Picture 1. shows development of chlorine producer in "*ith*" during the trial

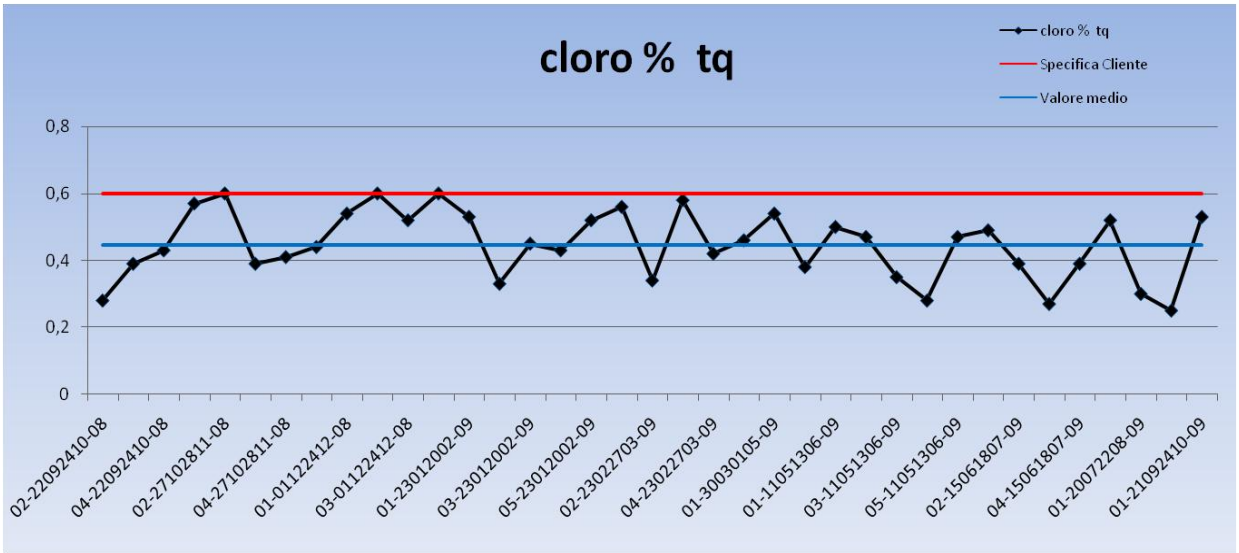
- Number in sample = 36
- Specification Limit UNI 9903-1:2004 = 0.9% Total chlorine t.q.
- Median = 0,49%



Graph 1: Development of chlorine producer in "ith" during the trial

Picture 2. shows evolution of sublots after the production of C.S.S.

- Number in sample = 37
- Customer Specification Limit = 0.6% Total chlorine t.q.
- Median = 0,45%



Graph 2: Evolution of sublots after the production of C.S.S.

Application of the study

The study conducted for the improvement of the quality of CSS to search for the standard composition of waste fuel has been the basis of design choice for the new facility being built by Dalena Ecologia Srl In fact, he helped define the design choices suitable for engineering and logistics technology to be adopted for the production of a CSS quality and homogeneous. The technological approach is seen during the transposition of Directive EC 98/2008 on *End Of Waste*

IMPROVEMENT THROUGH TECHNOLOGY THE "MECHANOCHEMICAL"

Objective of testing

The objective was to further improve the characteristics of an alternative fuel produced from waste in the plant owned by Dalena Ecology Ltd

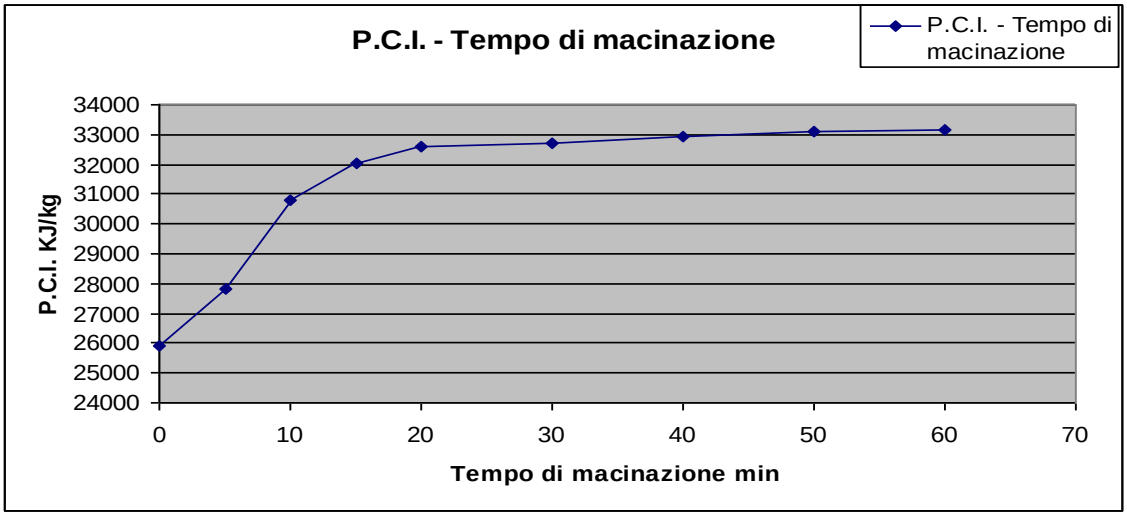
Picture 1: Plant for production of alternative fuel, Dalena Ecology Ltd

Ultramacinazione tests were conducted at the Laboratory of Environmental Technology of DIASS "Politecnico di Bari" with the help of a mill Fritsch Pulverisette P6, with planetary motion.

Picture 2: Ultramacinazione tests conducting, Laboratory of Environmental Technology of DIASS "Politecnico di Bari"

Conclusions

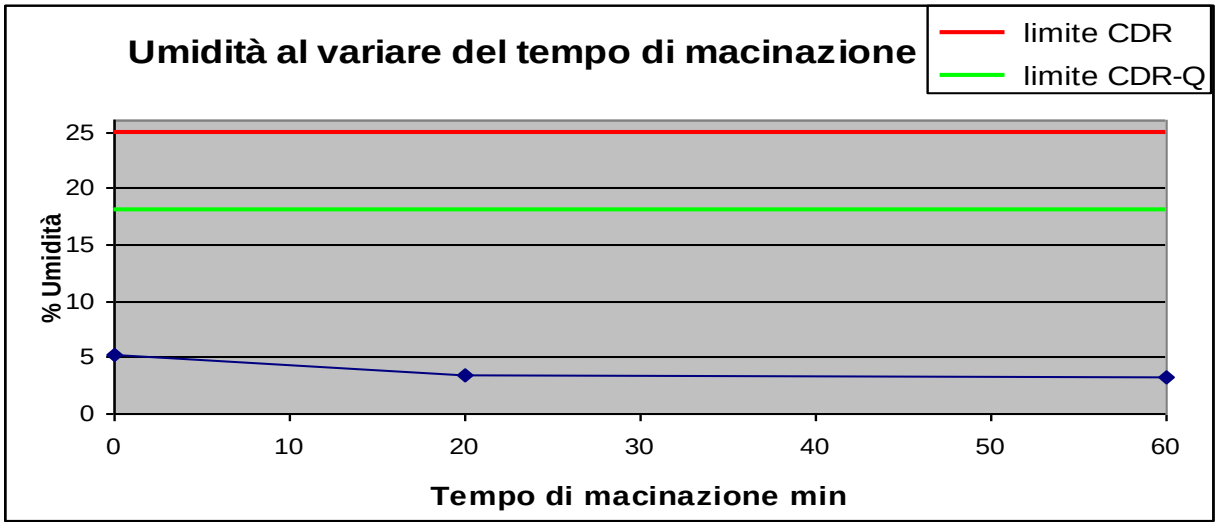
The test showed that the treatment of high-energy mechanical milling resulted in an improvement of the quality features of CSS and in particular:



Graph 3: Increase in the calorific value during certain time period

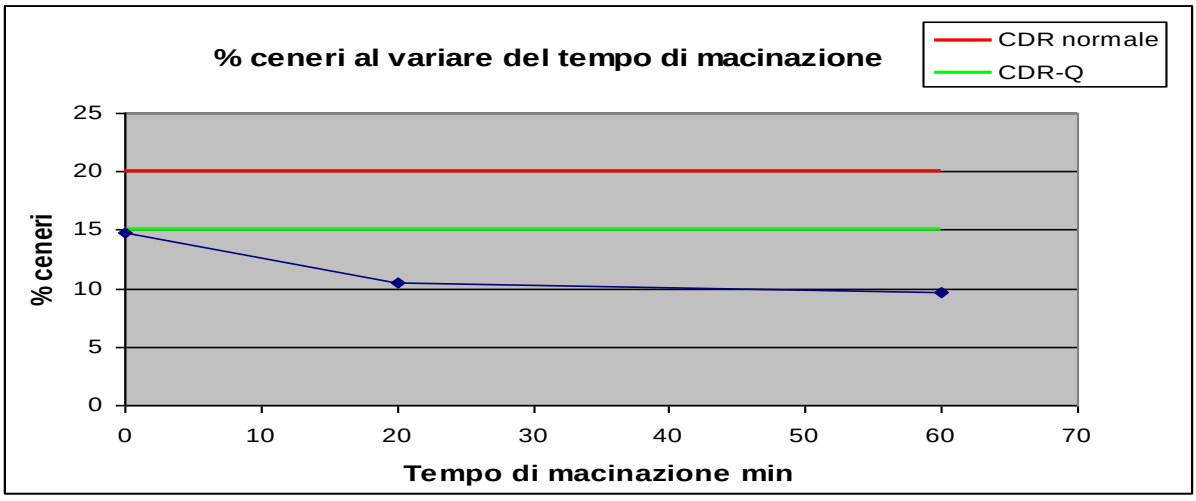
From the graph above, it appears that you have obtained an increase in the calorific value of about 7000 KJ / Kg in 20 'treatment for a total of more than 32,000 KJ / Kg

The following graph shows the decrease of the percentage of moisture on the ground compared to the fuel as it is



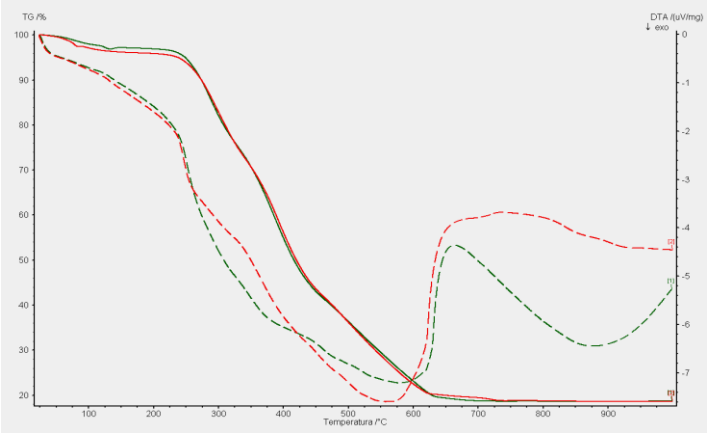
Graph 4: Decrease of the percentage of moisture on the ground

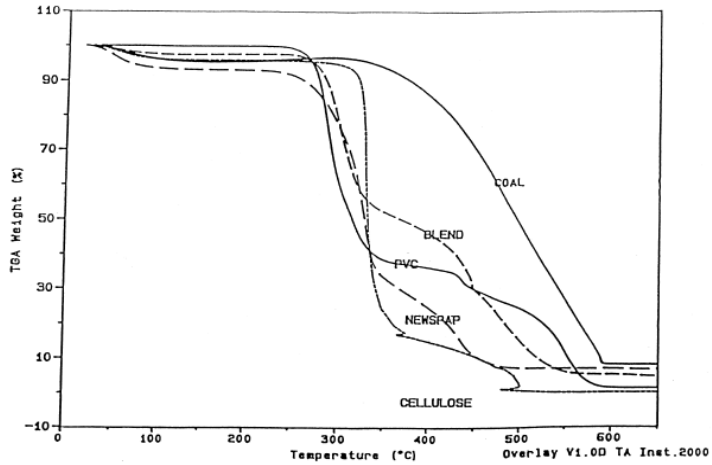
The graph below shows the declining share of fuel ash obtained from the ground than it is.



Graph 5: Declining share of fuel ash

The chart below shows the kinetics of combustion of the fuel very similar to that of the ground coal with a high homogeneity of the process.





Graph 6: Kinetics of combustion of the fuel

Studije za unapređenje karakteristika krutog sekundarnog goriva (C.S.S.) proizvedenog od specifičnog, neopasnog otpada

“ HiQCSS “

Sažetak:

Rad opisuje aktivnosti provedene prilikom istraživanja izvedenog na postrojenju za proizvodnju goriva iz otpada (RDF) u vlasništvu tvrtke Dalena Ecologia S.r.l. u Italiji. U proizvodnji HiQCSS korištene su sljedeće vrste otpada:

- miješana plastika,
- otpadne gume,
- otpadni tekstil,
- otpadna obuća.

Temelj projektnog rješenja za novo postrojenje koje gradi tvrtka Dalena Ecologia Srl bila je studija provedena za poboljšanje kvalitete CSS-a koja je poslužila za istraživanje standardnog sastava goriva iz otpada. Studija je donijela potrebne informacije za definiranje projektantskih mogućnosti pogodnih za tehnologije izgradnje i logistike, a koje su usvojene u svrhu proizvodnje kvalitetnog i homogenog CSS-a. Tehnološki pristup prikazan je kod provođenja Direktive EC 98/2008 *o otpadu i opozivu pojedinih Direktiva*.

Ključne riječi: sekundarno kruto gorivo, gorivo iz otpada, Direktiva EC 98/2008 o otpadu i opozivu pojedinih Direktiva

- **Svrha ispitivanja**

Svrha ispitivanja bila je istražiti optimalni sastav smjese otpada za proizvodnju kvalitetnog CSS-a. To ukratko znači odstraniti sve elemente koji interferiraju žarenjem, te zatim proizvesti CSS (HiqCSS) koji se može koristiti za razne potrebe, a ima karakteristike usporedive s primarnim gorivom.

- **Kontrola ulaznog otpada**

Od svibnja 2008 godine započela je proizvodnja CSS-a uz kontrolu kvalitete tepiha, kao ulazne supstance koja mora biti u skladu s specifikacijama za industrije: UNI 9903-1:2004

(kemijski sastav) te udovoljavati specifikacijama iz ugovora Dalena Ecologia Srl različitih tvrtki koje dovoze otpad. Zapravo, s danom inherentnom varijabilnošću matrice, ukazala se potreba za izradom baze podataka za internu uporabu koja će klasificirati dobavljače na osnovu specifičnosti, al ii u odnosu na statističku analizu (izvedeno na > 10 ulaza) kako bi se dobila reproducibilna metoda kontrole. Izabrana su tri parametra kao najkritičnija: PCI, vlaga i ukupni klor. P.c.i.i vlaga su važni za pravilno upravljanje toplinom, a klor zbog njegove velike varijabilnosti u matrici otpada, a koja se odnosi na heterogenost otpada.

- **Interna procedura**

Definirana je interna procedura (IO-07) za kontrolu ulaznog otpada, koja je izražena u tri faze:

1. Uspostava reprezentativnog uzorka za analizu. Korišteni su standardi UNI 10802:2004, UNI 9903-3:2004. Metoda uključuje uklanjanje različitih omjera uzoraka zemlje i smanjenje konačnog uzorka metodom četvrtanja.
2. Laboratorijske analize. Analize "brzim načinom" na tri parametra donose rezultate upravitelju postrojenjem unutar dva sata.
3. Obrada podataka i konačno formiranje smjese. Konačni cilj je formirati smjesu **STANDARD END CSS** , na temelju prosječnog kemijskog sastava.

Prije nastavka s primjenom, procedura je prvo provedena u laboratoriju. Trebalo je dobiti pouzdane analitičke rezultate u relativno kratkom roku kako bi se klasificirala pošiljka. Napravljeni su ponovljeni testovi na tri odabrana parametra, uspoređujući podatke dobivene konvencionalnim metodama analize (metoda UNI 9903). Glavni zadatak bio je smanjiti vrijeme određivanja vlage. Dobiveni su zadovoljavajući rezultati s pomakom u sadržaju od 10-15%. Vrijeme analize je smanjeno s 25 na 2 h.

- **Završne provjere**

Analitička kontrola CSS je napravljena iz dva razloga:

1. Sistematička potvrda udovoljavanja ugovornim odredbama;
2. Validacija metode za izračun smjese potrebne za proizvodnju **CSS STANDARD OF QUALITY**.

- **Rezultati**

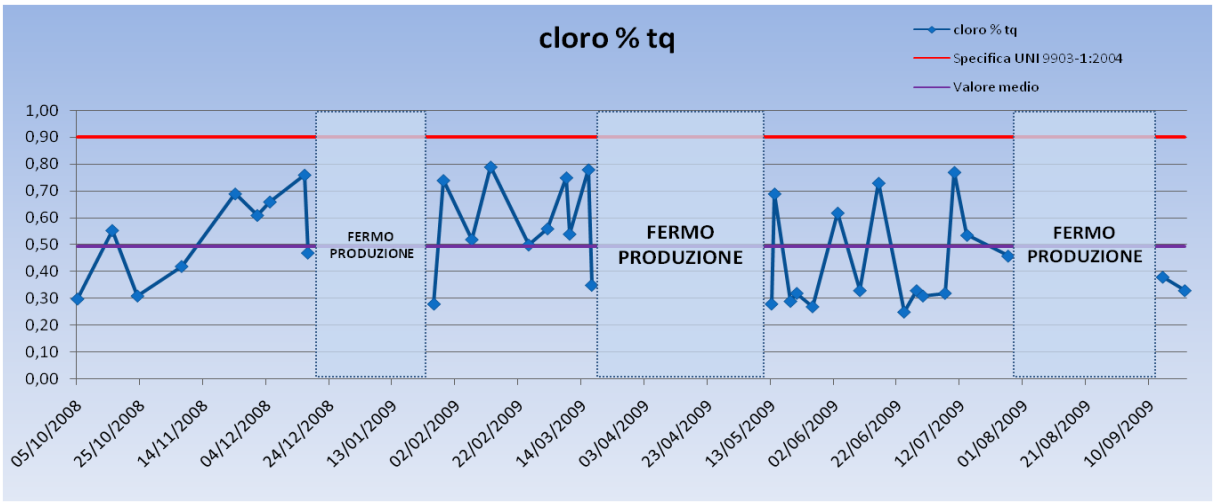
Nakon godinu i pol svakodnevnih analiza dobavljača otpada, napravljena je baza podataka kojom je uspostavljen relativno pouzdan sustav za dobivanje dobre procjene srednjih P.C.I., vlage i klora z asvaki dovoz.

Eksperimentalno je potvrđeno da podaci dobiveni iz smjese konačnog proizvoda CSS dobiveni izračunom koristeći DATABASE SUPPLIERS neznačajno malo odstupaju od promatranih podataka, te da je moguće predvidjeti sastav konačne smjese CSS i planirati optimalan odnos dobavljača i količina;

Usprkos kompleksnosti otpadne matrice, ukoliko se primjene prave preventivne mjere i pravilna kontrola intenziteta, moguće je proizvesti kemijski sastav udovoljavajući CSS standardima .

Kretanje vrijednosti klora tijekom probe

- Broj uzoraka = 36
- Granica UNI 9903-1:2004 = 0.9% za ukupni klor
- Srednja vrijednost = 0,49%



Graf 1: Kretanje vrijednosti klora tijekom probe

Graf 2. Prikazuje razvoj dijelova nakon proizvodnje C.S.S.-a

- Broj uzoraka = 37
- Granica = 0.6% za ukupni klor
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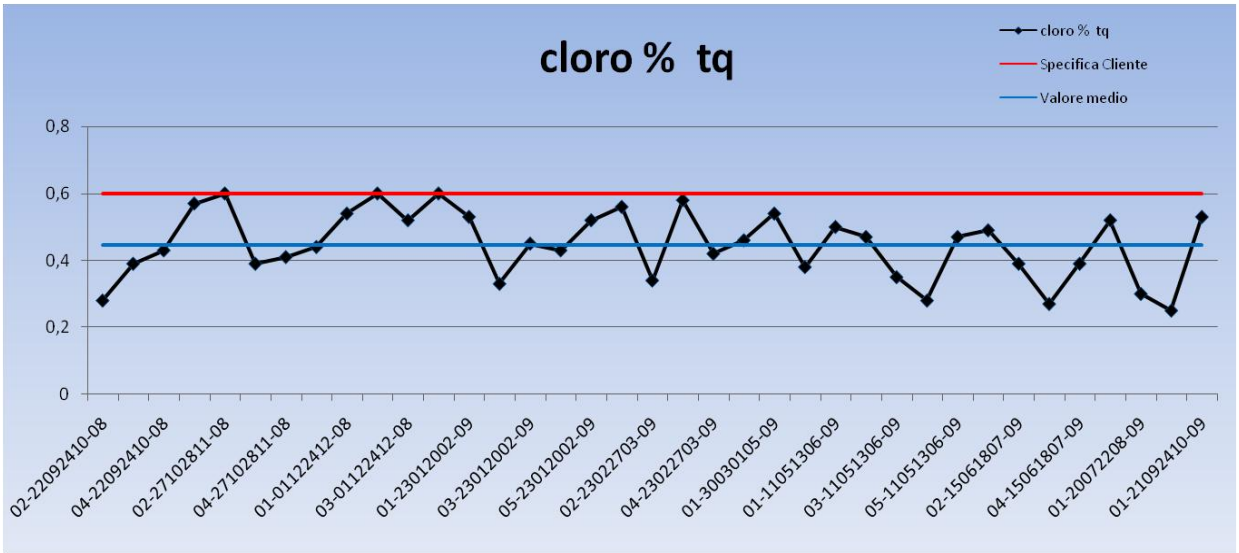


Graf 2. Razvoj dijelova nakon proizvodnje C.S.S.-a

- **Primjena studije**

Temelj projektnog rješenja za novo postrojenje koje gradi tvrtka Dalena Ecologia Srl bila je studija provedena za poboljšanje kvalitete CSS-a koja je poslužila za istraživanje standardnog sastava goriva iz otpada. Studija je donijela potrebne informacije za definiranje projektantskih mogućnosti pogodnih za tehnologije izgradnje i logistike, a koje su usvojene u svrhu proizvodnje kvalitetnog i homogenog CSS-a. Tehnološki pristup prikazan je kod provođenja Direktive EC 98/2008 *o otpadu i opozivu pojedinih Direktiva*.

POBOLJŠANJE TEHNOLOGIJOM "MECHANOCHEMICAL"

- **Cilj testiranja**

Cilj je bio dodatno poboljšati karakteristike alternativnog goriva proizvedenog iz otpada na postrojenju u vlasništvu tvrtke Dalena Ecology Ltd.

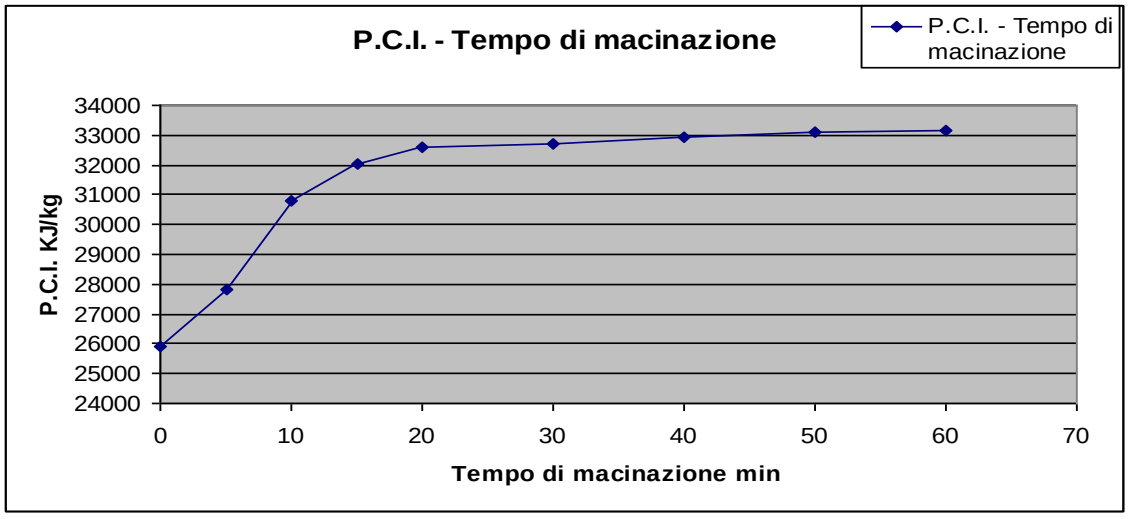
Slika 1: Postrojenje za proizvodnju alternativnog goriva, Dalena Ecology Ltd

Izvršeni su “Ultramacinazione” testovi u laboratoriju za okolišnu tehnologiju u DIASS "Politecnico di Bari", uz pomoć Fritsch Pulverisette P6.

Slika 2: Izvođenje "Ultramacinazione" testova, laboratorij za okolišnu tehnologiju u DIASS "Politecnico di Bari"

- **Zaključci**

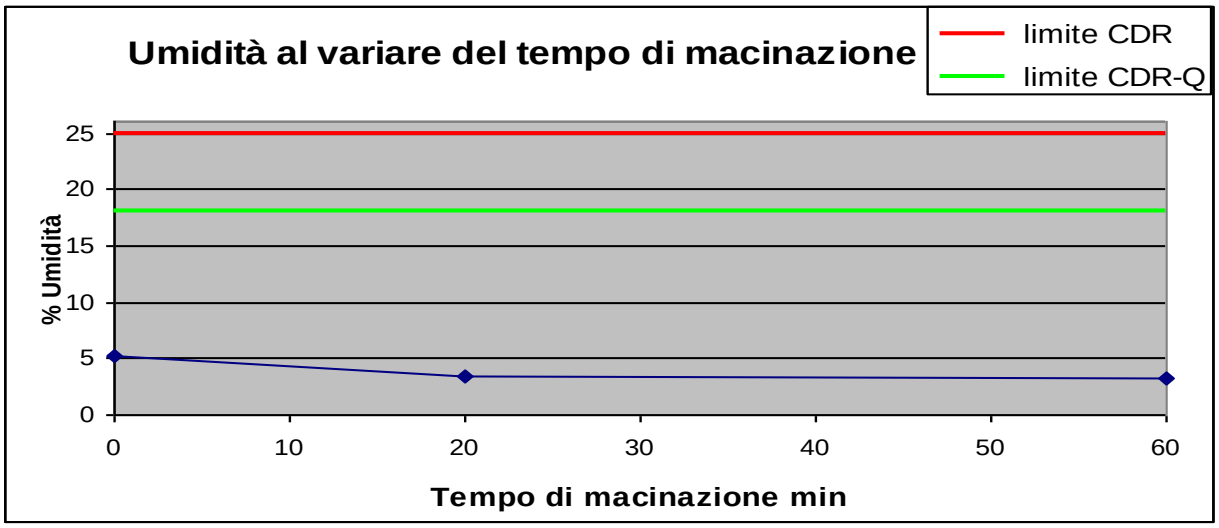
Testiranje je pokazalo da je obrada visoko-energetskog mehaničkog glodanja rezultirala poboljšanjem kvalitete CSS-a, posebno:



Graf 3: Povećanje kalorijske vrijednosti tijekom određenog vremenskog perioda

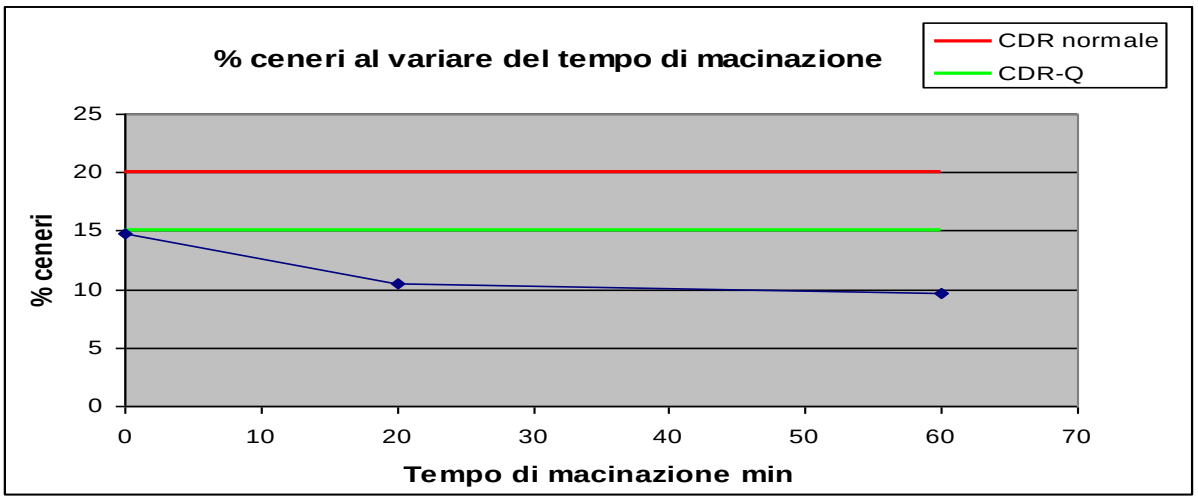
Iz grafa 3. Vidljivo je da je kalorijska vrijednost s 7000 KJ / Kg nakon 20 postupaka obrade povećana na više od 32,000 KJ / Kg

Graf 4. prikazuje smanjenje postotka vlage u zemlji u usporedbi s gorivom.



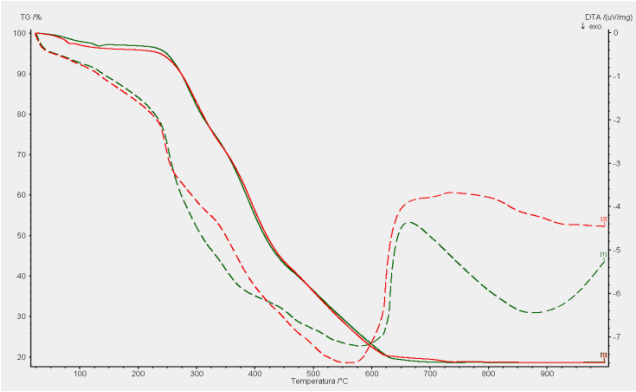
Graf 4. Smanjenje postotka vlage u zemlji

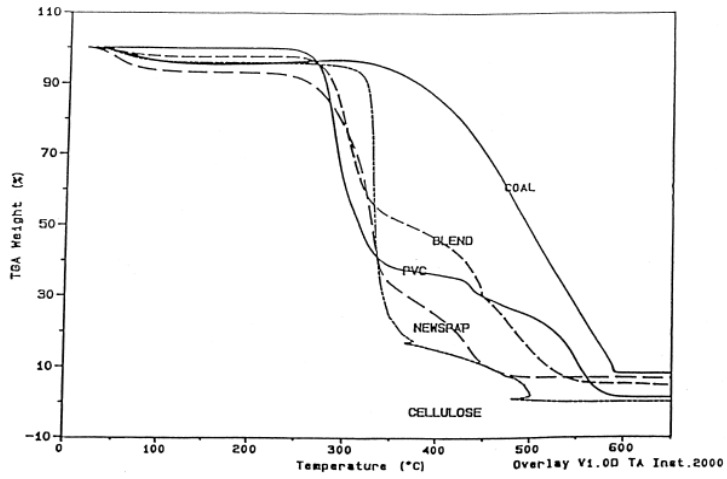
Graf 5. prikazuje opadajući udjel ogrjevnog pepela iz zemlje



Graf 5. Opadajući udjel ogrjevnog pepela

Graf 6. Prikazuje kinetiku sagorijevanja goriva koja je slična kinetici sagorijevanja zemljanog ugljena, uz visoku homogenost procesa





Graf 6. Kinetika sagorijevanja goriva